

**LAND CONSOLIDATION IN THE CONTEXT OF LITHUANIAN
RURAL DEVELOPMENT AND REVITALIZATION**

GIEDRIUS PAŠAKARNIS

**A thesis submitted in partial fulfilment of the
requirements of Liverpool John Moores University
for the degree of Doctor of Philosophy**

June 2015

Table of Contents

List of figures	vi
List of tables	viii
List of acronyms and abbreviations	x
Acknowledgements	xiii
Abstract	xvi
Chapter 1	1
Introduction	1
1.1. The research problem	1
1.2. Research question.....	5
1.3. Research aim and objectives	5
1.4. Beneficiaries of research.....	6
1.5. Original contribution to knowledge	8
1.6. Overview of chapters.....	10
Chapter 2	12
Framework of land management policy in Central and Eastern European countries: Past, present and future	12
2.1. Introduction	12
2.2. Significant changes of the last century in the CEEC's countryside	13
2.3. Countryside in the CEE countries after the land reform.....	16
2.4. Significance of international documents for rural development and land management.....	23
2.5. Introduction of land consolidation in the CEE countries' land management toolbox	34
2.6. Chapter summary	36
Chapter 3	38
Methodology	38

3.1.	Introduction	38
3.2.	Literature review	38
3.3.	Interviews	40
3.4.	Online questionnaires	43
3.5.	Case study	46
3.6.	Multiple criteria decision analysis and GIS	48
3.7.	Chapter summary	57
Chapter 4	.....	59
Land consolidation in Western European countries	.....	59
4.1.	Introduction	59
4.2.	Land consolidation in Germany.....	66
4.2.1.	Land consolidation legal basis (legal act, LC objectives, LC models)	67
4.2.2.	Requirements to start LC process	72
4.2.3.	LC project participants	73
4.2.4.	Valuation models in LC	76
4.2.5.	The financial issues of LC projects (expenses).....	77
4.3.	Land consolidation in France	79
4.3.1.	Land consolidation legal basis (legal act, LC objectives, LC models)	80
4.3.2.	Requirements to start LC process	82
4.3.3.	LC project participants	82
4.3.4.	Valuation models in LC	84
4.3.5.	The financial issues of LC projects (expenses).....	85
4.4.	Land consolidation in Switzerland.....	85
4.4.1.	LC legislation (legal act, LC objectives, LC models)	86
4.4.2.	Requirements to start LC process	88

4.4.3.	LC project participants	89
4.4.4.	Valuation models in LC	90
4.4.5.	The financial issues of LC projects (expenses).....	90
4.5.	Land consolidation in Belgium	91
4.5.1.	LC legislation (legal act, LC objectives, LC models)	92
4.5.2.	Requirements to start LC process	94
4.5.3.	LC project participants	95
4.5.4.	Valuation models in LC	98
4.5.5.	The financial issues of LC projects (expenses).....	99
4.6.	Land consolidation in Finland.....	100
4.6.1.	LC legislation (legal act, LC objectives, LC models)	101
4.6.2.	Requirements to start LC process	102
4.6.3.	LC project participants	103
4.6.4.	Valuation models in LC	104
4.6.5.	The financial issues of LC projects (expenses).....	104
4.7.	Land consolidation in Cyprus.....	105
4.7.1.	LC legislation (legal act, LC objectives, LC models)	106
4.7.2.	Requirements to start LC process	108
4.7.3.	LC project participants	109
4.7.4.	Valuation models in LC	111
4.7.5.	The financial issues of LC projects (expenses).....	111
4.8.	Comparative analysis of LC legal framework in WE countries	111
4.9.	Land consolidation and the UK.....	124
4.10.	Chapter summary	128
Chapter 5	.....	130
Land consolidation in Lithuania	.....	130
5.1.	Introduction	130

5.2.	Historical roots developing legal and institutional environment for land consolidation.....	134
5.3.	Review of the land consolidation project workflow.....	143
5.4.	Findings of Lithuanian practice of implementing land consolidation..	154
5.4.1.	Land owners attitude to the LC project results.....	161
5.4.2.	Local government attitude to the LC projects	166
5.4.3.	Land surveyors attitude to the LC process	174
5.5.	Chapter summary	180
Chapter 6	.....	182
Analysing the potential for land consolidation	.....	182
6.1.	Introduction	182
6.2.	Pre-study procedure in land consolidation	189
6.3.	Defining the criteria for identification of potential territories for LC in Lithuania.....	199
6.3.1.	Criteria for selection of projects at municipal level	204
6.3.2.	Criteria for project area level.....	213
6.4.	Developing a methodology to identify potential for land consolidation.....	222
6.4.1.	Applying MCDA to identify potential municipalities	224
6.4.2.	Applying MCDA to identify potential project areas.....	239
6.5.	Chapter summary	252
Chapter 7	.....	253
Drawing a framework of sustainable rural areas development through land consolidation in Lithuania	.....	253
7.1.	Introduction	253
7.2.	Considering recent Western European countries' practice	254
7.3.	Drawing land consolidation framework for Lithuania.....	256
7.3.1.	General improvements in legislation.....	262

7.3.2.	Institutional setup and strengthening existing bodies.....	269
7.3.3.	Capacity building	273
7.3.4.	Awareness rising.....	275
7.3.5.	Integration with other EU rural development support programmes	276
7.4.	Chapter summary	278
Chapter 8	.....	279
Discussions and conclusions	.....	279
8.1.	Introduction	279
8.2.	Summary of conclusions	281
8.2.1.	Conclusions from literature review.....	281
8.2.2.	Conclusions from WEC land consolidation model analysis.....	283
8.2.3.	Conclusions from Lithuanian land consolidation analysis	284
8.2.4.	Conclusions from the developed sustainable LC framework ...	286
8.3.	Beneficiaries of the developed framework.....	287
8.4.	Research limitations and future work	288
8.5.	Summary	290
8.5.1.	A significant contribution to knowledge	290
Published scientific papers related to the PhD thesis	.....	292
	Scientific papers at peer reviewed academic journals	292
	Scientific papers at peer reviewed conference proceedings	292
References	.....	293
Appendix 1	.....	317
Appendix 2	.....	332
Appendix 3	.....	341
Appendix 4	.....	343

List of figures

Figure 1: Beneficiaries of research	7
Figure 2: EU-27 member countries from the Central and Eastern European region	13
Figure 3: Significant land ownership changes in most CEECs over the past century. An example from Lithuania	16
Figure 4: Historical development of the CAP	26
Figure 5: Priorities for coming 2014-2020 period	33
Figure 6: The methodology for drawing a sample framework of sustainability	47
Figure 7: Principal stages applying Multiple Criteria Spatial Decision Support System.....	50
Figure 8: Tight MC-SDSS coupling strategy	53
Figure 9: Developed fishnet with 16 alternatives.....	55
Figure 10: Prospect project areas	56
Figure 11: Fragment from ArcGIS attribute table.....	57
Figure 12: Land consolidation – tool to achieve sustainable rural development.....	62
Figure 13: Selected countries for land consolidation legal acts analysis and comparison	64
Figure 14: Schema of comparative LC process analysis	64
Figure 15: Modern land consolidation as central part of rural development.....	113
Figure 16: Long land strips in hand-drawn map excerpt of the parish of Laxton, 1820.....	125
Figure 17: Position of land consolidation in the system of land management documents.....	136
Figure 18: Thirty nine land consolidation projects from RDP 2007-2013 period	140
Figure 19: Institutional structure (authorities) involved in land consolidation process.....	142
Figure 20: Main players in land consolidation project	144
Figure 21: Stages of land consolidation process	146
Figure 22: The project planner can expect inaccuracies if data is analysed without recourse to a field visit	148
Figure 23: Changes in land owners' attitudes to the LC project.....	164

Figure 24: LC project evaluation provided by private land owners	165
Figure 25: Accessibility to information about LC in district.....	168
Figure 26: Accessibility to information about LC in municipality offices.....	169
Figure 27: Public media sources of information about LC accessed by respondents	170
Figure 28: Reasons given for land abandonment	172
Figure 29: Infrastructural and agricultural issues to be solved through LC.....	173
Figure 30: Parcel area differences noticed analysing attribute data of cadastre map	175
Figure 31: Restrictions in legislation has very much limited LC project results ...	176
Figure 32: Country maps showing the potential for land consolidation	187
Figure 33: Structure of criteria significance.....	201
Figure 34: Map showing country experts invited who responded in the survey..	204
Figure 35: Best alternative can have higher and lower values	223
Figure 36: Applying the SAW method for potential definition at municipal level	233
Figure 37: Applying the TOPSIS method for potential definition at municipal level	239
Figure 38: Applying the SAW method for potential definition at project level	247
Figure 39: Applying the TOPSIS method for potential definition at project level.	251
Figure 40: Legislation permits such a configuration to the LC project area.....	264

List of tables

Table 1: Average physical farm size	19
Table 2: Main Rural Development measures of the 2007-2013 programming period chosen by member states	31
Table 3: The main similarities and differences in land consolidation procedure .	112
Table 4: Comprehensive land consolidation process schema.....	116
Table 5: Various actors representing project participants	121
Table 6: Fundamental facts about the first 14 LC projects.....	159
Table 7: Land consolidation project effect.....	162
Table 8: Future perspectives influenced by LC.....	165
Table 9: Dominating farm sizes.....	171
Table 10: International practice performing project feasibility study before land consolidation	190
Table 11: Expertise characteristics of survey respondents	202
Table 12: Criteria of importance at municipal level according to expert's opinion	205
Table 13: Five supplementary criteria offered by respondents.....	212
Table 14: Criteria of importance at project area level according to expert's opinion	214
Table 15: Characteristics of 16 municipalities with simulated data (part I).....	225
Table 16: Characteristics of 16 municipalities with simulated data (part II)	227
Table 17: Results of calculations at municipal level (part I).....	231
Table 18: Results of calculations at municipal level (part II)	232
Table 19: Significant criteria calculation results at municipal level applying TOPSIS (part I).....	236
Table 20: Significant criteria calculation results at municipal level applying TOPSIS (part II)	237
Table 21: Deviation results at municipal level from ideal positive and ideal negative variants.....	238
Table 22: Characteristics of 16 projects with simulated data (part I).....	240
Table 23: Characteristics of 16 projects with simulated data (part II)	242
Table 24: Results of calculations at project level (part I)	244

Table 25: Results of calculations at project level (part II)	245
Table 26: Significant criteria calculation results at project level applying TOPSIS (part I)	248
Table 27: Significant criteria calculation results at project level applying TOPSIS (part II)	249
Table 28: Deviation results at project level from ideal positive and ideal negative variants	250
Table 29: Land consolidation process workflow depending on the applied model	258

List of acronyms and abbreviations

AFAF	The Agricultural and Forest Land Development
AFR	The Land Consolidation Association
ANATAF	the National Association of Local Agents in charge of land consolidation
BOS	Bristol Online Survey
CAP	The Common Agricultural Policy
CBA	Cost-benefit Analysis
CCAF	The Commune Land Consolidation Committee
CEE	Central and Eastern Europe
CEEC	Central and Eastern European countries
CF	The Cohesion Fund
CIAF	The Inter-Communal Land Consolidation Committee
CSF	The Common Strategic Framework
DAFOR	The Direction of Rural Land Development
DLG	The Agency for Land and Water Management
EAFRD	The European Agricultural Fund for Rural Development
EAGF	The European Agricultural Guarantee Fund
EAGGF	The European Agricultural Guidance and Guarantee Fund
EC	European Commission
ECIR	Exchange and amicable cessions of rural immovables
EIA	Environmental Impact Assessment
EMFF	The European Maritime and Fisheries Fund
ERDF	The European Regional Development Fund
ESF	The European Social Fund
ESI	The European Structural and Investments funds
EU	European Union
EU-25	The 2004 enlargement of the European Union
EU-27	The 2007 enlargement of the European Union
FAO	The Food and Agriculture Organization of the United Nations
FIG	The International Federation of Surveyors
GIS	Geographic Information System

GNSS	Global Navigation Satellite System
Ha	Hectares
ICT	Information and Communication Technologies
ILEK	Integrated Rural Development Strategy
LAG	Local Action Group
LAU	Local Administrative Unit
LC	Land consolidation
LCA	Land Consolidation Act
LCP	Land consolidation project
LDTR	The Development of Rural Areas
LJMU	Liverpool John Moores University
LR	Land Readjustment
LTO	Land and Horticultural Organisation
MCA	Multi-criteria Analysis
MCDA	Multi-Criteria Decision Analysis
MCDM	Multi-criteria Decision Making
MCDS	Multi-Criteria Decision Support
MC-SDSS	Multiple Criteria Spatial Decision Support System
NGO	Non-Governmental Organization
NLS	The National Land Service
NUTS	Nomenclature of Territorial Units for Statistics
RD	Rural Development
RDP	Rural Development Policy
SAPARD	Special Accession Programme for Agriculture & Rural Development
SAW	Simple Additive Weighting
SDSS	Spatial Decision Support Systems
SLF	The State Land Fund
SPSS	The Statistical Package for the Social Sciences
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TOPSIS	Technique for Order Preference by Similarity to Ideal Solution
UK	United Kingdom of Great Britain and Northern Ireland
UNCED	United Nations Conference on Environment and Development
UNECE	The United Nations Economic Commission for Europe

VLM	The Flemish Land Agency
WEC	Western European countries
WSM	Weighted Sum Model
WWII	The World War two

Acknowledgements

Looking back a long way, some six years, it has never been an easy task to seek this PhD degree combining family, studies and work. Every time I had thought to have gained knowledge, I realised was at the very beginning again and again. Finally, this research has been completed with the help and support of numerous people to whom I am extremely grateful. First I would to give huge thanks to my Director of Studies Dr. Vida Malienė who trusted in me. I am thankful for her continuous inspiration, encouragement, providing essential ideas, and guidance and support given establishing this work. Many thanks Vida!

Besides my principal supervisor, I would like to show gratitude to my other two supervisors Prof. Christopher Couch and Prof. Joachim Thomas for their feedback, advice and guidance, and long discussions which were invaluable and superior. Critical, but always constructive, reviews, comments, remarks and observations were a basis for relevant improvements. Without all this you would not be reading this now.

Special thanks and appreciation goes to my friend Saulius Bumblauskas – a professional land surveyor, who inspired me in land consolidation and gave an opportunity for two years of practically implementing a land consolidation project in Lithuania. This practice was very invaluable combining practical and theoretical knowledge through all my PhD writing processes.

I wish to thank Dr. Virginija Gurskienė for suggesting to me the idea of doing a PhD in Liverpool John Moores University, and encouraging me to apply. Thanks go to my Bachelors and Master's degree supervisor Dr. Antanas Miknius from the Lithuanian University of Agriculture for an academic recommendation in applying to Liverpool John Moores University.

Many special thanks go to Robert Dixon-Gough and David Morley for all their contributions in reviewing, editing, advice and guidance and helping me to finalise this work.

I would like to express my gratitude to the School of the Built Environment (LJMU) for the financial support for these years. Without it, I was not be able to be here to do this thesis.

I would like to sincerely thank all Vida's family – husband Naglis, sons Mantas, Kernius, Auštras and Alexandra for a warm welcome in their house and great assistance.

The multi-criteria methods, multi-criteria spatial decision support system and GIS data analysis in this research would never have been accomplished without the decisive help and inspiration from my colleague Mr. Andrius Kučas. Thank you, Andrius for your clear and visual explanations and for your patience.

Most important of all I would like to thank my beloved wife Inela and my children Emile and Laurynas. I am forever indebted to my family for their understanding, endless patience and encouragement when it was most required which gave me the motivation to complete this study. This thesis took six years and this time was not available for you. I will try to compensate you this.

My parents, my best friends Marijus and Romas were always having a constant belief in me that I would complete PhD thesis.

I will not forget my sister Aušrine's help with an English grammar review of each prepared paper which forced her to understand land consolidation process.

I would also like to thank many international land consolidation experts who I have had a pleasure to meet at various conferences and workshops, who participated in various questionnaires, discussions and interviews regarding the methodological issues, and also all those who provided fruitful suggestions and advice.

This thesis spans a number of years and there are too many names to thank everyone individually. But, I want all of you to know that I greatly appreciate all your direct or indirect contributions.

My thesis is dedicated to those who care about the future of rural areas, and are in a position to use land consolidation to make improvements for the future.

Abstract

This thesis investigates the actual situation in the rural areas of Lithuania, one of the Central and Eastern European countries which, after the collapse of the Soviet regime, started a programme of land reform and today faces problems such as land fragmentation, land abandonment, lack of infrastructure, land conflicts, etc. Such problems affecting sustainable rural development can be solved by applying a land management instrument – land consolidation that has worked successfully for hundreds of years in Western European countries. Since 2000, Lithuania with the support of international land consolidation experts, has dealt with this instrument and supplemented that legal framework in 2004. Unfortunately this instrument still doesn't assure results compared with Western European countries. In order to identify aspects influencing comprehensive results, an investigation of the legal frameworks regulating land consolidation in six selected European countries was performed by analysing scientific papers, legal acts and interviewing land consolidation experts. Seeking to obtain a comprehensive Lithuanian land consolidation process picture, a case study analysis was applied and interviews with participating land owners and land surveyors as well as the online questionnaire for municipal specialists were performed. Moreover, based on European expert's practice reflected in the online questionnaire, criteria showing the potential for comprehensive land consolidation in Lithuania (at municipal and project area scale) were developed and techniques based on Multi-Criteria Decision Analysis offered. The most significant part of this thesis is a developed framework for how to reach sustainable rural areas (re)development through land consolidation in Lithuanian and other Central and Eastern European countries. Developed criteria showing the potential for comprehensive land consolidation and framework provides the main original contribution to new knowledge by benefiting policy makers, land management authorities, land surveyors, the academic and professional community and rural communities on both a national and international scale.

Keywords: land fragmentation, land reform, sustainable rural development, comprehensive land consolidation, land consolidation methodology, criteria showing the potential for land consolidation.

Chapter 1

Introduction

This chapter provides an introduction to the subject area of the research, highlighting the importance of the topic and research problem, states the research question, the aim and objectives that were established in order to carry out the study, the beneficiaries of the research, and how the research makes a significant contribution to new knowledge in this area. Finally, an overview of the chapters included within the thesis is provided.

1.1. The research problem

Population in the developing world is growing very fast and puts pressure on a finite resource – LAND. Such a situation indicates that a special attitude to rational and respectful use of this unappreciated treasure is very important. The situation hasn't changed through the ages: who has land – creates rules; rising subject land grabbing proves it. Conflicts regarding the land were always the trigger to dissension between brothers and even nations.

Future population pressure and the accelerating impact of climate change may force drastic measures, such as increased state intervention to control and manage that scarce and dwindling basic resource – land. The pressures of urbanisation in most countries of the world create a need for methods to assemble development land (Home, 2007b).

With over half of the population in the 27 Member States of the European Union (EU) living in rural areas that cover 90% of the territory, rural development is critically important. Farming and forestry remains heavily dependent on the land use and management of natural resources in the EU's rural areas, and plays a significant role as a platform for economic diversification of rural communities (Commission of the European Communities, 2007). The Food and Agriculture

Organization of the United Nations (FAO) (1997) projects that the world's human population is expected to increase to more than 9,800 million by 2050.

Agricultural policy is increasingly perceived by regional stakeholders and politicians as an integrative part of rural development complementing other sectorial policies (Dwyer et al., 2002); taking into account its multiple functions (i.e. recreation, ecosystem services, agricultural production and economic infrastructure). Thus, increasing migration from rural areas, a decrease in the number of agricultural employees, ageing of farmers and abandonment of both farm holdings and agricultural land have been reasons for major concerns (Busch, 2006). Young people no longer want to stay in the rural areas as they see rapid growth of urban areas. Palmer (2008) states that depopulation of rural areas in the future decades will have a significant impact on the use, control, and ownership of agricultural land.

In Central and Eastern European countries (CEEC) where restitution of private ownership rights has been completed, a high level of land fragmentation is recognized as a problem. Most farmers own very small land plots which are highly dispersed around the neighbourhood of the farm. Also the abandonment of land is becoming a serious and growing problem in Europe. It is accelerated by the retirement of an older generation of more traditional farmers and by the migration of younger people to urban areas.

A fundamentally different approach to rural development is required. An increasing number of voices are calling for an approach where the countryside is no longer seen narrowly as a factory for producing food, but as providing a multitude of functions including recreation, work and living places, aesthetic values and environmental services, including water management and purification, as well as ecological stability (Beckmann & Dissing, 2004).

In recent years the countryside has always held a variety of attractions for people from the cities; as a place for peaceful retirement, or as a weekend retreat for those still working who wish to spend their leisure time just having contact with the

earth or walking barefoot on grass, etc. To sustain the viability of this rural environment, so that future generations may also enjoy its bucolic delights, calls for the adoption of a strategic vision now to prevent the gradual erosion and degradation of the countryside as a natural, social and aesthetic asset (Pašakarnis et al., 2013a).

Rural areas, as cities, are not the same as they were centuries ago. Nevertheless the evolution in rural areas is slower than in the cities, but everything is changing too: the landscape, people, lifestyle, values, activities and infrastructure, etc. In order to meet today's demands, it is necessary to rethink territory planning and redevelopment by introducing effective instruments. Land consolidation is one of the land management instruments, which according to Western European experts, aims to improve the production and working conditions in agriculture and forestry as well as promoting the general use of land and the (re-)development of rural areas by re-arrangement of agricultural land where villages/settlements are not excluded as well (Thomas, 2004; Thomas, 2006a).

Whereas Western European countries have long traditions and significant practical experience of land consolidation, Central and Eastern European countries presently stand at the beginning of this process. It is a complex process which covers not only the technical aspects of the plan itself, but also the associated aspects of legislation, the establishment of the agencies to implement the plan, and, not least, the education of their staff (Thomas, 2006a; Thomas, 2006b).

Van Dijk (2007), maintains that the Food and Agriculture Organisation of the United Nations (FAO) is expecting very much from land consolidation (LC). Giovarelli & Bledsoe (2001) observed that the FAO was preparing prototype legislation for land consolidation as a "blueprint" for rural areas in Central European countries drawn up in accordance with experts from the relevant countries from the Western European countries.

According to the Lithuanian Land Law (2004) land consolidation is a complex readjustment of land parcels when their boundaries and location are changed

according to a land consolidation plan prepared for a certain territory, with an aim to enlarge land parcels, to form rational land holdings of farms and to improve their structure, to establish necessary infrastructure and to implement other goals and tasks of the agricultural and rural development as well as environment protection policy.

In the very near future land consolidation will be the most important procedure in CEECs creating a structure of economic agricultural property (Ossko & Sonnenberg, 2002). It is expected that the land consolidation process will not only solve the structural problems of rural land, but could also create viable rural areas through improvements to the rural services and infrastructure, incentives for economic diversification, etc.

In many CEE countries - including Lithuania, following the collapse of the Soviet regime, the restitution of land ownership rights commenced with a major target: to restore justice without detracting from a picture of a prosperous countryside. In Lithuania this brought about a demand for real changes and in 2000, land consolidation was introduced by Western experts. It took four years to incorporate land consolidation in the legislation of the land management tool-box. The initial tranche of 14 land consolidation projects was completed in 2008 and there also 39 new, currently on-going projects. However, there is some doubt by the international land management authorities as to whether it is possible to call this process land consolidation.

Lithuania as one of the representatives of former Soviet countries reflects the picture of other CEE countries with its own legal basis, political situation and economic situation. The author analyses the Lithuanian case as he is involved in land consolidation projects, has an access to the data, is a member of the land management professional and scientific society.

1.2. Research question

Based on the apparent research problem, the following research question was proposed:

How can LAND CONSOLIDATION, a popular land management instrument for many years applied in many Western European countries, be properly applied in rural areas of Lithuania and other Central and Eastern European countries to ensure viable rural development, which aims to redevelop the countryside to be an attractive place for people to live and work in, now and in the future?

1.3. Research aim and objectives

The research aims at *investigating land consolidation in Lithuania as an essential tool to achieve prosperous rural areas by focusing on the principles of sustainability. Through the evaluation and comparison of land consolidation examples within Europe, the study seeks to incorporate the best practice and to develop a framework for sustainable rural areas in Lithuania.*

The following objectives must be elaborated to achieve the proposed aim:

- 1. To identify the core problems that rural areas in Central and Eastern European countries face today (with the focus on sustainability).***
- 2. To analyse the prevalent land consolidation methodology used in Western European countries, to distinguish their advantages and disadvantages; to analyse the application of methods on the principles of sustainability for the development of prosperous rural areas.***
- 3. To analyse the Lithuanian existing land consolidation legislation model, the national land consolidation strategy, and to measure how it fits into the land consolidation policy at local, national and European levels.***

- 4. To measure the effectiveness of the land consolidation projects through case studies of the recently implemented projects in Lithuania and to evaluate the land consolidation process in protecting and enhancing rural areas in Lithuania.*
- 5. According to the principles, methodology and experiences of the land consolidation process in European countries to develop a framework applicable and important for sustainable rural areas development in Lithuania and potentially in Central and Eastern European countries.*

1.4. Beneficiaries of research

Revealed findings of this thesis could serve at national and international levels for developing and adjusting legal frameworks, strategies and measures seeking to achieve prosperous rural areas through land consolidation for future generations (Figure 1).

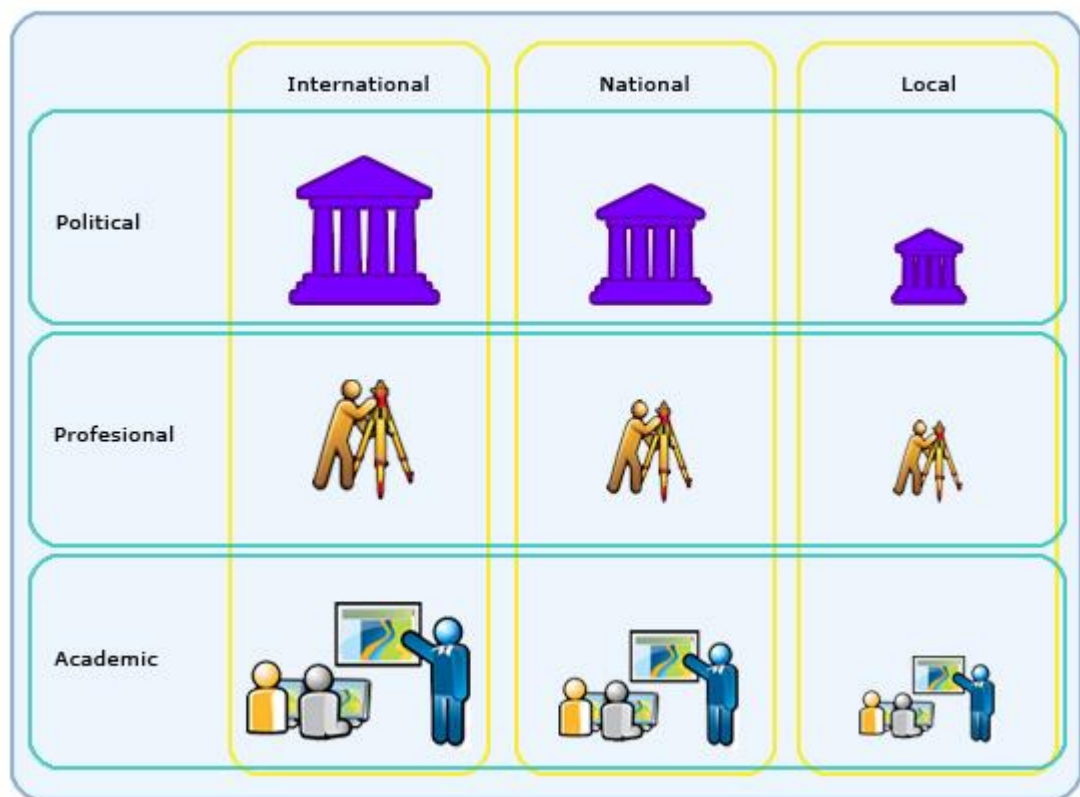
Insights of this thesis will be of interest to the European political arena through establishing guidelines in the Common Agricultural Policy (CAP), Rural Development policy (RDP) seeking to be flexible by constantly looking for effective measures as all countries are experiencing inequality between rural areas and urban territories. This demand is in the Europe 2020 strategy affirmed by the European Commission which fosters scientific attention to land management.

Currently the FAO under the United Nations supports Balkan countries and many members of the Commonwealth of Independent States to (re)develop land management legislation and introduce Western European land management instruments and practices. Transferring such practice is very important, in the short term, to adopt only the best and effective practices and to minimize possible mistakes. As a decade ago the FAO helped to introduce land consolidation legislation in many Central and Eastern European (CEE) countries, the revealed Lithuanian experience would be valuable for other countries en route.

Stakeholders involved in rural development from the old European continent countries could consider the identified weaknesses in their methodologies and strengthen them by introducing new actions in their legal frameworks.

The developed framework will be useful for the academic community analysing land management instruments and training new land management and authorities generation.

Figure 1: Beneficiaries of research



Source: Self study

The main beneficiary of the developed framework will be the Lithuanian community. National land policy authorities will find identified weaknesses in the land consolidation process and the findings will allow the adjustment of LC legislation and strategy. This will be beneficial to a number of local interested parties: the municipal sector, land management authorities, local action groups and all other parties involved in the process. The developed framework will

provide support for all involved parties with the information needed to make more comprehensive decisions. It will allow the realization of targets defined in the strategy Europe 2020 concerning smart, sustainable and inclusive growth.

1.5. Original contribution to knowledge

This thesis provides a significant contribution to knowledge of the subject area for the following reasons:

- The research discusses the cause of land fragmentation, land abandonment and the current situation of rural areas in CEECs.
- The research provides a comparative analysis of the peculiarities in land consolidation between selected Western European countries, which is very important for CEE countries developing and upgrading their own land consolidation legal acts and national LC strategies. The findings revealed provide the background for developing a framework of sustainable rural development through land consolidation in Lithuania and other CEE countries.
- A detailed analysis was made of the Lithuanian legal acts regulating the land consolidation process, which identified the participating institutions and their roles in the process. Implemented LC projects in Lithuania were analysed through comparing the situation before and after LC. An in-depth and comprehensive analysis of one land consolidation project identified the weakest aspects in the legislation and of the entire process.
- A qualitative analysis, comparison and summarization were performed for the first time in Lithuania with two groups: local municipal authorities and landowners. The results reveal how the expectations of landowners changed before and after land consolidation. Also disclosed is the municipal authorities' miserable understanding of the topic.

- The study has revealed the success factors, which are important in implementing land consolidation projects in Lithuania. These success factors may be considered by international land consolidation experts when starting pilot land consolidation projects and have helped to develop the legal base for countries who have not yet introduced land consolidation.
- It provides support for land management authorities in identification of potential areas (municipalities or project areas) suitable for comprehensive land consolidation and two multi-criteria decision analysis methods were offered. International land consolidation experts (practitioners and scientists) were invited to identify significant criteria showing the potential for comprehensive land consolidation at different scales.
- It has developed a methodology for the identification of potential areas by applying a decision support system and has revealed that significant criteria could support land management authorities to make rational decisions of whether or not is it feasible to initiate launch projects in certain areas. The author offers the application of a spatial decision support system equipped with GIS.
- The multiple criteria spatial decision support system is applied for the first time in this study for the sample evaluation of the potential of land consolidation projects in Lithuania according to the criteria suggested by international experts.
- According to the gaps in the whole land consolidation process in Lithuania, and considering those aspects which work well in the Western European Countries (WEC) analysed, this thesis develops a framework with proposals on how to improve legislation and to optimise the process in order to reach sustainable rural areas development through land consolidation in Lithuania.

In summary, the originality of this research lies in the novel attitude to the land consolidation approach redeveloping rural areas in Lithuania and other CEEC.

1.6. Overview of chapters

Chapter 1 serves as an introduction and overview of the subject area and includes the stated research problem, raised the research question, overall aim and objectives of this thesis, as well as the beneficiaries of the research and the original contribution to knowledge.

Chapter 2 provides a literature review to address the first stated objective of this thesis. The situation in the countryside of the CEEC after the collapse of the Soviet Union were analysed and problems that appeared influencing land fragmentation, land abandonment, rural depopulation, etc. were highlighted. In order to solve the occurred situation in the CEEC countryside, offers were made by WEC experts in applying land consolidation. International documents regulating sustainable rural development were considered.

Chapter 3 explains the applied research design and methodology, which were selected to provide an answer to the formulated research question and to address the stated objectives. This was applied to a mixture of social research methods that were sequentially described as to how they were used with data obtained for the analysis.

Chapter 4 provides answers to the second objective where the comparative analysis of land consolidation models in selected WEC was undertaken. This chapter reveals the application of various land consolidation models (i.e. stated objectives, requirements to start the project, etc.), where they were applied to sustainable rural development. Finally, this chapter describes the situation in the UK – the reasons why there is no land consolidation.

Chapter 5 at the beginning provides a picture of the rural areas of Lithuania prior to the Soviet occupation and the land ownership rights restoration (land reform)

after gaining independence. Furthermore, the author describes some pilot land consolidation projects that have been introduced and supported by WEC experts who gave the basis for developing the legal acts and institutional setup (the third objective). Also in this chapter the case study examines the process workflow and how the effectiveness of the implemented land consolidation projects are treated from the landowner's and municipal authorities' perspectives (the fourth objective).

Chapter 6 starts with analysis of the pre-study procedures prior to starting a land consolidation project, which is widely applied in Western European countries for the evaluation of a project's feasibility. The author identified the most important criteria (at different scales), which help identify prospective areas for comprehensive land consolidation. Criteria, important at different scales, were provided by the international land consolidation experts and tested with multiple criteria spatial decision support system applying Simple Additive Weighting (SAW) and Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) methods in order to evaluate potential of the territory.

Chapter 7 starts from the overview of recent land consolidation models applied in WEC. Furthermore, the author based on findings from the previous chapters, where the situation in WEC was analysed, develops the framework to achieve prosperous rural areas in Lithuania by introducing two LC models. Additionally, the author offers a revision of the legal acts by incorporating best practices identified from the analysed WEC.

Chapter 8 returns to the stated aim and objectives to draw out the overall conclusions from the undertaken study, including research limitations and highlighting the significant contribution to knowledge made by this research.

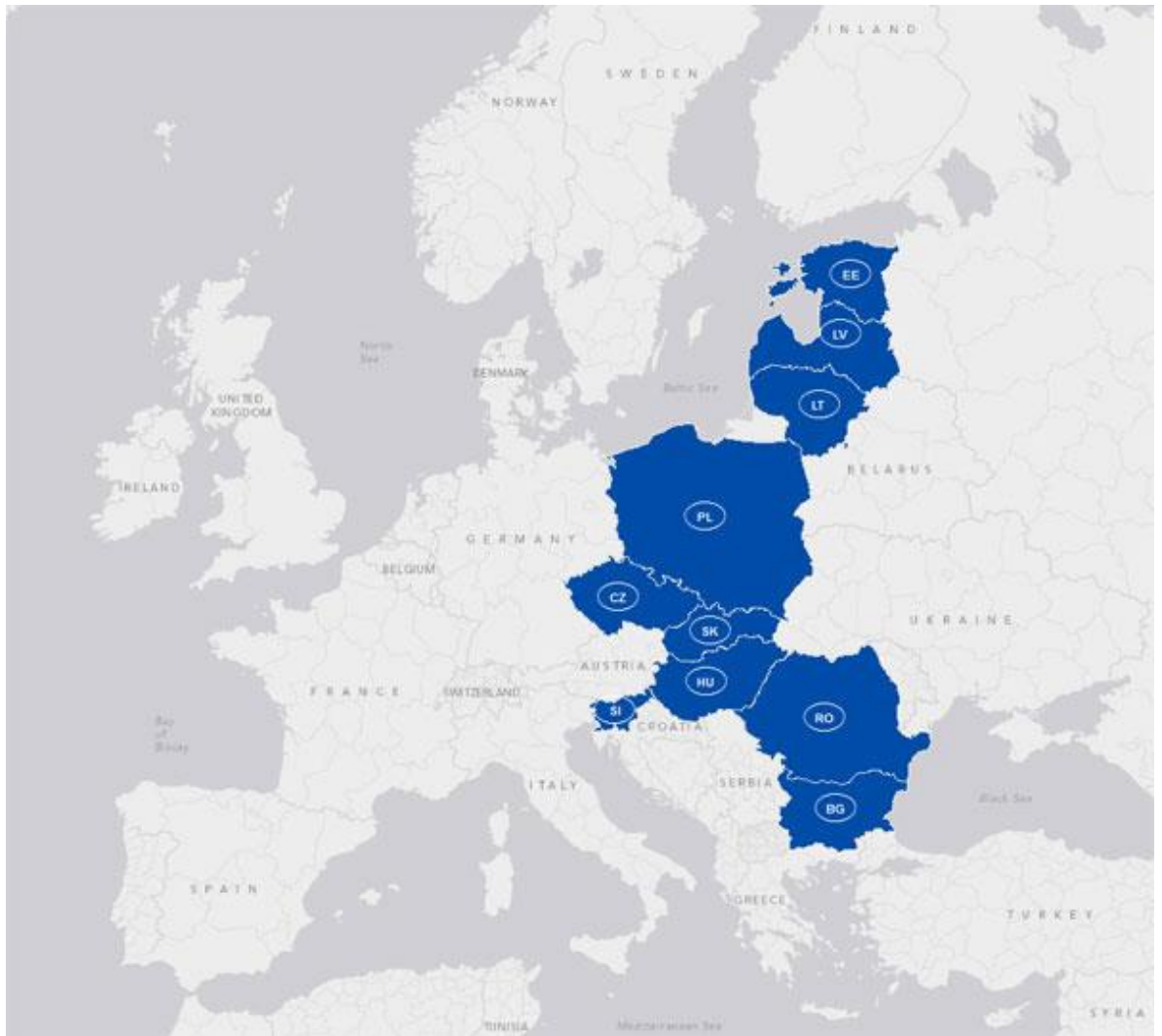
Chapter 2

Framework of land management policy in Central and Eastern European countries: Past, present and future

2.1. Introduction

The historical roots and situations in the countryside of Central and Eastern European countries (CEEC) that occurred during the period between the end of WWII and the transformation of 1989 are the principal subjects of this chapter. CEE countries here refer to the EU-27 member countries from the Central and Eastern European region (Figure 2). The region suffered from a multitude of different problems influencing rural degradation, such as all types of land fragmentation, widespread land abandonment and rural depopulation, etc., which were reviewed during an extensive literature review with the aim of drawing together the elements and picture of rural areas which we have today. This was conducted by reviewing most cited academic and political documents. Significant international documents calling for sustainable rural development and land management in Europe were discussed and examined, outlining their importance. Land consolidation is one of the land management instruments that is recognised by influential international organisations as an effective instrument for sustainable development. Furthermore, a short introduction concerning the type and form of land consolidation in CEEC is also provided.

Figure 2: EU-27 member countries from the Central and Eastern European region



Source: Self study

2.2. Significant changes of the last century in the CEEC's countryside

Prior to 1939 and the onset of WWII, the majority of European countries in both WE and CE, enjoyed political democracy and a free-market economy (Ossko & Sonnenberg, 2002). However, in certain states – newly created and recreated following the end of WWI, the activities of the land markets together with the rural economy – were restricted to a large measure by the essentially feudal structure of land ownership: that is the majority of rural land was in the ownership of very few, influential people who exerted almost total control over both the ownership and management of the land. This situation was also true in many WECs although the

situation changed greatly in WECs as a functioning land market – aided in part by political influence – became a key component of a successful market economy (Ossko & Sonnenberg, 2002).

After the WWII, *the Iron Curtain* has divided Europe into two separate blocks. Western European countries chose a market economy while Eastern European countries implemented socialist ideology (Marxist principles) and compulsorily moved to an “everyone’s equal” planned economy. In the socialist countries private property including agricultural land was nationalised and the state became the major owner of land and other property (Ossko & Sonnenberg, 2002). Van Dijk (2003b) stresses that individual ownership was eliminated as much as possible. The legal and institutional framework concerning land was also changed and adjusted to the new situation required by the political dictatorship and the command economy (Ossko & Sonnenberg, 2002). However, collectivisation was implemented differently in each country due to the different historical backgrounds and political situation; and was, therefore a result of different mixtures of property rights (ibid). After the collectivisation in agriculture two main types of farms appeared: state farms and collective farms. Swinnen (1996) found that state farms were seen as model farms. The socialist ideal was the establishment of large production units where every member contributed his or her share; and society as a whole would benefit together from its yield (Van Dijk, 2003a). These large agricultural production units were known as *Kolkhozes* (collective farms) and *Sovkhozes* (state owned farms). They were allocated in the best farmlands and received more support from the government for investments in infrastructure and technology. As a consequence, state farms were typically more capital intensive than collective farms and their workers' income situation was better.

For example, in Baltic countries many land owners during collectivization were forced to join collective farms and those who refused to join had their land nationalized and were exiled to Siberia. The collectivisation process has not affected all the CEE countries equally; some countries have retained through generations the most valuable property – land. For example, Poland continued to

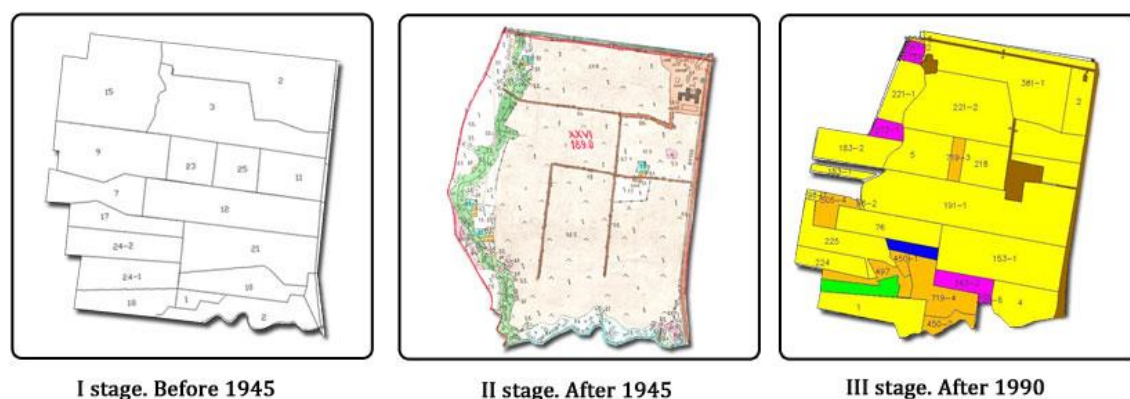
operate small private farms throughout the communist rule (Giovarelli & Bledsoe, 2001). During the collectivization in CEECs new infrastructures were created (road network, drainage systems, electricity lines, etc.), which has unrecognizably changed the landscape. Many farmsteads have disappeared from the map during amelioration. To support collective and state farms new residential areas were developed and the design of the infrastructure was created according to a new centrally planned economy model.

Following the collapse of the communist and socialist regimes in CEECs, the new governments quickly took steps to transform centrally planned economies into market economy systems. One of the first measures taken, at the beginning of the 1990s, was the privatization of enterprises, land and buildings (Thomas, 2006b). Considered a cornerstone for the market economy in the sphere of agriculture, priority was given to speed up the re-privatization process, secure land tenure and property rights, develop land markets, and untie the inherent wealth locked within the property market (Riddell & Rembold, 2000). CEECs carried out mass privatisation, compensation, and restitution processes to establish and develop an active land market. Thomas (2006b) has identified two types of restitution – restitution in land or compensation, if restitution in land is impossible. Typically, the reform laws specify that land is restored to the former owners within historical boundaries, if possible. Otherwise they receive property rights to a plot of land of comparable size and quality (Swinnen, 1996). The situation of land ownership before Soviet annexation was used as the basis for land restitution to former owners in almost all the CEECs (Figure 3).

As a result of their effort the real estate and rural land markets have started functioning, but the activity of the rural land markets compared with those in Western Europe were, and are, still very poor (Ossko & Sonnenberg, 2002). Van Dijk (2007) saw that land markets are an essential requirement for successful farming. All of the EU accession states, except Poland and Hungary, have engaged in some form of restitution of land rights to former owners (Giovarelli & Bledsoe, 2001). Furthermore, due to the restoring ownership rights, some restrictions were

made, especially where a part of the property before the WWII was operated by ethnic minorities (i.e. in Poland, Bulgaria).

Figure 3: Significant land ownership changes in most CEECs over the past century. An example from Lithuania



Source: Self study

The result of the massive privatization process is that millions of families in countries in transition became peasants and owners of small plots, with an average of about one hectare per household, spread over different parcels and located in different areas in the vicinity of settlements: an incredible degree of fragmentation. It is not uncommon for a person to be the owner of ten fruit trees in a garden or half a row of grapes (UNECE, 2001; Thomas, 2006b). In general, while implementing land reform, economic depression was experienced in agriculture in all the CEE countries. Many land owners (successors) received their allocation of land not even knowing what to do with it and sometimes not knowing where it is. Most of such land owners (typically, urban dwellers) rented their land to active local farmers or to farming collectives. After the return of the ownership rights, land abandonment has appeared to be a problem caused primarily as land owners were not ready to farm in market economy conditions.

2.3. Countryside in the CEE countries after the land reform

It is evident that as a result of land reform processes in Central and Eastern European countries, the land is highly fragmented. FAO (2004a) has revealed that

land fragmentation affects mostly the agriculture sector because the distribution of co-operative and state farm land was driven by equity principles without considering the aspects of farm management.

The parcels which farmers have received due to land reform are often too small and poorly shaped, particularly in respect to their length to width ratio. Both characteristics make it difficult to implement new production procedures, utilize modern machinery and other appropriate technologies. Most of the plots are not adjacent to each other, and many are not even situated in the same area, being outside the municipal jurisdiction or even in neighbouring counties (Riddell & Rembold, 2000).

In some CEE countries (regions) fragmentation can take extreme forms (Van Dijk, 2003b; Jagt et al., 2007). Sabates-Wheeler (2002) argues that due to these different dimensions of land, different types of fragmentation can be distinguished:

- physical fragmentation;
- activity fragmentation;
- social fragmentation; and
- ownership fragmentation.

Physical fragmentation relates to the physical properties of land activity; social fragmentation derives from the social and production relationships embedded in the rights attached to land use; whilst ownership fragmentation refers to the disjuncture between legal and physical property rights. Despite certain commonalities, land fragmentation patterns differ from country to country. The main type of fragmentation in Central Europe is namely land use fragmentation (low average farm size) (Van Dijk, 2005). It must be noted that in the most of CEECs the arable land is over 50% of their total areas. Fragmentation is not a new concern and certainly is not limited to ecological systems or natural features only. In the past the problem recognised in agriculture was that the fragmentation of agricultural holdings has been a key argument for land consolidation projects (King & Burton, 1983; Hoogeveen & van Lier, 1999).

Fragmentation has become a general land use problem because of increased dispersion of human settlements together with the expansion of infrastructure and traffic, which are essential in the defragmentation process (for these settlements). Fragmentation causes second generation problems with environmental consequences such as noise, pollution, and accidents in the traffic (Gulinck & Wagendorp, 2002). Fragmentation may also be desirable in the context of political stability, since fragmentation allows a considerable percentage of the population to grow their own food and, thus, survive independently from food distribution networks and the impact of economic crises (for instance, inflation and future rises in transportation costs) (Van Dijk, 2005). Small farms are mostly used to feed family members and, if the yield is greater than planned, the surplus could be sold in the local markets. These have resulted in serious social and economic disintegration and widespread disappointment among local actors and stakeholders (Hartvigsen, 2005).

The possibility of EU membership has accelerated reforms in those countries that were lagging somewhat behind the leading EU accession candidates. Restitution of agricultural land in the CEECs, as discussed above, has created small, displaced land plots with average sizes ranging from less than 1 ha to about 40 ha across different countries (Lerman, 2004). This compares with an average farm size in EU-27 (Eurostat, 2005) of 11.9 ha (see Table 1).

The typical dualistic pattern of farming structures in CEE and the Commonwealth of Independent States region are obvious. Middle-sized commercial farms with 5-25 hectares are in many countries viable economic enterprises but, however, they are emerging slowly. These individual farms and down-sized corporate farms might be the future nuclei for a sustained regional rural development (Graefen, 2002). Individual farms in the CEECs represent, on average, slightly over 60% of farmland, whilst the remaining 40% is still controlled by corporate units that have replaced the agricultural production cooperatives and state farms (Lerman, 2004).

Table 1: Average physical farm size

Country	ha	Country	ha	Country	ha
Belgium	26.9	Italy	7.4	Portugal	11.4
Bulgaria	5.1	Cyprus	3.4	Romania	3.3
Czech Republic	84.2	Latvia	13.2	Slovenia	6.3
Denmark	53.7	Lithuania	11.0	Slovakia	27.4
Germany	43.7	Luxembourg	52.7	Finland	32.1
Estonia	29.9	Hungary	6.0	Sweden	42.1
Ireland	31.8	Malta	0.9	United Kingdom	55.7
Greece	4.8	Netherlands	23.9	EU12	5.5
Spain	23.0	Austria	19.1	EU15	21.4
France	48.7	Poland	6.0	EU25	16.0
EU27 - 11.9 ha					

Source: (Eurostat, 2005)

Land fragmentation is also closely linked with the other widespread problem in CEE countries, that of land abandonment. The abandonment of land is a serious and growing problem in large parts of Central and Eastern Europe but also throughout Europe, accelerated by the retirement of an old generation of more traditional farmers and migration of the young generation to urban areas.

Land abandonment is caused by a combination of reasons such as physical characteristics of the land (relief, soil quality, and climate) together with social issues (lack of facilities, opportunities for young people, and attraction to urban centres). Another important cause is the structure of the farms (farm size, plot size, and the possibility to access the land) and their viability as commercial units. Finally, legal matters also play an important role in land abandonment: difficulties in ownership and the process of restitution of land rights to absent owners can also be causes for abandonment (Jagt et al., 2007).

Land abandonment can have several effects: it can lead to a loss of semi-natural habitat, in areas of high nature value farms; it has consequences on the cultural

landscape, and can lead to more homogeneous landscapes; and to the loss of structures of cultural value (terraces, historical buildings) (Sikor et al., 2009). Additionally, it increases the number of derelict farmsteads and buildings (Zavadskas & Antucheviciene, 2007; Antucheviciene & Zavadskas, 2008) and has a negative impact on the socio-economic well-being of rural communities (Maliene et al., 2008). Finally, the loss of agricultural use can further increase the process of outward migration and marginalisation in rural areas (Jagt et al., 2007).

The picture of rural areas is one of rapid change. Land fragmentation and land abandonment competes with abandoned farmsteads, agricultural buildings and their associated infrastructure and all that has been left from collective or state farms provides a common picture of a declining countryside. In almost all countries, rural-to-urban migration and migration to other countries has reduced the population in rural areas, which are now frequently dominated by the most vulnerable rural people: low-educated individuals, pensioners, individuals with addiction problems, etc.

Rural populations are also getting older, indicating that the rural labour force will continue to decline. Young people do not want to stay any longer in the rural areas as they see the rapid growth of urban areas. This depopulation of rural areas during the future decades will have a significant impact on the use, control, and ownership of agricultural land (Palmer, 2008). There is no longer a rural community without its city nearby. Thus, the line between the peri-urban and the peri-rural area has become blurred (Riddell & Rembold, 2000).

As a result, young people escape the farms whilst more and more arable land lies fallow and farmers leave their tried and tested methods and simplify them – even risking lower quality of crops and environmental damage (Vranken et al., 2004). Ecological education of farmers doesn't exist in practice and if there is any it is insufficient and undertaken mostly by nongovernmental organizations rather than by public institutions. The low environmental awareness of society and politicians is the main reason why there are only a few who defend against the destruction of nature (Gatzweiler et al., 2002).

Therefore, if we want to preserve the natural wealth of agricultural areas of Central and Eastern Europe it is necessary to introduce specific instruments of agrarian policy. They should apply to the specific character of agriculture and to the overall situation of those countries. While creating instruments of the agrarian policy it is important to remember that land administration in CEECs is poor (Karaczun, 2003) with a very low level of environmental awareness.

Another problem, which obstructs the completion of land reform, is the reference to the “restitution in comparable boundaries”. When the choice is the restitution of land, many CEEC governments have included specifications in the Land Law which permits giving a comparable piece of land (instead of the original plot in “historical boundaries”), if the new owner wants to privately farm the land (Swinnen, 1996). This has led to the situation where potential claims of former owners, conflicting laws regarding the restitution process, and unclaimed land, have all slowed down the privatization process (Giovarelli & Bledsoe, 2001). National legislation in CEECs cannot assure the protection of land ownership rights because during the land reform process imprecise measurements of land parcels boundaries were used. Without clear (land parcel) boundaries, misunderstandings and disputes appear between neighbours that hamper land management and rural development. People in CEE countries are still sensitive when questions regarding land ownership rights arise as only a couple decades have passed after the restoration of justice following independence. It was hard to consider the creation of sustainable rural areas since the problems outlined above occur in most CEECs. For example, in Poland Markuszewska (2013) recently noted that Polish farmers have an emotional attachment to farmland, often cultivated by the same family for generations, who consider that it is much more important to retain the land than to consider the financial benefits that could result following land relocation. It is especially noted within small family farms and dual-working part-time farmers, who maintain farms only as a side-line. Furthermore, Markuszewska (2013) highlights that large-scale commercial farms are more favourable to reducing the problems of land fragmentation and poorly shaped parcels.

Agriculture is no longer the simple commodity industry that it was years ago, when the only avenue for a farmer's success was to increase the productivity and yield. The environment, at global and regional levels, has been highlighted recently by the continuing rapid growth of the world's human population, the increasing socio-economic interdependence of countries and regions, the growing awareness of the value of natural ecosystems, and the perception that current land use practices may influence the global climatic system. The proper management of land, water, forests and wildlife is crucial for sustainable development (Gatzweiler et al., 2002).

European agriculture is facing the challenge of seeking for alternatives. To overcome the problems of over-production, low farmers' incomes, abandonment of rural areas and environmental pollution, intensive production is to be a topic of high importance in the near future. The recent developments of the European policy decouples direct aid from production and steers the support into stronger sustainable use of natural resources (European Commission, 2005; Palma et al., 2007).

In addition, the FAO (2004b) acknowledges that the resulting land fragmentation may have had detrimental results, particularly in rural areas, for private and public investments, sustainable economic growth, social development and environmental quality. Recent surveys have suggested that larger individually owned farms produce higher family incomes than smaller ones and thus farm augmentation makes a positive contribution to the wellbeing of the rural population (Deininger et al., 2004; Lerman & Cimpoieş, 2006; Lerman & Shagaida, 2007).

A fundamentally different approach to rural development is required. An increasing number of voices are calling for an approach where the countryside is no longer seen narrowly as a factory for producing food, but as a means of providing a multitude of functions including recreation, work and living places, aesthetic values and environmental services, including water management and purification, as well as ecological stability (Beckmann & Dissing, 2004).

Now there is an increasing recognition of the need for a “second wave” of land reform – aimed to rationalize rural space through land management tools such as consolidation of fragmented parcels (FAO, 2004a). After a decade of on-going land reform Graefen (2002) suggested that it is high time to start preparing for the new land management stage:

- The intention to facilitate the gathering of the fragmented parcels by supporting voluntary exchange of lands, or the buying of lands for the purpose of merging using the present agricultural subsidies framework;
- The adoption of the draft law on Land Consolidation by Parliament as soon as possible; and
- The adoption of the draft law on a National Land Fund.

As Graefen (2002) stated, if this is operated from the beginning, it could lead directly to:

- A more adequate parcel size, as required for viable and competitive family farming contributing to sustainable agriculture and rural development; and
- The strengthening of the land market in general and provision of a stable market based on reasonable transaction prices.

The main problem in the CEECs is that some parts of the first stage mentioned above are still not implemented at all.

2.4. Significance of international documents for rural development and land management

Effective guidelines for rural development are significantly important for CEECs seeking to solve all problems occurring after recent land reform. Rational and sustainable rural development is ratified in further international documents. Today provisions of these documents are reflected in many national strategic documents, frameworks and laws of Western European and Central and Eastern European countries.

The 6th Conference of European Ministers responsible for Regional Planning held at Torremolinos (Spain) in 1983 considered regional/spatial planning at European level and approved long term planning principles set out in the Torremolinos

Charter where the fundamental objectives of regional/spatial planning have to seek:

- Balanced socio-economic development of the regions;
- Improvement of the quality of life;
- Responsible management of natural resources and protection of the environment; and
- Rational use of land (European Ministers responsible for Regional Planning, 1983).

European Ministers during the conference set the specific objective regarding rural areas aiming to create acceptable living conditions in the countryside, as regards all economic, social, cultural and ecological aspects as well as infrastructures and amenities, while distinguishing between under-developed and peripheral rural regions and those close to large conurbations (European Ministers responsible for Regional Planning, 1983).

For some, time has not changed the growing concern for the need to protect the environment through sustainable forms of land use. The United Nations (1987) defined sustainable development as:

"a type of development that manages to respond to the needs of the present generation without putting at risk the availability of resources for future generations, by maintaining the balance between ecological, economic and social factors".

The United Nations has made significant contribution in that sustainability factors are important worldwide and are embedded in many international development strategies and declarations. An example is in Agenda 21 adopted in Rio de Janeiro at the first UN Conference on Environment and Development (UNCED) in 1992. Agenda 21 recognizes the necessity and requests nations to adopt a model of sustainable development. This trend is confirmed by the outcome at the Rio de Janeiro conference – the first principle in the Rio Declaration:

"Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature." (United Nations, 2011).

The Parliamentary Assembly of the Council of Europe stresses the importance of agricultural policy in rural development, as it is declared in the European Charter for Rural Areas, agriculture and nature maintenance works are vital functions for rural areas in all parts of Europe. The member states of the Council of Europe have ratified, that the principle of sustainable development should be reflected in all policies applicable to rural areas (Council of Europe, 1996).

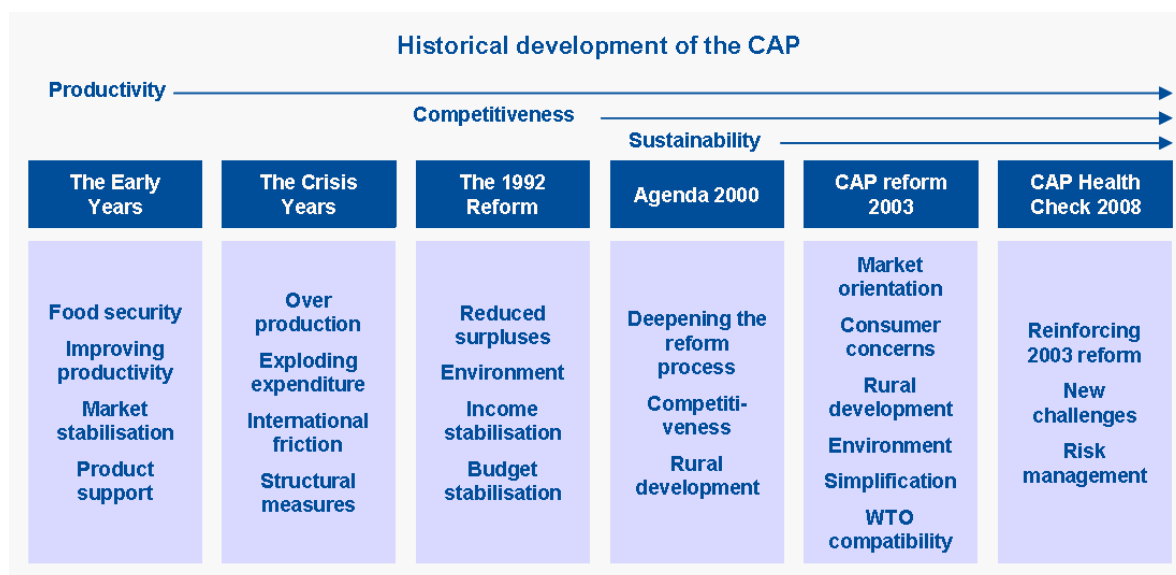
Another significant declaration in the same year regarding rural development in the context of the European Union was held at the European Conference on Rural Development in Cork, Ireland. All conference participants agreed to urge Europe's policy-makers:

- to raise public awareness about the importance of making a new start in rural development policy;
- to make rural areas more attractive to live and to work in, and become centres of a more meaningful life for a growing diversity of people of all ages;
- to support this ten-point programme and co-operate as partners in the fulfilment of each and every one of the goals, which are embodied in this declaration.
- to play an active role in promoting sustainable rural development in an international context (EU Cork Conference on Rural Development, 1996).

One of the oldest policies of the European Union is Agricultural policy – the Common Agricultural Policy (CAP) which has roots from the 1950s (European Commission, 2013b). European Commission (2013b) presents a history of the Common Agricultural Policy which has evolved depending on the age and this is reflected in a set priorities characterized by a certain era. Priorities have changed from assuring food security by increasing productivity, to the demand for

competitiveness and finally to the new requirement for sustainability. The priorities and the objectives of historical development of the CAP are shown in the time table (Figure 4).

Figure 4: Historical development of the CAP



Source: (European Commission, 2013b)

Originally, elements of the rural development policy were embedded in the CAP, but after 2000 it was reorganized and now CAP influences rural development policy through two pillars which are:

- the European Agricultural Guarantee Fund (EAGF) – direct payments and market measures; and
- the European Agricultural Fund for Rural Development (EAFRD) – multi-annual rural development measures (European Union, 2011).

CAP was integral and had linkages with the Lisbon strategy and the Gothenburg agenda as well. The original Lisbon Strategy with focus on more and better jobs and greater social cohesion and respect for the environment was launched in 2000 as a response to the challenges of globalisation and ageing. After a year in Gothenburg, a third pillar of sustainability appeared at the strategy – environment awareness measure. In 2005, in order to provide a greater sense of prioritisation the strategy was re-launched by focusing on growth and jobs objectives.

Principally, it aimed to provide people with a better standard of living in an environmentally and socially sustainable way (European Commission, 2010a).

In all the CEE countries the possibility to enter the European Union was the highest acceleration to start solving rural development obstructions. To enter the EU certain requirements were set not only for agriculture; Member States and organizations like World Bank also spent billions of Euros for pre-accession countries. This period is called the second wave, where improvements for integrated rural development had to be foreseen.

In 2002 the European Commission highlighted two main issues: the unfavourable farm structure in the candidate countries and the post-accession risk of growing rural unemployment and poverty (Commission of the European Communities, 2002; Davis, 2006). Dwyer et al. (2002) assert that there was an important policy process at national level – the candidate countries must have prepared their rural development plans for implementation before the 1st January, 2004. Rural Development Policy seeks to establish a coherent and sustainable framework for the future of Europe's rural areas (Commission of the European Communities, 2007) and is closely related to the improvement of living conditions in the countryside regarding housing, environment, infrastructure, communication, employment possibilities and land management, etc. (Backman, 2002; Maliené & Malys, 2008). There is a growing concern for the need to protect the environment through sustainable forms of land use.

In 1999 the European Union launched a pre-accession instrument – SAPARD (*Special Accession Programme for Agriculture & Rural Development*), a programme where (Dwyer et al., 2002) the main aim was to help prepare central institutions in the candidate countries for administration of the CAP finances. Meanwhile *Agenda2000* (first outlined in the documents published by the Commission in July 1997) was approved by all EU-15. A special fund of 520 million Euros per annum over the period of 2000 – 2006 was agreed at the Berlin Council for special assistance allocated between all the CEECs applicant countries for agricultural and rural development (Davis, 2006). Besides agricultural restructuring, it addressed

environmental concerns and the wider needs of rural areas (Commission of the European Communities, 2007); such as *Natura 2000*, an ecological network created by the EU giving high attention to environmental policy conserving natural habitats, as well as wild fauna and flora.

The EU has foreseen how to improve its member states' agriculture's competitiveness by using an integrated approach to rural development (which has been described by Palmer et al. 2003):

- Strengthening the rural economy by developing a policy environment conducive to broad-based growth and equitable sharing of benefits, supporting non-farm activities, and providing access to credit, markets, and infrastructural support;
- Social development in rural communities including dealing with employment, access to social services, water and sanitation, social integration and ageing, and rural-urban migration;
- Sustainable natural resource management including access to natural resources and environmental protection; and
- Human and social capital building which would lead eventually to the empowerment of the poor and greater participation in the development process by those usually left out of it.

In evaluating the RDP 2000-2006 period, it has been noticed that the SAPARD programme affected improvements in integration between agricultural and other interests of rural policy, stimulating more strategic approaches to farm-related development in certain countries, supporting innovative and appropriate schemes, and projects at local level (Dwyer et al., 2002). Also, the positive changes in rural development were felt. Each country has defined their own priorities to support agriculture and rural development. For example, in 2005 the EU countries largely implemented such measures determined by the Commission of the European Communities (2007): "Afforestation"; "Training"; "Other forestry measures"; "Investments in agricultural holdings"; "Early retirement"; "Improving processing and marketing of agricultural products" and "Diversification of agricultural activities". Less successful measures were "Financial engineering" and "Restoring

of agricultural potential". In general, RDP is co-financed by the EU and the member states' national budgets. The Commission of the European Communities (2007) found that national contribution varies from 20% in most of the new member states to more than 70% in Luxemburg.

The EU policy framework for rural development can be divided into four levels:

- European strategic guidelines;
- National strategies;
- Programmes; and
- Detailed implementation by thematic axis and measures.

Member States are free to set priorities in their own strategies, adjust programmes and to choose measures to meet their own needs to facilitate sustainable rural development. Strategic guidelines show how to reach common objectives whereby National Strategy Plans are prepared by each member state. The rural development policy framework offers a "menu" of 41 measures where from this menu Member States can choose what to include in their national or regional programmes, considering those measures that best suit the needs of their rural areas best (European Commission, 2013a).

A pleasant living and working environment is needed to attract enterprises to come to economically attractive regions; this is one of Europe's core objectives in the global framework (Jagt et al., 2007). The European Council emphasises the economic, environmental, and social elements of sustainability; the following three major objectives for RDP have been set for the period of 2007–2013:

- Increasing the competitiveness of the agricultural sector (Axis 1);
- Enhancing the environment and countryside through support for land management (Axis 2);
- Enhancing the quality of life in rural areas and promoting diversification of economic activities (Axis 3) (Commission of the European Communities, 2007).

To enhance the quality of life in rural areas, the *Leader* model is to be continued and consolidated at the EU level by integrating what used to be a *Community*

Initiative in the programming period of 2000-2006 as an obligatory element to the rural development programmes implemented by the member states during the period of 2007-2013 (Axis 4) (Commission of the European Communities, 2007). For this period the EU-27 countries have already foreseen priorities to support rural development. Chosen measures and foreseen investments in percentage differ from country to country, but the most popular and prominence measure is “Agri-environment payments” chosen by 17 member states (see Table 2). Rural Development is mainly financed by the European Agricultural Fund for Rural Development (EAFRD).

The constant change and update of the EU supported programmes, as well as the enlargement of the EU itself will potentially stimulate change in rural policy, but the core objectives pointing to the viable rural areas creation will remain.

In most Western Europe countries, land consolidation is an integrated part in the context of a broader rural development. In the European Union member states it is often implemented with the EU co-finance under the national rural development programme. All the EU member countries prepare rural development programmes for the current period (European Commission, 2006). The EU Council Regulation for support for rural development defined the land consolidation as one of the actions which can be supported under the programme.

Land consolidation is a rural development instrument focused on comprehensively sustainable rural area rearrangement, where the fundamental action of the land consolidation process is land readjustment, which could be implemented on a voluntary or compulsory basis (depending upon the country policy).

Table 2: Main Rural Development measures of the 2007-2013 programming period chosen by member states

No.	Measure	Country
1.	Axis II Agri-environment payments	Belgium, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, Italy, Cyprus, Luxemburg, Netherlands, Austria, Slovenia, Finland, Sweden, United Kingdom
2.	Axis I Modernisation of agricultural holdings	Latvia, Lithuania, Hungary
3.	Axis II Natural handicap payments to farmers in mountain areas	France, Slovakia
4.	Axis III Village renewal and development	Romania, Bulgaria
5.	Axis III Conservation and upgrading of the rural heritage	Malta
6.	Axis II Payments to farmers in areas with handicaps, other than mountain areas	Poland
7.	Axis I Infrastructure related to the development and adaptation of agriculture and forestry	Portugal

Source: (Commission of the European Communities, 2007)

It is the intention of the EU Commission that the new rural development programmes and the subsequent projects shall be as integrated as possible and with a cross sector approach (European Commission, 2006). Land consolidation is an excellent instrument to implement rural development projects with multiple purposes and goals in the same land consolidation project, for example:

- Improvement of agricultural structures (reduction of fragmentation and enlargement of farm sizes).
- Implementation of nature - and environmental projects (i.e. according to the EU *Natura 2000* - and Water framework directives).
- National and local infrastructure projects (i.e. new highways and railways, local rural roads and improved access to parcels) (Hartvigsen, 2006).

The period between 2007 – 2013 has ended and all projects from this period will be completed in 2015. It is very important that all efforts that have started to revitalize rural areas should continue in the same direction and that all highlighted gaps from this finishing period will be considered in the next period of 2014-2020. European Commission (2010b) seeks to assure the delivery of sustainable futures for member countries with more jobs and better lives through a prepared strategy – Europe 2020, in order to deal with the challenges brought by globalisation, pressure on resources, and an ageing population. According to this strategy, the Commission’s Rural Development programme for 2014-2020 gives first priority and fosters scientific attention to environmentally-friendly production methods and land management (Figure 5).

Figure 5: Priorities for coming 2014-2020 period



Source: (European Commission, 2013c)

Several EU funds provide additional support for rural areas alongside the European Agricultural Fund for Rural Development, namely:

- the European Regional Development Fund (ERDF);
- the European Social Fund (ESF);
- the Cohesion Fund (CF); and
- the European Maritime and Fisheries Fund (EMFF).

In order to deliver greater European added value and to maximise synergies, in 2014-2020 all European Structural and Investments funds (ESI funds) will concentrate their support on achieving the EU2020 headline targets and will be coordinated under a Common Strategic Framework (CSF) (European Commission, 2013c).

2.5. Introduction of land consolidation in the CEE countries' land management toolbox

As the land reform processes had been carried out in a superficial way, it therefore became apparent that it was necessary to look for other more effective land management tools. Van Dijk (2003b) stressed that in the past Western European countries have faced fragmentation of similar severity as exists today in CEECs. To tackle this problem, several instruments that evolved in most of the Western European countries will be necessary – land readjustment and land consolidation.

Van Dijk (2007), hereafter, maintains that the FAO is expecting very much from land consolidation and is preparing prototype legislation on land consolidation as a “blueprint” for Central European countries, drawn up with experts from the relevant countries in the West (Giovarelli & Bledsoe, 2001). Recent FAO activities (pilot projects, workshops, etc.) in Ukraine, Georgia and Moldova show that in the nearest future land consolidation will remain as the most important instrument in restructuring inefficient agricultural properties in many former Soviet countries (Ossko & Sonnenberg, 2002). With the help of experts from WEC all the processes of LC, as well as the participating parties, should be considered in order to secure transparency, and engender a positive attitude in the society.

The CEECs after the collapse of the Soviet regime started writing their chapter of new land consolidation history, as the transformation from planned to market economy started more than 20 years ago. Local land managers from many CEE countries have launched and successfully finished pilot projects with support and supervision from Western European land consolidation experts. Pilot projects were mainly based on a voluntary land consolidation model (land owners are free to decide to participate in the project or refuse) widely used in Western European countries, which has the advantage that it could be applied without having land consolidation process regulated by legal acts. These pilots' beneficiary countries are free to prepare their land consolidation legislation. Countries still keep a good course: were and are working on national land consolidation strategy development, establishing Land Funds/Banks, training their staff and measuring

benefits from pilot projects, etc. It is understandable that pilot land consolidation projects look very poor when compared to the initial land consolidation approach in many WEC.

Land consolidation objectives have changed from a narrow agricultural focus to the broad rural development influenced by global and European “development movements” as suggested by the Torremolinos Charter (1983), Brundtland Commission (1987), Agenda 21 (1992), European Charter for Rural Areas (1996), Cork declaration (1996), etc. Today, especially Western European countries have comprehensive land consolidation processes which are very much welcomed by the Central and Eastern European countries politicians, professional community and participants. Development actions are focused not only on land parcels rearrangement to achieve efficiency in agricultural production, but also involving sustainability measures such as: strengthening local community relations (as target is one for everyone – better future life in rural areas); establishment of new alternative services in rural areas (such as country cognitive tourism); the creation of green zones and public spaces; measures minimizing inequality between rural and urban areas by improvements focused on better housing, infrastructure (i.e. roads, drainage) alternative energy resources, employment, education, health services, environment, cultural opportunities, etc. Land consolidation actions can be broadened by relations with Rural Development Programmes such as early retirement programmes to support young innovative farmers, eco farming, etc. Vivid evidence that land consolidation beside agricultural improvement considers the environment – projects in environmentally sensitive Natura2000 areas, re-naturalisation projects, contaminated land conversion, shelters development (i.e. hedge rows) for vanishing species, CO₂ emission and water pollution minimisation (i.e. road network redevelopment), etc. Sustainable land consolidation assures rational land use and rural viability.

Unfortunately this powerful instrument is sometimes, even today mainly in CEECs, still used only in a very narrow sense, mostly focused on economic concerns – farm enlargement, without taking into account climate change prevention, environment protection measures and alternative employment creation, etc. The main actions in

CEE countries focus now only on how to enlarge farm holdings and create convenient local road networks or drainage systems through construction/renovation (in many cases which stays only on project plans). Implementing land consolidation projects, which create only large agricultural production units, are not valuable and sometimes even detrimental for endangered species. If land consolidation is implemented considering rising sustainability factors, it should support environmental protection and natural resource management since during one project it could protect sensitive nature areas and create new working places in these territories.

Today it is not very important which land consolidation model will be copied or, as experts says, used as a blueprint in the CEEC; land consolidation should be implemented to fulfil all 6 priorities from the new EU Rural Development Programme for the next coming period of 2014-2020.

2.6. Chapter summary

- This chapter has discussed the dominating problems as land fragmentation, land abandonment, and land use conflicts, etc. around Central and Eastern European countries, as well as, the cause of these problems which largely evolved as a result of land reform following the collapse of the Soviet regime.
- Analysed literature emphasised that there is an increasing need to seek (apart from others) effective land management instruments, which are able to resolve actual situations regarding rational and environmentally friendly land use approaches in the countryside in order to return their social and economic vitality.
- International documents call for sustainable development. Authorities from political and scientific arenas are focused on developing of effective strategies, which can influence climate change, low carbon and the effective management of resources to be able to lower the risk of natural disasters. These objectives are embedded in agricultural, rural development policies

and strategies. Fixed trends in the strategies stay the same, with changes only in measures and sources of financial support.

- The greatest impetus for solving the above-mentioned problems in CEEC was the EU support for pre-accession countries. Today all Member States have to follow the common strategies, and the EU Rural Development policy, which are focused on the creation of sustainable rural areas.
- CEE countries by introducing land consolidation through a land management tool-box and using international support have started to change the picture in the rural areas. These changes often are not so significant, mainly being focused on simple merging of land plots, but it is one step forward taking into account that many land owners of the post-Soviet countries are emotionally tied with recently restored ownership.

Chapter 3

Methodology

3.1. Introduction

The methodological design used in this work is based on social research methods in order to answer to the research questions and will be presented here in this chapter. The author presents the methods used in order to gather primary and secondary research data, describes how the target groups were selected, together with the key persons for interviews, and what the questionnaires revealed. All acquired data was used to develop a framework for sustainable rural areas through land consolidation in Lithuania.

3.2. Literature review

As land consolidation is not a new topic in many Western European countries, there is a wealth of relevant material. An initial literature review of relevant publications, such as existing academic literature, country reports and strategies was conducted. Theoretical and empirical research methods were adopted: analysis, summarization, extrapolation and abstraction of legal acts, scientific papers, statistical reports and case studies.

The author used Liverpool John Moores University's electronic library access to search scientific databases to find the most recent sources. The prime keyword was "land consolidation", but keywords such as "rural land readjustment", "rural land rearrangement", "land re-allotment plan", "re-allocation of parcels", "land re-parcelling", and "land amelioration" were also used. The analysis of relevant material clarified the demand for a more detailed analysis since land consolidation in different countries has many varied objectives and definitions. The most significant papers published by the Food and Agriculture Organization under the United Nations (FAO) and the International Federation of Surveyors (FIG) were

initially reviewed in order to clarify and expand the author's knowledge concerning the concepts of international land consolidation methodologies and to examine the ways in which sustainable rural development is achieved in various European countries. This helped identify the most pertinent issues within the research topic. Through reviewing the historical backgrounds of land reform following the Soviet regime in Chapter 2, it became apparent that land consolidation has a great potential in many Central and Eastern European countries in the development of a viable countryside. Many case studies in Central and Eastern European countries have been prepared by Western European experts who supervised the development of the pilot projects, guided the preparation of legislation, etc. In fact, every year new publications about land consolidation practice in various countries appear at FIG and FAO websites. Sustainable countryside development through land consolidation is identified on the European agenda.

The definitive information about land management instruments is only available in national legal acts, realization reports and strategic documents. Legal acts were available on institutional websites and were also occasionally obtained from interviewees. Furthermore, the online institutional libraries provided very valuable resources in terms of initial research into the history, purpose and practices of individual countries. When analysing such material, a researcher may expect to deal with uncertainties concerning the legal acts since they are prepared in their respective native languages and translations may be vague, inconsistent, or often don't exist. There are sufficient materials in the English language about the peculiarities of German, Danish, Dutch and Swedish procedures, although the situation is quite different in the case of other countries such as Italy, France, Switzerland, etc. An analysis of legal acts without the support of local experts is hardly possible. Analysed original legal acts, their translations and verification with other research methods (i.e. interviews, online questionnaires) are provided in Chapter 4 and 5. This allowed the author to make comprehensive comparisons between land consolidation methodologies.

Basically, the literature review allowed shaping the initial process picture and the knowledge. However, the literature review, mainly being a secondary material cannot provide all the data required to achieve the research aim and objectives and has to be supplemented with other research methods.

3.3. Interviews

In seeking to perform such a comprehensive programme of research, the availability of good quality data is very critical. Interviews are one of the methods that may be used to acquire such on the specific topic. An analysis of the legislation, case studies and scientific papers is one part, but in order to understand how it works in reality, a picture has to be supplemented with direct evidence from interviews with the parties involved. In order to conduct a specific interview, it is necessary to firstly identify the target group.

The author was seeking to obtain as much useful data from the interviewees as possible by using the in-depth intensive interview model when interviewing international land consolidation experts via e-mail as described in Chapter 4. After investigating the key structures of the land consolidation procedure in the literature, experts were invited to describe an actual situation and the peculiarities that exist in their countries. According to Charmaz (2006, p.25), when performing intensive interviews the interviewer is there to “listen”, to observe with sensitivity, and to encourage the participant to respond in a manner in which the participant does most of the “talking”.

The author of this thesis participated in various professional workshops, conferences and seminars during which many international land consolidation experts (practitioners and scientists) were met. Eleven experts from these events were interviewed by email when analysing international land consolidation practices described in Chapter 4. The most significant contacts were established at the following events:

- FARLAND project “Future Approaches to Land Development” (INTERREG IIC) regional study visit 4-8 June 2007, Lithuania;

- 1st International Land Management Symposium “Land Management Strategies for Improving Urban-Rural Inter-Relationships - Best Practice and Regional Solutions” 10-11 May 2010, Hanover, Germany;
- European Academy of Land Use and Development symposium “Sustainability: Focus on Urban and Peri-Urban Development” 1-3 September 2011, Liverpool, UK, and
- “3rd international LANDNET workshop on Land Market Development and Land Consolidation” 13-16 February 2012, Budapest, Hungary.

According to Marczyk et al. (2005) the effectiveness of an interview depends on how it is structured. Robson (2002, p.270) highlights the advantage of a semi-structured interview: while having predetermined questions, the wording of the questions may be changed and explanations given; particular questions which seem inappropriate with one interviewee can be omitted, or additional ones included. Such an interview can guarantee to the researcher that the respondent tells his opinion without others’ influence (Cohen et al., 2007, p.221). Semi-structured interviews were felt to be the most appropriate method for their flexibility to explore the raised issues of interest.

When analysing the land consolidation process in Lithuania it was noted that in the majority of cases, the development of land consolidation plans involves the interaction between two players: land owners and the private land surveyor. The author used in-depth, semi-structured interviews with these two target groups in order to gather reflections for further data analysis. The semi-structured interview was performed on a face-to-face basis using questionnaires with private land surveyors (contractors) and project initiators (actual beneficiaries – landowners). Further here it is explained about performed interviews with these two target groups.

In Lithuania LC projects usually last at least two years and are implemented by private land surveyors. During this two-year period the surveyor interviews all project participants and negotiates with various authorities. This active involvement allows for the identification of inaction within legal acts which is then

reported to the land management authorities. Active land management authority participation is mainly present at the initial phase of the project, until defining the project area and selecting the contractor (private land surveyor). When the contractor is selected, the land management authority participates in the project at regular intervals, mainly in public hearings, when and if approvals or advice are needed. It is possible to safely assume that land surveyors are responsible for the implementation of two-thirds of all land consolidation project processes carried out in Lithuania. This is the reason why land surveyors' opinion has to be considered. When interviewing 8 land surveyors who practised in implementing land consolidation projects, questions were directed towards the process of workflow stages to seek detailed descriptions of the difficulties faced and the solutions. The answers were recorded in the notebook. The respondent's contacts were developed through professional conferences and seminars involving Lithuanian land management authorities and land surveyors. Between 2006 and 2007, the FAO and the National Land Service, under the Lithuanian Ministry of Agriculture, organised a training course on the "Support to the preparation of an operational land consolidation system" where the author met a number of land management authorities and land surveyors directly involved in the land consolidation process. Those contacts were used in semi-structured interviews in order to get evidence about the peculiarities of the land consolidation workflow to enhance the analysis of national legal acts.

As the author was implementing a LC project in Lithuania between 2005 and 2008, the landowners of the project were interviewed face-to-face using semi-structured interviews. When interviewing land owners, a printed questionnaire was used that included various questions not only directed towards the land consolidation project, but on the whole socio-economic picture of their territory. The question of attitude was organised at the different stages of the project:

- at the beginning, just after starting the project, when each land owner had to be interviewed about their wishes regarding the land consolidation process; and

- at the end of the project – the date of final project approval when all project participants must participate in order to sign the notary agreement (a copy of the questionnaire with translation is available in Appendix 1).

In Chapter 5 it is described how the attitude of landowners changes at the different project stages. It has to be considered that reflections provided here are from the second LC stage (period 2005-2008) as the third stage, started in 2012, was ongoing and estimated to finish only in the spring of 2015. Owing to time and financial constraints, the interviews of the participants (landowners) of the land consolidation project were conducted in a single land consolidation project area, where the author worked as the project manager.

Interviews (semi-structured interviews) were an effective method to acquire a lot of comprehensive data (especially qualitative) from the parties involved, but at the same time, it was less consistent, very time consuming when performing it and during post-processing.

3.4. Online questionnaires

In seeking to achieve the research objectives, the author found that online questionnaires were a more effective method to gather important data according to the advantages described by Bryman (2008, p.653) and Cohen et al. (2007, p.229), but mainly due to the time and number of respondents who may be invited and responses received, geographical location, and implementation cost. The Bristol Online Survey (www.survey.bris.ac.uk) solution was used to perform the online survey, as this facility is available for Liverpool John Moores University researchers. Bristol Online Surveys (BOS) is an easy-to-use service, where technical knowledge is not required, that allows researchers to develop, deploy, and analyse surveys via the Web (The University of Bristol, n.d.). The researcher using BOS develops a questionnaire, sets up survey settings, and launches the survey where a special survey hyperlink is generated and may be circulated for the target groups. The researcher is able to track the actual response rate and

respondents answers. When the survey is completed, the survey results can be downloaded and analysed using specific software (i.e. SPSS).

The author used the online questionnaire only in those cases where it was assured to meet the anticipated minimum of thirty respondents , what Cohen et al. (2007, p.101) called – “rule of thumb”. To receive useful data, the questionnaires had an open and closed structure to the questions.

In Lithuania, after the implementation of the land consolidation project the planned infrastructure development has to be constructed from the municipal budget. Mainly two municipal departments (architecture and agricultural department) participate in the process, but their participation is formal. Participation is necessary since at the final stage, the developed land consolidation project plan has to be approved. The author gaining knowledge about the expectations of landowners during the land consolidation process from the interviews used the Bristol Online Surveys system to reveal local government (municipality) attitudes and expectations from land consolidation. In Lithuania, there are 60 municipalities, of which 53 are district municipalities. After preparing the questionnaire, the author emailed an invitation to municipal GIS specialists from the architecture and agricultural departments to participate in the survey (special hyperlink was generated - http://www.survey.ljmu.ac.uk/zk_savivalda). Specialist contacts were available at each municipality website. It has to be highlighted that this survey was prepared in Lithuanian as for many respondents it is difficult for them to understand survey questions in English (especially for respondents from the agricultural department). 42 respondents participated in this survey and gave their attitudes to the land consolidation process (findings described in Chapter 5).

The questionnaire developed at Bristol Online Surveys was also used to obtain opinions from international land management experts who had scientific and/or practical knowledge about land consolidation. Experts were invited to indicate their opinion about criteria showing the potential for comprehensive land consolidation at different scales: municipal and project area (findings are provided

in Chapter 6). The author, after analysing literature, identified criteria that showed the potential for land consolidation. Having identified the criteria, they were organized in the questionnaire at different scales: municipal and project area. The author of the thesis focused on 39 European countries and was expecting to receive at least one opinion from each country. In selecting target groups, the author used the same contacts as for interviews mentioned in the previous section (3.3), but it was a challenging task to find relevant contacts from Portugal, Italy, Greece, Iceland, Czech Republic and Luxemburg. In order to find relevant experts from those countries, several members from the FIG *Commission* ⁷¹ were asked to recommend experts from the missing countries. The survey was active for 2 months and 8 days, but the summer and holiday period influenced the response rate, which was 36%. The survey was distributed via email to a total of 194 land management experts having knowledge about land consolidation, from which 69 responses were obtained. Invitation to participate in the survey was sent by email with covering letter and attached short instruction (describing survey aim, giving some survey sample questions and hyperlink to the survey). Three respondents from Lithuania were helped by the author to fill in this survey as they had some difficulties with the English language. There were a few international respondents who dropped out during the process and failed to complete the questionnaire. Their responses were not considered as almost all questions were mandatory and Bristol Online Surveys system does not allow for the submissions of partially filled questionnaires.

Notwithstanding the fact that respondents were purposively selected and were able to choose a convenient time to reflect their opinion, the author discovered on several occasions after launching the online questionnaires the main disadvantage identified by Bryman (2008, p.653)– the lack of motivation (or time) to fill in the questionnaire.

To motivate the respondents, the author used several methods. For local (Lithuanian) respondents the author had an advantage in having personal contact

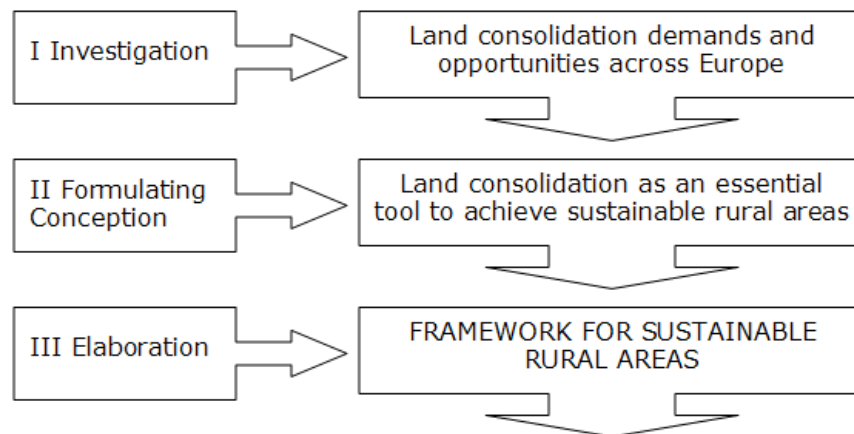
¹ Members of FIG Commission 7 are related with land management, cadastre and wide range of land policy instruments including land consolidation.

with each respondent and was able to call every respondent asking them to participate in the launched questionnaire. A different situation was experienced with international respondents. The map was developed and shared among invited respondents showing the countries invited to participate in the survey and the number of responses received from each country. Such a map stimulated those respondents invited to participate since they could observe that neighbour countries' respondents had already answered the survey. In addition, based on their international contacts with experts from other countries, they were also able to recommend further, valuable contacts. From this, the author was able to make contact with a number of recommended experts. Such a scenario is called a "snowball sampling" and described by Cohen et al. (2007, p.116) which helps establishing more contacts especially in narrow topics. Sometimes the author specifically sent a map with responses and asked respondents if they could recommend experts from other countries, which hadn't participated. A copy of the short instruction and invitation, and the questionnaire is available in Appendix 3.

3.5. Case study

Marczyk et al. (2005, p.147) explain that the goal of the case study is to provide an accurate and complete description about the case. The aim of this thesis is to incorporate best practices and develop a framework for sustainable rural areas in Lithuania, which could be transferred to other CEE countries. The methodology for drawing a sample framework of sustainability (Figure 6) is based on the WEC land consolidation methodologies analysis in the case study described in Chapter 4.

Figure 6: The methodology for drawing a sample framework of sustainability



Source: (Pašakarnis & Maliene, 2010)

Case studies analysing land consolidation methodologies in six Western European countries (Germany, France, Switzerland, Belgium, Finland and Cyprus) were performed by evaluating legal acts and various literature sources, and through interviewing local experts. Those experts interviewed shared relevant scientific papers, reports, and the most recently translated legal acts regulating the land consolidation process. If uncertainties arose after analysing the provided/recommended material, the experts were asked to clarify it. The case study model in this research has revealed how land consolidation works in selected countries in practice.

In order to comprehensively investigate the land consolidation process in Lithuania, the author has chosen to perform a case study of a 638 ha land consolidation project implemented in Telšiai County, Mažeikiai district in parts of the Židikai and Ukrinai cadastral areas. Cohen et al. (2007, p.257) highlights that a key issue in case study research is the selection of information. Comprehensive information and highly detailed data – all from primary sources, were available for the author as he was working as project manager implementing a particular project. This advantage simplified the research process and allowed a comprehensive picture of the project to be drawn from the beginning to its implementation using a wide range of solid data (i.e. cadastral databases, documents, reports, maps, etc.). The case study was enhanced through data from

interviews with landowners, land management authorities, and the planners who were allowed to perform the analysis of the comprehensive process. The author's observations are reflected in the case study with a strong description of the whole process (Chapter 5).

The last case study was performed through analysing and presenting the methodology for selecting potential regions and territories, suitable for comprehensive land consolidation in Lithuanian, using multiple criteria decision analysis (presented in the Chapter 6). Literature sources were analysed in order to identify criteria used in European countries. International land management experts having knowledge about land consolidation were invited to participate in an online questionnaire and present their opinion about criteria showing the potential for comprehensive land consolidation. Multiple criteria decision analysis methods were selected and applied in order to find out "best" and "worst" alternatives.

3.6. Multiple criteria decision analysis and GIS

People face delicate decisions concerning daily problems encountered in their professional and private lives: job interviews, evaluating suppliers and partnerships, university rankings, etc. (Ishizaka & Nemery, 2013). Some of our everyday problems are related to spatial decision-making: i.e. where to park a car, which hotel to rent for the vacations, etc. To answer these questions, various complex tools can be used. These tools can be as simple as "drawing on a rock" or as complex as 3-D augmented reality glasses enriched with specific GIS data. This is confirmed by Malczewski's (1999) statement: a decision problem which has a geographical reference component can be called a spatial decision problem.

Researchers choose Multi-Criteria Decision Analysis (MCDA) for its ability to deal with numerous conflicting criteria – such as economic, social and environmental factors, of both a quantitative and qualitative nature – in a single evaluation process (Mulliner, 2013). The core element is still the decision maker, although MCDA provides the possibility of exploring different spatial alternatives (Beinat &

Nijkamp, 1998). MCDA is a discipline that encompasses mathematics, management, informatics, psychology, social science, and economics, etc., which is the reason why researchers and commercial companies have developed various software programs over the last decade to help users structure and solve their decision problems (Ishizaka & Nemery, 2013).

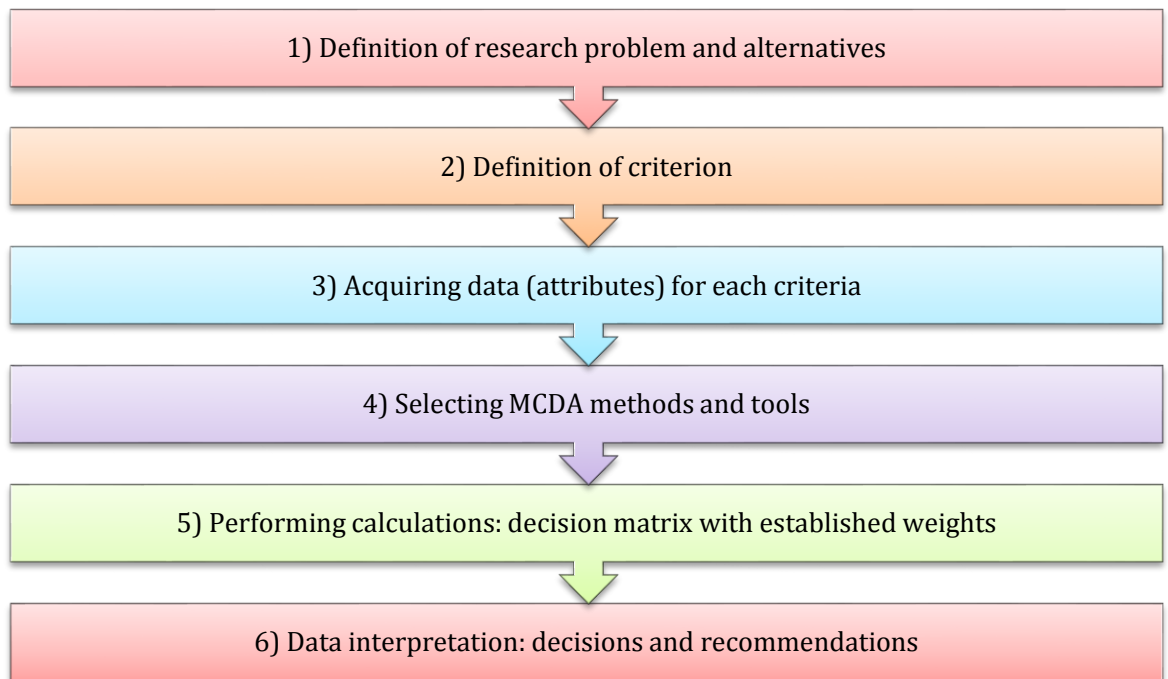
All land consolidation experts will agree that during a comprehensive land consolidation process there are various “conflicts” - not only between the parties, but also between objectives and the balance between social, economic and environmental aspects, which is permanent. Demetriou (2012) in his thesis reviewed various applications (environment, agriculture, transportation, etc.) where Spatial Decision Support Systems (SDSS) supports semi-structured spatial decision problems and, based on this discovered, how SDSS can be applied to the land consolidation process.

Triantaphyllou (2000) noted that many Multi-Criteria Decision Making methods have been proposed and developed since the sixties. Methods have been developed to support the decision-maker in their unique and personal decision process in providing stepping-stones and techniques for finding a compromise solution (Ishizaka & Nemery, 2013). Guitouni and Martel (1998), Ishizaka and Nemery (2013) notice that none of the methods is perfect nor can they be applied to all decision-making situations. They explain that each method has its own limitations, particularities, hypotheses, premises and perspectives. According to Munda et al. (1998), multi-criteria evaluation techniques can help to provide more insight into the nature of conflicts and into ways to arrive at political compromises in the case of divergent preferences in a multi-group or committee system, so increasing the transparency of the choice process. Beinart (1997, p.40) draws a fundamental statement about MCDA suggesting that the “best” alternative with the highest value can be interpreted only as “better than” other alternatives involved in decision making.

A single most important step in solving any MCDM problem is to correctly define the problem (Triantaphyllou, 2000). The author, following this statement, has

made a decision using MCDA to solve the ranking problem (conflicting objectives) from the most preferred to the least preferred alternatives when selecting potential territories suitable for comprehensive land consolidation at different scales: municipal and project territory level. Such decision-making is closely related to spatial information and this is why a Multiple Criteria Spatial Decision Support System (MC-SDSS) has to be involved. A MC-SDSS consists of a GIS (Geographic Information System) and a Multi-Criteria Analysis (MCA). The author in applying a MC-SDSS used six principal stages in the analysis process (Figure 7).

Figure 7: Principal stages applying Multiple Criteria Spatial Decision Support System



Source: Self study

GIS data relevance is a very important factor when solving spatial problems. The data for solving spatial problems usually is obtained by authorities and/or officials (secondary sources) or calculated using the GIS geo-processing functionality from various primary sources (i.e. sensors, surveying data, etc.). Goodchild and Kemp (1990) present their insights into why GIS is an ideal tool to analyse and solve multiple criteria problems. These can be summarised as:

- GIS databases combine spatial and non-spatial information;
- GIS generally has ideal data viewing capabilities - it allows for the efficient and effective visual examinations of solutions;
- GIS generally allows users to interactively modify solutions to perform sensitivity analysis; and
- GIS, by definition, should also contain spatial query and analytical capabilities such as measurement of area, distance measurement, overlay capability and corridor analysis.

In order to start solving problems, the decision-maker has to understand the “problem” (alternatives), carefully select criteria and clarify their weighting. Criteria definition is a very important part since the criteria has to be relevant to the research problem and the alternatives. When solving spatial decision problems, the criteria have unique data of certain territories. Criteria can be tightly related to the scale: one criterion can be very important at a village scale, but not important when making decision at a national scale. Criteria can be selected on the basis of legislation (i.e. programmatic documents, guidelines), scientific literature (i.e. case studies, publications) and expert opinion. According to Keeney and Raiffa (1976), a literature review can be one option, the other option or supplementing option being expert opinion. The author used this suggestion and selected criteria within literature, with other possible criteria being provided using the online survey by international experts. It has to be emphasised that selected criteria are tightly related with social, economic and environmental measures. International land management experts having knowledge about land consolidation were first asked their opinion regarding each criterion as to whether it is important to have that particular criterion in the evaluation or not. If the expert chose the answer that the criterion was not important, that means that such a criterion had to be excluded from the evaluation. If the expert decided that the criterion was important and it shows a potential for comprehensive land consolidation, then the expert was asked to tell whether the value of this criterion had to be higher or lower. Higher values mean that criteria during normalization have to be maximized, while lower criteria values have to be minimized. The number of criteria included influences the decision matrix sensitivity and criteria significance.

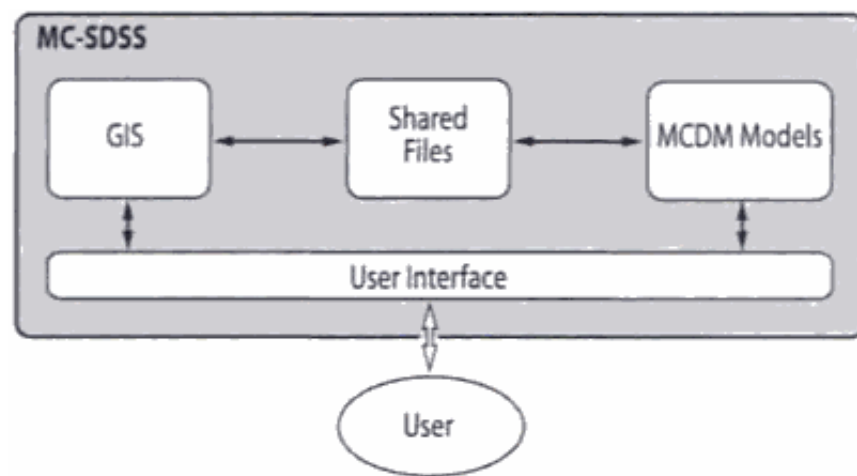
Attributes of each criterion can be absolute, qualitative and quantitative, data which will be normalized. Normalization unifies conflicting criteria units (i.e. hectares, euros, indexes, etc.) from 0.001 to 1.000. Normalization can be performed using the function: maximize or minimize. If the maximize function is used, the higher values are more preferred by the decision-maker and all values in the column have to be divided by the highest value, if lower values are preferred the minimize function is used and the division is performed by the lowest value.

Criteria weightings (significance) are usually estimated by the expert's opinion through ranking (subjectively) or mathematically calculated from criteria data (objectively). The author made the decision to establish criteria significances objectively – calculating significances from criteria values (from spatial data attributes). Calculated significances of criteria depend on the attribute value and applied function – maximize or minimize. In such a way data becomes similar to “an expert” telling its own significance. Such a method was applied in Lithuania and described by Kučas (2010) when evaluating forest fragmentation. The calculation of criteria significances in such a way – assures decision transparency, as only function (maximize or minimize) are defined by the decision maker (experts opinion).

Triantaphyllou (2000) recognizes SAW (Simple Additive Weighting) and TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution) as two of the most popular MCDA methods used today, but according to Fishburn (1967) SAW - also known as Weighted Sum Model (WSM) - is the earliest and the most widely used method. These multiple criteria evaluation methods are most commonly used in Lithuania as well (Podvezko, 2011). Wide applicability to solving problems within the built environment leaves no doubt as to the reliability of these methods. The author follows Ishizaka and Nemery's (2013, p.6) suggestion in choosing an appropriate MCDA method to look at the required input information and the outcomes. The main reason for selecting these methods is for the analysis – SAW and TOPSIS methods have the same structure of data input and output, which is really important when analysing data with GIS software. Esri ArcGIS for Desktop

Standard software version 10.1 with multiple criteria spatial decision support system extension as developed by Kučas (2010) (thereafter MC-SDSS) were simulated using selected criteria. Kučas (2010) developing a MC-SDSS extension has applied tight coupling strategy (Figure 8) explained by Malczewski (1999), that allowed GIS and MCDM components to run simultaneously and to share a common database; therefore, program control remains within the GIS when performing the MCDM analysis (Ascough et al., 2002; Kučas, 2010).

Figure 8: Tight MC-SDSS coupling strategy



Source: (Malczewski, 1999, p.304)

Applying SAW method matrix is normalized according these conditions:

If criterion is maximized:

$$\underline{X}_{ij} = \frac{X_{ij}}{X_j^{max}} \quad (1)$$

If criterion is minimized:

$$\underline{X}_{ij} = \frac{X_j^{min}}{X_{ij}} \quad (2)$$

where: X_{ij} – the value of the i -th criteria for the j -th alternative
 X_j^{max} – the biggest value of the i -th criteria
 X_j^{min} – the smallest value of the i -th criteria

After matrix normalization each value has to be multiplied with appropriate weighting and summed for each alternative. The biggest value shows the best alternative for the decision-maker.

The second chosen method – Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) – was developed by Yoon and Hwang in 1981, where the basic concept of this method is that the selected alternative should have the shortest distance (the Euclidean distance) from the ideal solution and the farthest distance from the negative ideal solution in some geometrical sense (Triantaphyllou, 2000). Simanaviciene and Ustinovichius (2010) compared TOPSIS method with SAW method and stated that TOPSIS method is more sensitive than SAW. If the data appears significant, value peaks TOPSIS method provides different output results compared with SAW method. Mulliner (2013) highlights that the TOPSIS method uses squared terms in the evaluation of criteria. The consequence of this is that very good and very bad data points (criteria values) can be exaggerated, having more of an impact on the final outcome, whereas average data points will not have as much of an impact (in comparison with methods that do not utilise squared terms) (ibid).

Applying TOPSIS method relative closeness to the ideal alternatives K_{BIT} is calculated by the formula (Kučas, 2010; Podvezko, 2011):

$$K_{BIT} = \frac{L_j^-}{L_j^+ + L_j^-} \quad (3)$$

where: L_j^+ - a distance between the compared i -th variant and the ideal alternative;

L_j^- - a distance between the compared i -th variant and the negatively ideal alternative;

The best alternative is that which has the highest K_{BIT} value (closer to one).

The SAW and TOPSIS methods chosen for this study are transparent, flexible and can be easily adapted by interest groups in order to assure that support will be granted to the right projects. It has been noted that the region of Lombardy (Italy)

also applies the SAW method in order to increase transparency and objectivity in assigning funds to projects of regional interest (land use and social facilities) (Giannerini et al., 1998).

After conducting alternative assessments with the MC-SDSS tool, output data visualisation has to be performed, and a map prepared showing the potential regions/territories for comprehensive land consolidation, to support decision-makers identifying TOP5 and/or TOP10 “best” and “worst” regions/territories.

Seeking to provide a practical example of how the method works in reality, the author, based on the summarized international expert opinions, conducted an empirical case study using MC-SDSS module on a created fishnet (grid of 16 cells representing municipalities) with simulated attribute data (Figure 9).

Figure 9: Developed fishnet with 16 alternatives

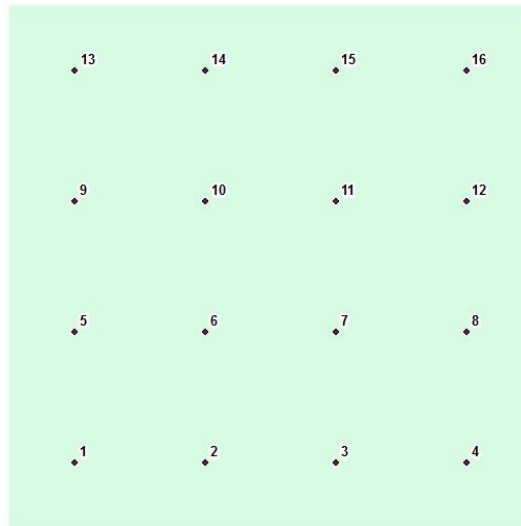
13	14	15	16
9	10	11	12
5	6	7	8
1	2	3	4

Source: Self study

Data were simulated as real data collection from the officials was not acquired for this research. During data simulation for Municipality1 was assigned “bad” values making it a worst alternative, while Municipality16 was the best alternative. 16 cells (alternatives) are equated as territories (municipalities). Further, according to possible real-life scenario, Municipality16 receives 16 applications for land consolidation (prospect project areas - Figure 10) where Project1 is filled with

“bad” values making it as a worst alternative, while Project16 is the best alternative.

Figure 10: Prospect project areas



Source: Self study

One key point has to be highlighted - zero (“Null”) values are omitted from simulated criteria. In those cases, if zero (“Null”) value appears in the data, it is better to change it with non-significant value (i.e. 0.001), because the division by zero is impossible. The fishnet developed in GIS is structured by 16 spatial objects (cells on the map), which are alternatives (rows) and criteria are attributes (columns) (Figure 11). The same structure is used with 16 project areas (points).

Figure 11: Fragment from ArcGIS attribute table

OID*	Shape*	IDAS	Num	Num	Num	Nu	Num	Num	Avera	Avera	Avera	Avera	Avera	Avera	Avera	Avera	Avera	Avera	Avera	Num	Avera	Average	Sh
1	Polygon	1	3	86,4	1	1	2	48,71	2,22	11,52	1,08	1,65	0,99	2,345	2	64	3	3	96	12	4,5	4	
2	Polygon	2	6	81	3	1	3	49,74	4,44	10,8	2,16	3,3	0,975	4,69	4	60	6	6	90	11	9	8	
3	Polygon	3	9	75,6	5	2	4	50,88	6,66	10,08	3,24	4,95	0,91	7,035	6	56	9	9	84	10	13,5	12	
4	Polygon	4	12	70,2	7	3	5	51,71	8,88	9,36	4,32	6,6	0,845	9,38	8	52	12	12	78	9	18	16	
5	Polygon	5	15	64,8	9	4	6	52,71	11,1	8,64	5,4	8,25	0,78	11,725	10	48	15	15	72	8	22,5	20	
6	Polygon	6	18	59,4	11	5	7	53,75	13,32	7,92	6,48	9,9	0,715	14,07	12	44	18	18	66	7	27	24	
7	Polygon	7	21	54	13	6	8	54,77	15,54	7,2	7,56	11,55	0,65	16,415	14	40	21	21	60	6	31,5	28	
8	Polygon	8	24	48,6	15	7	9	55,76	17,76	5,04	8,64	13,2	0,585	18,76	16	36	24	24	54	5	36	32	
9	Polygon	9	27	43,2	17	8	10	56,74	19,98	6,48	9,72	14,85	0,52	21,105	18	32	27	27	48	4	40,5	36	
10	Polygon	10	30	37,8	19	9	11	57,76	22,2	5,76	10,8	16,5	0,455	23,45	20	28	30	30	42	3	45	40	
11	Polygon	11	33	32,4	21	10	12	58,71	24,42	4,32	11,88	18,15	0,39	25,795	22	24	33	33	36	2	49,5	44	
12	Polygon	12	36	27	23	11	13	59,75	26,64	3,6	12,96	19,8	0,325	28,14	24	20	36	36	30	1	54	48	
13	Polygon	13	39	21,6	25	12	14	60,74	28,86	2,88	14,04	21,45	0,26	30,485	26	16	39	39	24	1	58,5	52	
14	Polygon	14	42	16,2	27	13	15	61,71	31,08	2,16	15,12	23,1	0,195	32,83	28	12	42	42	18	1	63	56	
15	Polygon	15	45	10,8	29	14	16	62,75	33,3	1,72	16,2	24,75	0,13	35,175	30	8	45	45	12	1	67,5	60	
16	Polygon	16	48	5,4	31	15	17	63,71	35,52	1,44	17,28	26,4	0,065	37,52	32	4	48	48	6	1	72	64	

Source: Self study

3.7. Chapter summary

- This chapter has presented applied research design and methodology, which were selected to answer the formulated research question. It applied a mixture of social research methods that were sequentially described as to how they were selected and used to obtain as well as analyse core data.
- An analysis of scientific and professional papers has provided a fundamental understanding about the research topic, which provided a basis for the application of further research methods: interviews, online questionnaires and case studies. Especially the literature review has assisted in the formulation of correct questions for interviews and online questionnaires. The literature review was one of the main methods to identify the criteria which could show the potential for comprehensive land consolidation.
- Interviews, despite the fact that they are time consuming, allowed enriching of the land consolidation process picture with qualitative data which was the core for case studies. Semi-structured interviews were felt to be the most appropriate method for their flexibility to explore the raised issues of interest.

- Online questionnaires were used to supplement case studies mainly with quantitative data from the number of respondents whose opinion is very important, but they are geographically scattered. The author used the online questionnaire (Bristol Online Surveys system) twice:
 - to ask architecture and agriculture specialists from Lithuanian district municipalities about their attitude to land consolidation; and
 - to ask international land management experts having knowledge in land consolidation about criteria showing potential for comprehensive land consolidation at municipal and project area scales.
- This chapter describes how three case studies were carried out in order to reach the research aim:
 - land consolidation methodologies in six selected Western European countries analysed (the basis for developing framework for Lithuania);
 - land consolidation methodology applied in Lithuania analysed (identified process workflow and results from the projects); and
 - revealed the criteria showing the potential for comprehensive land consolidation and MCDA methods application for the ranking of territories presented.
- A challenging task is to assign RDP funds in a transparent and objective way to the “right” land consolidation projects as they are related with “conflicting” criteria (i.e. balancing between project objectives) in a particular territory. The multi-criteria spatial decision support system has been chosen as the most suitable technique for decision support and visualising. Two, of the most popular MCDA methods were chosen (SAW and TOPSIS) to apply as they have the same structure of data input and output, which is very important when analysing data with GIS software.

Chapter 4

Land consolidation in Western European countries

4.1. Introduction

Land fragmentation was always an issue in European countries following the Napoleonic Code. To battle with land fragmentation specific land management instruments – land readjustment and land consolidation, as tools to battle this problem, were introduced. Many Western European countries have a long tradition for land consolidation. Even in England, for example, the “Enclosure” movement gradually replaced the pre-existing open structure of agricultural land use over the period c.1500–1880. For example in Denmark the land consolidation programme has roots dating more than 200 years back to the land reforms in the 1780s, where common use of the agricultural land in the villages was reformed into private ownership and private family farms were established (Hartvigsen, 2005).

The original goal of land consolidation remained traditionally the same everywhere – the improvement of general conditions for agriculture and forestry. Today, goals and the objectives of land consolidation vary from country to country. Land consolidation objectives are influenced by political, social, economic and environmental aspects. The general objective is, however, to improve land division and promote the appropriate use of the real estate (Vitikainen, 2004a), where the fundamental action of the land consolidation process is land readjustment. Throughout all countries land consolidation differs in various aspects: it could be implemented according to a “bottom-up” or “top down” approach, on a voluntary or compulsory basis (Thomas, 2006a; Thomas, 2006b), involving two land owners, or one village or even several cadastral territories and focused only on land parcels rearrangement or rural infrastructure creation with environmental protection measures.

Modern land consolidation practices in Western Europe developed after World War II in the second half of the 20th century, when parity between the rural and urban standards of living arose all over the Europe; there was a strong awareness of the importance of food security partly induced by wartime experiences (Van Dijk, 2004). Until the 1970's the focus was mainly on the improvement of agricultural structures via reducing fragmentation and enlarging farm sizes. More than twenty years ago, land consolidation in some Western European countries (WECs) changed from an agricultural farm-focused instrument to an instrument that is likely to cover public demand in land and to solve land use conflicts (Thomas, 2004) and from a landscape-destroying means to an environmentally friendly and sustainable land management instrument (Thomas, 1998). A third impetus came from the European Union regarding cohesion policy where land consolidation was investigated as an indispensable measure for integrated rural development (Thomas, 2006c).

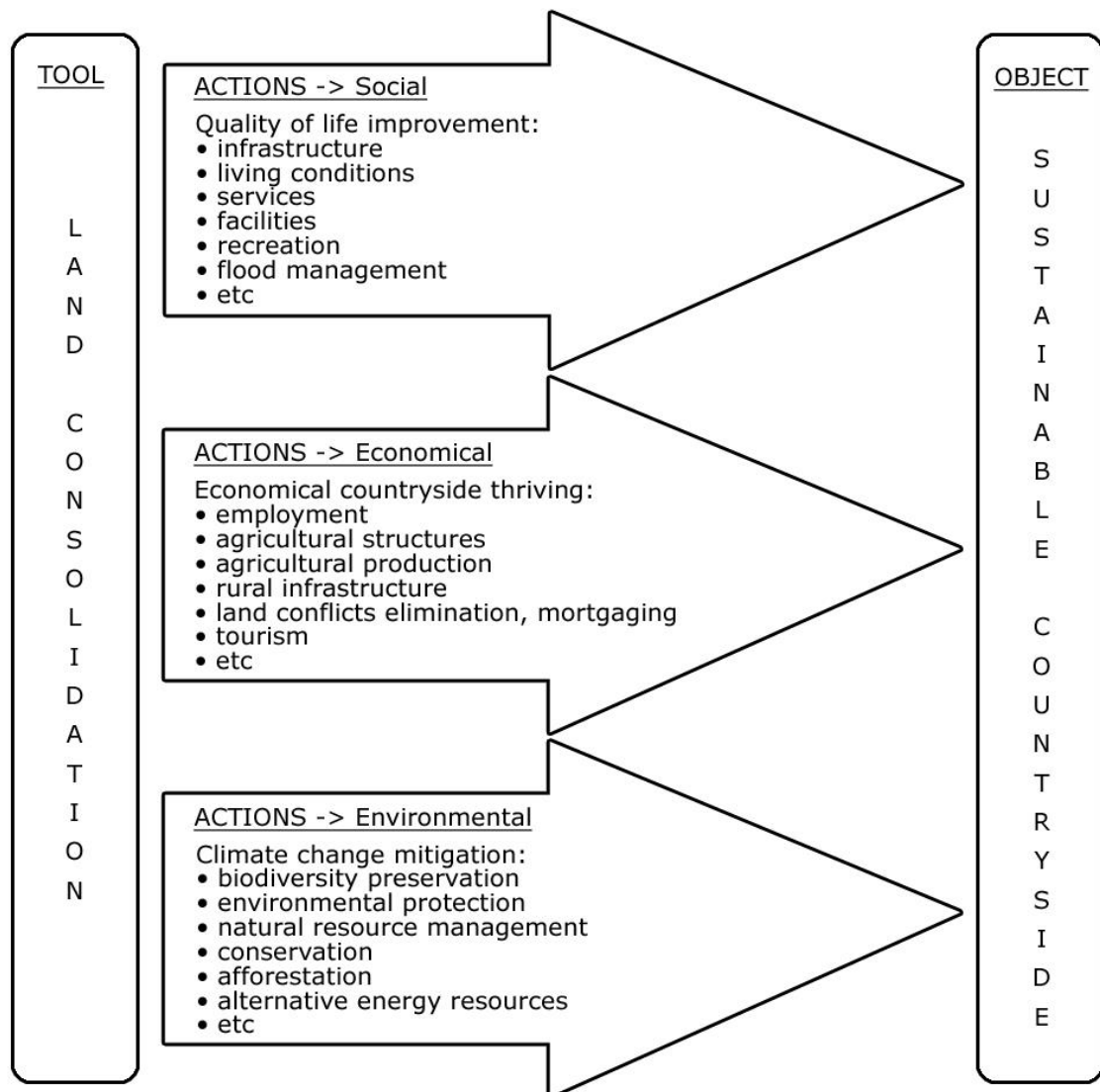
In the literature and among experts there is a tendency to differentiate between land consolidation in a narrow sense where the focus is on merging land parcels ("simple land consolidation") and land consolidation in a broader sense covering village renewal and infrastructure development ("comprehensive land consolidation" or "complex land consolidation"). Both types of land consolidation can be done in a simple or a sophisticated way depending on the technical implementation standards and the desired outcome (Thomas, 2006c). Practice and traditions using different types of LC models (voluntary or compulsory, simplified or complex) and well written legislation (with clear goal and objectives) provides encouragement for land owners to participate in LC projects (Pašakarnis et al., 2013a).

In many countries, including the European Union countries, intensive agriculture resulted in serious environmental problems such as pollution of soil, water and air; and a decrease in the number of wild animals and plants. Pereira et al. (2008) point out that in the 1980s with the introduction of the *White Book* by the European Commission, the attitude towards productivity has refocused on the agri-environmental targets. Today land consolidation is an effective instrument in

rural development, which includes improvements to agricultural production, employment, taxation policy, infrastructure, public facilities, housing and the protection of natural resources (Maliene & Weis, 2004; Maliene et al., 2005). To reach sustainable development of the rural areas during the process of land consolidation, some ecological aspects should be taken into account. If land consolidation is implemented in a comprehensive way, it could support environmental protection and natural resource management. The fragmentation of natural ecosystems as a result of inappropriate land consolidation has been recognized as one of the major causes of the decline of biodiversity, the others being wind and water erosion, and the lowering of the water table (Lisec et al., 2005). Land consolidation legislation is not panacea that is why it has direct or indirect connections to the land use legislation, building legislation, environmental protection legislation, nature conservation legislation, and to the agricultural, forest, road, water and expropriation legislation (Meuser, 1992, pp.67–91; Vitikainen, 2004b).

In order to reach the most recent sustainable development trends of the countryside during the process of land consolidation, social, economic and environmental aspects should be taken into account (see Figure 12). Priorities and desirable outcomes in land consolidation projects are defined in national strategies, regional strategies or even at each separate project level.

Figure 12: Land consolidation – tool to achieve sustainable rural development



Source: (Pašakarnis & Malienė, 2009)

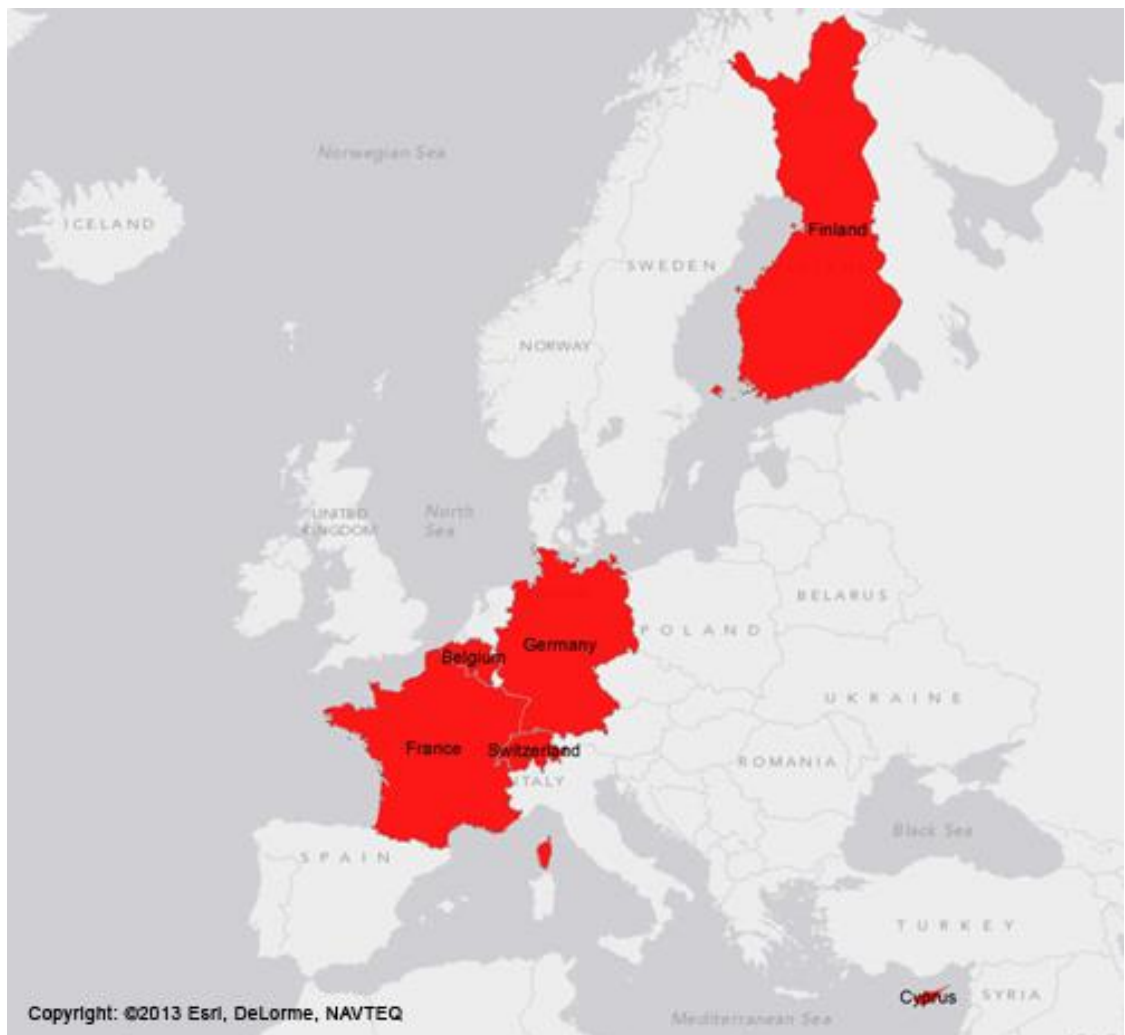
Land consolidation as a tool has to be well established in the land management legal framework with clear goals, objectives, process workflow and responsibilities. Land consolidation in project territory can run not only through merging and restructuring land ownership. Recent trends across Western European countries have showed a clear signal that it has increasingly become an instrument of rural development in the wider context (FIG, 2004). In modern societies, the importance of community welfare and environmental issues is taking priority. Currently used methodologies are influenced by the specific conditions in different countries and regions, by their historical and more recent political and

social development, and also by the natural conditions. The variety of land consolidation approaches can be revealed only through in depth national legal acts regulating the land consolidation process analysis, review of scientific literature and international experts' (practitioners and scientists in the area of LC) interviews. For this analysis of selected European countries, many similarities and some different practices are found in their application of land consolidation (Figure 13):

1. Germany – has a variety of specific LC models defined in the Land Consolidation Act, the practice of which was adopted by many other countries (Thomas, 2004; Thomas, 2006a; Thomas, 2007; Thomas, 2015);
2. France – with strong community, specific traditions and history in agriculture;
3. Switzerland – has mixed modes of peculiarities adopted from France and Germany;
4. The federal state of Belgium – different aspects (organisational structure, legal acts) may be observed in the Flanders and Wallonia regions;
5. Finland – with one modern land consolidation process, not only for agricultural concerns;
6. Cyprus – with a well working land consolidation legal base which was recently adopted from Germany and the Netherlands.

In this chapter special attention is paid to German land consolidation methodology and practice as these models or a composition of them can be seen in many other countries. Germany has long traditions applying land consolidation, well established and well working legislation in order to reach multifunctional objectives. Other countries selected for this analysis had slight differences in land consolidation application practice due to their traditions, policies, socio-economic and other circumstances.

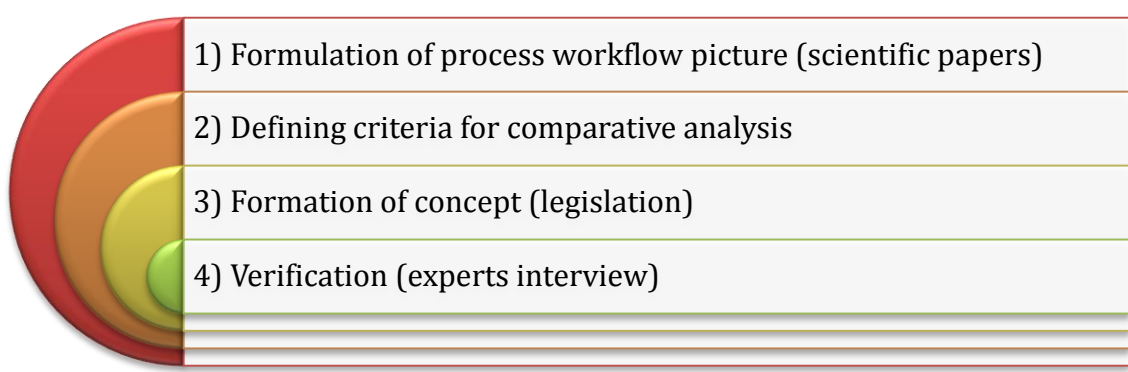
Figure 13: Selected countries for land consolidation legal acts analysis and comparison



Source: Self study

Analysis of selected countries was divided into four stages (see Figure 14).

Figure 14: Schema of comparative LC process analysis



Source: Self study

The purpose of analysing scientific papers was to observe abstract considerations and distinguish substantial criteria of the land consolidation process framework for further systematization. During the process very valuable sources with country profiles were found in FIG (International Federation of Surveyors) and FAO (Food and Agriculture Organization of the United Nations) resource databases. It was noticed that the first and most important criteria for evaluation – Legal acts (rules of the game), regulating the process and defining clear models – will be used to achieve specific goals and objectives. Every project starts only after the decision making process, which means that the project has to meet clearly defined requirements in order to start the procedure. The number of participating bodies in land consolidation depends on project objectives and magnitude. High public involvement in the development process allows effective solving of various issues. Land valuation is the core part of every land readjustment in the land consolidation process. Land valuation methods have to be accepted by the participants; they have to be fair and transparent as it affects property rights. From the beginning of the project financial issues are very important: what shares will be covered by project expenses, project measures implementation, are there any subsidies from the state and EU funds. These comparative criteria were found to be most important to the whole process from the beginning up to the implementation.

After detailed analysis of the land consolidation process, according to the defined criteria, the systematisation of the process reveals similarities and differences in selected countries. These findings are crucial, helping to understand land consolidation process peculiarities and could be used by other countries developing a land consolidation legal framework and methodology.

Finally, after the review of land consolidation practices in European countries this chapter will provide a literature investigation on the reasons which formed the land ownership structure in England where it has become evident that land consolidation is unnecessary. Land management instruments which are similar to land consolidation will be introduced in section 4.9.

4.2. Land consolidation in Germany

Before analysing the situation in Germany, it is necessary to highlight that twenty years since German unity have passed and there are 16 individual Federal States (Länder) where each State has its own capacity and legal instruments for planning, implementation and responsibility for enforcement (German Foundation for International Development, 1998). The German Länder applies the Federal LC Act and executes it through the so called implementation laws or orders¹. There are five major planning instruments with special emphasis on agricultural and rural development. They are related and complement each other:

1. *Landscape Planning*. Sector plan that contributes to or is part of spatial comprehensive planning;
2. *Agrarian Structural Development Planning*. Sector planning that contributes to spatial comprehensive (regional) planning.
3. Action Programme: Rural Area Development. *Comprehensive area development planning* which contributes to landscape management, agro-ecological and village renovation and infrastructure development and that amends spatial comprehensive planning for special areas with highest priority.
4. *Comprehensive Spatial (Regional-) Planning*. Development plans at (1) State, (2) Province (or Planning Region), and (3) local level.
5. *Land Consolidation Planning*. Comprehensive rural development plan. Components are land readjustment (reallocation), agricultural-, village- and rural development, nature protection, infrastructure development (German Foundation for International Development, 1998).

Furthermore, special focus on land consolidation will be provided as land consolidation projects are able to change the picture of the countryside. Rural roads are built, flood protection measures implemented, trees planted, or bodies of water “re-natured”. Everyone can immediately see the significant changes. The actual service of land consolidation almost always remains invisible: land

¹ Email from Joachim Thomas in February 2015

reorganisation. It includes the reorganisation of plots of land, the elimination of contradictions between the real estate cadastre and actual use, the re-measurement of all plot boundaries, and finally the legal documentation of ownership rights in the public books (Saxon State Office of Environment and Agriculture Geologie, 2013).

4.2.1. Land consolidation legal basis (legal act, LC objectives, LC models)

The German legal basis is very advanced due to its long practice and traditions. The German land consolidation chapter started in the middle of the 19th century as more or less a "voluntary" approach (had to be accepted by the majority) focusing on merging of land parcels. Historically, land consolidation started where groups of farmers took the initiative to regroup their parcels that were fragmented due to historical reasons, topographical and water management conditions or prevailing inheritance and succession laws (Van Huylenbroeck et al., 1996). Pahl-Weber & Henckel (2008) highlight that realignment of land parcels currently does not devote attention exclusively to agriculture, but covers wider planning of general rural concepts.

Land consolidation process which is valid in all Länder (Federal Republic of Germany) is carried out on the basis of the German Land Consolidation Act – Flurbereinigungsgesetz (FlurbG) summarized by Wilden (2007):

“The land consolidation area shall be reshaped with due regard for the respective structure of the landscape to serve the interests of the parties concerned as weighed against each other, to further the general use and development of the land and to benefit the general public. Village renewal measures may be taken; building plans and similar plans shall not prevent the built-up area of a village from being included in a Land Consolidation Plan. The legal situation shall be cleared (§ 37)”.

The German Land Consolidation Act rules how to deal not only with agricultural and forest land, but also covers village renewal. There are five different approaches described in the Land Consolidation Act (ArgeFlurb, 1995):

- 1) Comprehensive Land Consolidation (*Regelflurbereinigung*) (§ 1, 37).
- 2) Simplified Land Consolidation (*Vereinfachte Flurbereinigung*) (§ 86).
- 3) Land Consolidation Procedure in the Case of Permissible Compulsory Acquisition (*Unternehmensflurbereinigung*) (§ 87).
- 4) Accelerated Land Consolidation (*Beschleunigte Zusammenlegung*) (§ 91).
- 5) Voluntary Land Exchange (*Freiwilliger Landtausch*) (§ 103a).

The land consolidation approach is selected by land consolidation authorities depending on various parameters and desirable objectives, size of the project area, number of involved participants, economic situation and assumed time, etc.

The purpose of Comprehensive Land Consolidation (§ 1, 37) in the Land Consolidation Act is specified that the land consolidation project area

“shall be rearranged and scattered uneconomically shaped parcels shall be consolidated to meet modern managerial requirements and reshaped to obtain units of a more favourable location, shape and size; ways, roads, water bodies and other common facilities shall be provided, soil-conserving, soil-improving and landscaping measures shall be taken as well as any other measures improving the basic conditions of the farming enterprises, reducing the amount of work and facilitating farm management”.

Comprehensive Land Consolidation (also in the literature called standard or normal) approach aims to preserve and enforce the stability of farms, in parallel with the preservation of the environment and landscape and in harmony with agricultural production in the countryside. It aims to enhance the non-productive functions of agriculture, to improve the physical rural infrastructure in general and to promote the creation of off-farm employment (Thomas, 2004). Environmental awareness in these LC approaches was introduced through amendment of the Law in 1976. As for example Comprehensive Land Consolidation of all five approaches

constitutes the majority (37%) of the all implemented land consolidation projects during 1993 – 2012 in Saxony (Saxon State Office of Environment and Agriculture Geologie, 2013).

Simplified Land Consolidation (§ 86) which permits specific LC goals was proven to be successful during the economic and societal development of the young Federal Republic of Germany in 1994. This approach by the Saxony land consolidation authorities is called “little brother” of Comprehensive Land Consolidation due to the few process simplifications that is, no expropriation measures can be used (Saxon State Office of Environment and Agriculture Geologie, 2013). According to the § 86, it is dedicated for land development and can be initiated for such purposes:

- 1) *“To render possible or to carry out land development measures, especially measures to improve the agrarian structure, settlement measures, measures concerning the renewal of rural settlements, urban development, environmental protection, ecological water engineering, nature protection and landscape conservation or measures reshaping the external appearance of the village or the natural scenery.*
- 2) *To rectify unfavourable conditions of the general use and development of land resulting from or caused by the construction, alteration or removal of infrastructure facilities or similar measures.*
- 3) *To resolve conflicting interests concerning the use of land.*
- 4) *To carry out a requisite reorganization of land holdings in hamlets, small communities, areas with isolated farms, and in communities where a land consolidation procedure has already been carried out.”*

Land consolidation has a relation with infrastructure (in particular applicable by Comprehensive LC for public facilities) development, that is why according to the §40 (Land Consolidation Act)

“land may be contributed on a comparatively small scale as well for facilities servicing public transport or some other public interest, such as public ways and roads, railway or tramway facilities and other public

transport facilities, water supply, energy supply, sewage treatment and sewage disposal facilities, wind break, climate protection, fire protection and pollution protection facilities, playing and sports facilities as well as any facilities serving the protection of the natural environment landscape conservation or recreation.”

In Germany it is very popular to use land consolidation with compulsory measures as a tool for transport and communication infrastructure development – projects of public interest. Since infrastructure development affects many land owners that is why a voluntary approach would be too risky to apply due to inefficient administrative activities. Such a situation leads to the compulsory approach introduction within the law from 1920 in order to implement the ongoing planning and construction activities regarding the first highways in Germany in the 1930s¹. The compulsory land consolidation method is used because a lot of land owners and other concerned parties representing public interest (rural and infrastructural development) are involved in this process. Changing of minds or resistance can cause the project to fail where so many parties are involved; it is too expensive to make such a mistake. Thomas (2007) states that in the future the German instrument - “Land Consolidation in the Case of Permissible Compulsory Land Acquisition” (§ 87) – seems likely to be of high relevance in most of the European countries, especially in the case of public infrastructure projects (highway construction, flood protection, railway construction, water reservoirs, airport enlargement, etc.).

This model is based on looking for a Win-Win status for infrastructure development and safeguarding agriculture and is a real alternative for the expensive compulsory acquisition process which really minimizes the loss of land. § 87 rules the loss of land is solidary apportioned among a larger number of owners which means that there is no impact for certain individuals. The initiator of this procedure generally is the authority responsible for the compulsory acquisition which will consult with a Farmers’ Association to calculate the rate of

¹ Email from Joachim Thomas in August 2013

apportionment of the loss of land. If it is economically feasible the higher consolidation authority may use foreseen opportunity in the Land Consolidation Act to launch several models together in one LC project area: Comprehensive Land Consolidation, Simplified Land Consolidation and Land Consolidation Procedure in the Case of Permissible Compulsory Acquisition.

The German Land Consolidation Act is equipped with a fast and simple LC approach as well (Accelerated LC):

“In order to ensure that the improvement of production and working conditions in agriculture and forestry aimed at by land consolidation is realized as quickly as possible and in order to enable necessary measures for the protection of nature and of landscape conservation, an Accelerated Land Consolidation (§ 91) procedure may be carried out in communities, where the creation of a new road system and major water resources projects are, for the time being, not required.”

LC act §92, 93, 97 further says, that after a request to form larger units with such a procedure, from several land owners or the Farmers’ Association or authority responsible for the protection of nature and landscape conservation the consolidation authority regroups rural land in units of economic size and rational shapes or rearranges in cooperation with all land owners concerned. Alterations of existing ways and water bodies and the construction of new ones as well as soil improvements are restricted to the required minimum under this approach.

In the Land Consolidation Act there is a fifth method – Voluntary Land Exchange (§ 103a), which may be carried out having at least two applicants for such a procedure as a quick and simple method to reshape rural land parcels aiming at an improvement of the agrarian structure. Voluntary Land Exchange may also be carried out for the reasons of the protection of the natural environment or landscape conservation. Voluntary Land Exchange is a procedure under the direction of the consolidation authority by which rural land is exchanged by mutual consent of the holders of property rights in the parcels concerned. This method is quickest as the provisions concerning the Body of Participants, the valuation procedure, the principles of compensation, the provisional transfer of

possession and the appointment of a proxy shall not apply. The land to be exchanged shall be consolidated to form relatively large units. Wherever possible, whole parcels shall be exchanged and such measures as the construction of roads and water bodies as well as soil improvement measures shall be avoided. Thomas (2006b) pointed out why farmers tend to prefer such a model – it lasts only a few weeks or months, while Accelerated Land Consolidation (§ 91) takes about two years and up to five years for the higher intensity Comprehensive Land Consolidation (§ 1, 37).

In Germany, during the land consolidation process older or distant land owners have the opportunity to leave land if they do not want their own land back after land regulation, but rather prefer to be compensated with money (Saxon State Office of Environment and Agriculture Geologie, 2013).

Legislation allows a mixture of land consolidation models throughout the land consolidation area or in parts thereof, to be continued as an accelerated consolidation procedure or as a voluntary land exchange. The responsible LC authority has a power to decide which LC model to apply to reach stated results.

Thomas (2006c) highlighted that since the German unification in 1990 a "Law on Adjustment of Agriculture" (Landwirtschaftsanpassungsgesetz - LwAnpG) was available for the East German Länder (in the area of the former socialistic German Democratic Republic) – an addition to the Federal Land Consolidation Act; it is a special law concerning re-arrangement and adjustment of farms and rural real estate (refer to § 8 in LwAnpG). This legal Act was applied especially in the areas where agricultural production cooperatives were performing chaotic planning and disregarding land ownership.

4.2.2. Requirements to start LC process

In order to launch the LC project in Germany there is no official minimal project size requirement or official minimum number of participants of the project. It must

be noted that agricultural land in the terms of German LC Act (§85) also includes woodland.

The stated project objectives, the number of project initiating land owners and participating land parcels indicate to the Land Consolidation Authority which LC model should be chosen to achieve the anticipated results. Nevertheless, the LC authority is especially interested in the feasibility of the project as some projects may give priority for environmental objectives rather than socio-economic ones.

When the Land Consolidation Authority receives the application from land owners to proceed with land consolidation, the LC implementation model is chosen, announcements made by public notice of the Land Consolidation Decision and if necessary preparatory work is started. According to the LC Act §26c, the higher consolidation authority may authorize an Association of Bodies of Participants or, where an association does not exist, any other appropriate agency to carry out preparatory work and to purchase or take on lease land for land consolidation purposes (mainly for public) before land consolidation has been ordered to be carried out.

4.2.3. LC project participants

The Länder is exclusively empowered to authorize resolutions for the implementation of the Federal Land Consolidation Act and all administration costs related to the land consolidation procedure are covered by the respective Land. Project implementation is the responsibility of the Land Consolidation Authorities, usually at the district or county level (Pahl-Weber & Henckel, 2008). The Länder will determine which authorities are the consolidation authorities and the higher consolidation authorities and will confirm their areas of responsibility (§2). The local consolidation authority will be the one responsible for the consolidation area located. By way of exception, the higher consolidation authority may direct that another rather than the local consolidation authority act as a consolidation

authority (§3). LC authority is supervising the Body of Participants to ensure that they act in conformity with the purpose of this Act.

The professional representation of agriculture, forestry or fishery, in so far as they are to be heard or treated as a party concerned in accordance with the provisions of this Act (§109), is the Chamber of Agriculture.

Land consolidation shall be carried out within a given area (land consolidation area) under the direction of the responsible authorities and in cooperation with all land owners concerned, the appropriate public agencies and the Farmers' Association. It is set out in §85 of LC Act that if a coherent woodland area of more than 10 hectares falls into a land consolidation project territory the Foresters' Association will represent procedures concerned. The agricultural settlement agency may participate in the project too. For public infrastructural measures development responsible are municipalities or public agencies. The Land Consolidation Act allows leeway for the project participants. Optimal results can only be achievable during the land consolidation process when participants (landowners, community, government agencies, associations, and companies) actively collaborate (Saxon State Office of Environment and Agriculture Geologie, 2013).

The Farmers' Association, the responsible physical planning authority of all States of Germany (LAND), the communities and counties as well as any other organizations and authorities to be designated by the supreme LAND authority responsible for agriculture shall be heard (§5).

§10 of LC Act describes in details the parties concerned in the land consolidation procedure:

1) As participants:

The owners of the parcels comprised by the land consolidation area as well as any persons who, because they hold a hereditary building right in the land, are to be treated as owners;

2) As participants of a second order:

- a. Communities and counties in whose district there are situated parcels affected by the land consolidation procedure;*
- b. Other corporate bodies who will receive land for common or public facilities or whose boundaries will be altered.*
- c. Water resources and soil corporations whose districts constitute or form part of the land consolidation area and have an effect on it or are affected by it;*
- d. Any owner of rights in land that constitutes or forms part of the land consolidation area or owners of interest in such rights or of personal rights by which the owner of such rights is entitled to own or use such land or to limit the use of it;*
- e. Anyone who will be allocated a new lot after the compensation procedure is finished, pending the establishment of the new legal status before status of implementation order.*
- f. Any owner of parcels that are not part of the land consolidation area who will be liable to make a contribution towards the cost of maintenance or implementation (receiving benefit from developed facilities) or to take part in the establishment of fixed boundary marks along the perimeter of the land consolidation area.*

After the Land Consolidation decision (the first administrative decision) the land consolidation project starts with the formation of the Body of Participants. The Board of the Body of Participants is elected at the first meeting from the Assembly of the Body of Participants. They are responsible for convening meetings and representing participants and common interest in various procedures. Their main function is to construct and maintain common facilities and to effect the necessary soil improvements, as far as nothing has been provided to the contrary in the Land Consolidation Plan and as far as execution and maintenance have not been entrusted to individual parties concerned or to a water resources and soil corporation (§18).

There is an Association of Bodies of Participants, which is formed from several Bodies of Participants. The main duty of the Association is to act upon the higher land consolidation authority request to carry out preparatory work and to purchase or take on lease land for land consolidation purposes before LC has started (§26c).

4.2.4. Valuation models in LC

According to the LC Act, the valuation procedure, as a rule, can be carried out by agricultural experts (§31). The consolidation authority determines the number of experts necessary for the project and selects them from the list of persons suitable as experts. If a valuation requires knowledge beyond general agricultural experience, special recognized experts shall be called in.

In the German LC Act, the following land valuation models are identified:

- comparative valuation (agricultural land and building sites);
- valuation of soil; and
- estimation of market value.

The concept of the Comparative Valuation model (§27) is to ensure that the participants are allocated lots of equal value; and the value of the original parcels shall be assessed. This procedure is based on valuing the parcels of each participant in relation to all the parcels situated in the consolidation area.

To value land used for agriculture, the expert uses the proportionate value as a general rule, which is assessed on the basis of the lasting gains that the land can yield (based on the natural soil fertility) to any owner irrespective of its distance from farmstead or the village, in most circumstances (§28). The results of a valuation of the soil in accordance with the Soil Valuation Act shall be taken as a basis for the valuation; deviations shall be permissible.

Valuation of building sites, building land and structures is based on the market value (§29). The market value has to be determined by the price that could be

realized at the time to which the valuation refers in a normal business transaction in view of the nature, condition and location of the parcel irrespective of unusual or personal circumstances; any change in the value of structures that has occurred in the view of the prospective land consolidation procedure, shall not be considered. In the case of built-on parcels, separate market values shall be assessed for the parcel itself and for the structures on it, if comparative prices permit such a procedure; the market values shall be stated separately. The market value of structures shall not be assessed, unless they are allocated to a new owner.

4.2.5. The financial issues of LC projects (expenses)

In Germany, land consolidation (any model) is not free of charge for the project participants and neither is project neighbourhood parcels receiving benefits from the implemented LC project.

The State (Länder) covers all proceeding costs: authorities' personnel and operating costs, thus also including the costs for experts during valuation, costs for surveying, and costs for the preparation and correction of the public books. The participants bear the execution costs – all expenditures specific to conducting the proceeding. Examples of this are construction costs for the field road network, landscaping costs, costs in case of ecological compensation measures, rehabilitation costs of the new parcels as well as the operating costs of surveying such as border stones, posts, and wages for surveyor's assistants (Saxon State Office of Environment and Agriculture Geologie, 2013). §19 says that project participants have to contribute project implementation in money or in kind, work or other services (material contributions) proportionally, to the value of rearranging their new lots. The type of contribution regulates the Body of Participants. The contribution may be not equal for each participant if they receive much more special facilities and the LC Authority has a power to exempt individual participants in whole or in part from making such contributions.

Developed common facilities and other betterments increase the value of the property, therefore proceeds from the sale of land not needed to compensate the

participants shall be used to cover the costs of the improvement (§46). According to §42, the owners of parcels not included in the land consolidation area but profiting substantially from facilities, may be charged with a share of the cost of maintenance of such facilities proportionate to the advantage gained by them.

The LC Authority indicates those actions serving the implementation of the land consolidation procedure that will be exempted from fees, taxes, charges or rates; the aforesaid shall not apply to any provisions concerning fees, charges or rates that are based on legal regulations of the Länder. Also it shall not apply to the tax payable on the acquisition of land (§108).

The largest portion of the execution costs typically involves the expenses of producing community facilities (farm roads for instance). Land consolidation pursues not just goals for private benefit, but also indirectly economic and social policy goals. That's why a significant part of the execution costs are taken over with earmarked grants from federal and state governments. The grant funding amount depends on the average agricultural comparative figure in the project area (Saxon State Office of Environment and Agriculture Geologie, 2013).

Land consolidation in Germany is supported by the European Union, as LC measures are part of the German Rural Development Programme. Land consolidation projects are subsidized by national financial support from the State and the Federation (share amounts are individual) which are further re-financed by the EU. Some LC models in some States are excluded from financing, which means that the project Developer has to carry the full implementation costs. For example, in the Brandenburg-Berlin Rural Development Programme for 2007-2013 in measures relating to *“Improving and developing infrastructure related to the development and adaptation of agriculture and forestry”* where land consolidation was applied, the following measures and criteria were set which were important for support with a total of €110 million:

- Improvement of access to agricultural and forestry enterprises and their land in remote areas;

- The operations shall contribute to an improved agricultural structure in a sustainable way. These processes are part of integrated and sustainable rural development;
- To adapt new farming and environmental policies and to increase the reorganisation of land holdings especially, the simplified procedure that can be used to reorganise agricultural land holdings;
- Among the measures to improve the agricultural structure, cost-efficient measures (e.g. voluntary exchange of land, exchange of uses) are preferred;
- Flood control measures shall be supported (European Commission, 2007, pp.14–15).

Wilden (2007) considered that the German Land Consolidation Act provided a comprehensive approach which was suitable to achieve all rural development objectives set out in the EAFRD (regulation for the support period of 2007-2013).

4.3. Land consolidation in France

The Roman Land Law was altered by the Code Napoleon with regard to the inheritance laws and, with some modifications it is still in force today. As a second son, Napoleon introduced the idea of equal shares in the inheritance of land in his interest and that of other younger sons and daughters (Bullard, 2007). In France, people are very attached to their property because of close familial connections. Derlich (2002) has identified that this connection is closer in some mountain regions than in the big agricultural plains.

The country, which had legally introduced fragmentation, had its first experience with land consolidation at Rouvres en Plaine in 1707 (Provincial Directorate of Agriculture and Forestry, 2007). Up to 1918 there was no special legislation for land consolidation, but after this date a law with “*Remembrement*” (Land Consolidation) was introduced (Binns, 1950).

France together with other Western European countries used land management tools following World War II in an attempt to recover and improve the agricultural

sector. The objective of land development in France is similar to many countries – to increase the size of land parcels to ensure they are more suited to mechanisation. This includes the provision of adequate road networks to provide access to the restructured landscape in general and the new parcels in particular (Bullard, 2007).

The United Nations (2008) identified the Law No. 2005-157 of 23 February 2005 on The Development of Rural Areas (LDTR) as the first legislative text specifically dedicated to rural areas, with the goal of refocusing national regional development policy on the full range of rural areas. The LDTR foresees objectives focusing on sustainable rural development.

4.3.1. Land consolidation legal basis (legal act, LC objectives, LC models)

France follows the Code Rural of 1956, which provides provisions concerning land re-organisation and consolidation. Today, the Code Rural still rules the rural land consolidation, but the word “*remembrement*” (regrouping of land) has been changed to “Aménagement foncier agricole et forestier” (agricultural and forest land development) abbreviated as AFAF¹. According to § L.121-1 of the Code Rural land management in rural areas seeks “*to ensure the development and improvement of operating conditions for agriculture and forestry.*” In the code it is defined that the *remembrement* project usually involves a whole municipality.

In France, most of rural properties are traditionally scattered and as Burel and Baudry (1995) noticed, are far away from each other, which increases farmers’ working conditions and hampers modern agriculture.

The objective of land consolidation is to improve the farming concern, agricultural and forest, and to participate in the land policy of the district (Derlich, 2002). In recent years such an attitude has broadened to include the sustainable

¹ Email from Michel Epinat and Rafic Khouri in July 2013.

development of natural rural spaces at inter-communal level. The law on the Development of Rural Areas of 2005 stipulates that the sustainable consolidation and development of the rural space constitutes an essential priority for national territory planning (Epinat, 2007).

In France there are two main land consolidation objectives:

- Classical (rural) land consolidation, which has the objective of regrouping properties by setting up a new and more adapted plot map, therefore constituting more important farming units, which would be closer to farms (Morel, 2003).
- Land consolidation for linear infrastructure (mainly large infrastructure development such as highways, railway, etc.) (Derlich, 2002). Similar to the classical land consolidation procedure; differs only in the mechanism of compensation. When land consolidation for linear infrastructure is underway it has several aims:
 - Limited disruption of agricultural activity (properties and farms);
 - Restore utilities, in particular for roads and water networks;
 - Facilitate its landscape integration, and protect the natural environment (Morel, 2003).

There are two approaches (instrumental) whereby land consolidation projects are implemented (Epinat, 2007):

- Complex projects - agricultural and forest land development (AFAF) – procedure allows for the fundamental reorganization, over a vast perimeter, of the parcels and then to achieve roads or water works, or plantations (procedure concerns either agricultural parcels, or forest parcels, or both simultaneously):
 - Classical agricultural and forest land development;
 - Agricultural and forest land development linked to a linear infrastructure.
- Amicable swaps – Exchange and amicable cessions of rural immovables (ECIR) – a procedure based upon the amicable character of exchanges or

cessions (sales under certain conditions) of small parcels (procedure concerns agricultural or forest parcels).

4.3.2. Requirements to start LC process

The main initiators of land consolidation are land owners and users (farmers) who need re-parcelling (especially after linear projects) to improve the conditions for agricultural production and to readjust road infrastructure. In addition, Municipal Councils wishing to regroup the parcels belonging to the commune and to create land reserves may initiate land consolidation (Epinat, 2007). The law does not set any specific criteria required for the area of the project territory or the number of participants, but there is an obligatory requirement for a comprehensive pre-study to analyse potential project territory.

4.3.3. LC project participants

The Ministry of Agriculture and Forestry is in charge of following-up and controlling the legality of LC. In the process of land consolidation, the Ministry of Agriculture and Forestry acts together with the Ministry of Finance; the Ministry for Environment; and the Ministry for Equipment and Transportation. Departments of these ministries are responsible for initiating and funding land consolidation projects (Morel, 2003). LC experts interviewed from France added that the Department is in charge of the legal supervision and the State only monitors actions which might impact on the environment and the setting up of a new cadastral map¹. It is very important to highlight that in France, the role of the State in the process is being reduced; the local authorities (commune, department) taking the lead. Article § L121-1 of the Code Rural states the following: "LC procedures are conducted by communal, inter-communal or departmental LC commissions, under the department's responsibility.

¹ Email from Michel Epinat and Rafic Khouri in July 2013.

Land owners and users (farmers) of the commune, together with the Municipal Council requiring an LC of amicable swaps or a complex LC procedure, apply to the General Council (department authority). The General Council accepts the request, analyses the demand and triggers the procedure. The General Council appoints the Commune LC Committee (CCAF) if the project is at a commune scale, or the inter-communal LC committee (CIAF) when the project involves more than one commune, to be in charge of the statutory, administrative and technical control of the LC process (Epinat, 2007). The LC committee can appoint any experts necessary during the project. There is a difference in the number of members participating in the LC committee: in case of CCAF – 16 members, in CIAF – 28 members.

After the decision to start a land consolidation project, the Land Consolidation Association (*association foncière de remembrement* – “AFR”) are formed from all participants in order to manage and implement the works within the project.

The Head of the CCAF is a commissioner investigator chosen from a list set up by the administrative court. The CCAF is in charge of the follow-up of the procedure conforming to the Code Rural and other regulations. The CCAF decides the mode of land development and the area concerned. The CCAF is responsible for all the procedural parts and works together with the contractor – private expert surveyor (Géomètre-Expert) (Derlich, 2002).

To maintain the ecological function of the project, a territory planner with very limited means is supported by the environmental conservation professionals, who are the members of the LC committee. Burel and Baudry (1995) stress these professionals usually do not know very well either the socio-economic or the environmental context, as they do not live in the target municipality, and they have no financial possibilities to develop any information or particular field-work.

Stanfield (1995) highlights a very active land consolidation participant in France – SAFER, like a land bank, which uses pre-emption rights during such projects and supports in cases where land is urgent. SAFER works through 29 regional offices

and their function is: "mostly the increase of area for agricultural and forest use, to facilitate the cultivation of land, to install and keep farmers on the land, and to carry out improvements on parcels" (Code Rural § L.141 and § R.141-1). SAFER has additional rights, which allows the control of projects transferring the ownership of objects in rural areas and orientates in a more beneficial way the impacts on land tenure by having real means to control land speculation. It has to be highlighted that SAFER does not initiate land consolidation projects and it has no financial contribution to the project as well.

Epinat (2007) provides much attention to private chartered surveyors (Géomètre-Expert) who are responsible for the technical element in French land consolidation. Private chartered surveyors are qualified by the Ministry of Agriculture and Forestry. The surveyor together with the LC committee (CCAF) work closely during land parcels classification (according to their agronomic productivity), surveying, negotiations with participants and drawing all plans.

The Order of Licensed Surveyors (L'OGÉ) and the Union of Licensed Surveyors (GERAR) authorizes private chartered surveyors to perform land consolidation; the ANATAF (National Association of Local Agents in charge of land consolidation) develops LC awareness campaigns.

4.3.4. Valuation models in LC

During the land consolidation procedure, land exchanges in France are based on agronomic value. On this basis, the situation and supply of parcels, their classification and operation must determine a point value per hectare in several classes. These classes are determined by the land quality, the soil depth, conditions of the farming concern, dry character of parcel, etc. By convention, reference parcels are chosen to determine the basis of classification and the first class is valued at 10,000 points while the others are determinates in the function of the parcels characteristics (Derlich, 2002).

4.3.5. The financial issues of LC projects (expenses)

For several years the State has not funded any further land projects¹. They are now only funded by the Departments, who may oblige the owners, under certain conditions, to contribute to the funding.

When classical agricultural and forest LC (AFAF) is implemented, the General Council fully funds the parcels' restructuring project. Participating land owners have to partially cover improvements (new roads or roads removal, drainage, planting or removal of hedges, levelling off slopes, etc.) (Epinat, 2007).

In the case of agricultural and forest LC linked to a linear infrastructure development, the company in charge, funds all of the parcels' restructuring project and also has to fund all other works according to the agreement (Epinat, 2007).

4.4. Land consolidation in Switzerland

Land consolidation (ameliorations) in Switzerland was introduced at the beginning of the 20th century to tackle land fragmentation, rights of way and the absence of passable tracks, which increasingly obstructed land cultivation (Swiss Federal Office for Agriculture, 2001). In these projects, the main improvements were focused on land re-allotment, road construction, wetland drainage and engineering of streams seeking either to increase yield or to facilitate agricultural work (Bollinger, 2010).

In the fifties, agricultural land consolidation was broadened with infrastructure development measures i.e. Kloten airport, motorway networks and the railway. Land consolidation became closely linked with local, regional and country planning (Swiss Federal Office for Agriculture, 2001).

¹ Email from Michel Epinat and Rafic Khouri in July 2013.

Later, from the eighties demand has arisen from environmental and landscape protection as well as for nature conservation. Attitude to land consolidation has changed as this instrument became more and more an interdisciplinary tool aimed at the realisation of advantageous solutions for public interests and agriculture (Swiss Federal Office for Agriculture, 2001). Environmental awareness has shifted the focus towards conservation and the regeneration of moors, poor meadows, hedges and trees, as well as the re-introducing the natural form of streams. Farmers could gain financial support for undertaking such conservational tasks (Bollinger, 2010).

4.4.1. LC legislation (legal act, LC objectives, LC models)

The Swiss political and legal system has three levels: National (Confederation), Cantonal and Communal (municipal). It is very important to highlight that the federal laws in the field of land consolidation are like the frame for Cantons; procedures may vary between Alpine regions and the Central Plateau. The Federal Constitution of the Swiss Confederation (Anon, 1999) Art. 75-1 states that: "*The Confederation shall lay down principles on spatial planning. These principles shall be binding on the Cantons and serve to ensure the appropriate and economical use of the land and its properly ordered settlement*". Each Canton follows its own legislation supplementing the Constitution, which means that the procedures described below are quite generalised.

Switzerland follows three legal acts which describe land consolidation (FAO, n.d.):

- (*Meliorationsgesetz*) 1977 - Land Improvement Law.
- (*Verordnung über die Landumlegung*) 1989 - Ordinance on land consolidation.
- (*Verordnung über die Landumlegung und die Grenzbereinigung*) 1989 - Ordinance on land consolidation and boundary adjustment.

In Switzerland there are 26 Cantons, each with its own Government, Parliament, Authorities and Court Systems. Each Canton following federal law specifies a legal

framework on cantonal level. Land Consolidation as an instrument on the National level of Switzerland can be found in four legal domains:

- Agricultural land consolidation (*Landwirtschaftsgesetz*) – focusing on improving production factors and increasing regional economic development, implemented in rural areas.
- Land acquisition – initiated by road or railway authorities, applying:
 - for National Highways (*Nationalstrassengesetz*) as a tool for acquisition of land for construction;
 - for Railways (*Eisenbahngesetz*) as a tool for acquisition of land for construction;
- Physical Planning (*Raumplanungsgesetz*) – initiated by a municipal authority seeking to arrange the ownership pattern in urban areas in a new way and to prepare the land for exploitation (focus on settlement development).
- Modern melioration (*Gesamtmelioration*) – focuses on solving land use conflicts and includes economic and ecologic aspects in rural areas.

The Swiss legislation in the case of land acquisition determines that land acquisition can be accomplished in three ways:

- Private contract;
- Land consolidation; and
- Expropriation (when the other two ways are not successful).

According to the Swiss Federal Law on Agriculture (see §94) land consolidation is the reallocation of the land and is considered to be one of the tools of the land improvement (The Federal Assembly of the Swiss Confederation, 2010). Following this law, land consolidation is a part of structural improvements consisting of land improvements and agricultural buildings. Land consolidation is also used in physical planning, highway and railway construction and ruled in respective federal and cantonal laws. Due to the Swiss' highly federative system, the Federation regulates mainly on strategic level while the cantonal laws based on the federal, take care of the operational level. According to Arborino (2008), LC besides agricultural improvements includes improved land-use coordination

between farming surfaces and ecological networks, appropriate groundwater management, and support for demand oriented production and marketing strategies.

4.4.2. Requirements to start LC process

Land consolidation in Switzerland can be started by private initiative, by official initiative or by official decree. Land consolidation aimed at improving agricultural production conditions can be started by at least two applicants¹.

Following the Swiss Civil Code (Anon, 2013) (Art. 703), land consolidation can be started only by collective action and when such an action has been approved by the majority of the landowners owning more than half of the land involved, the other landowners are obliged to participate.

The land of Switzerland is intensively used. Every planning authority has to take into consideration multiple aspects such as agricultural production, environment protection, easements and servitudes, land use planning and endangerments, etc. This is the reason why before starting the project, it is important to commence an extensive period of consultation involving all officials likely to be concerned especially where different criteria, such as sustainability measures have to be examined.

Before launching an LC project, a cost-benefit analysis is performed by an Association to measure the expected project results and at the end of the project to track achieved results. A cost-benefit analysis is mandatory in extensive land consolidations that concern different stakeholders, but not in smaller re-allotments of agricultural or building land that only serve the interests of certain parties. The analysis is used primarily to determine the profitability of land consolidation and as the basis for making the implementation decision as well as for apportioning the costs of land consolidation (Hiironen et al., 2010).

¹ Email from Jürg Kaufmann in January 2013.

Pre-studies are initiated by farmers, land-owners, villages and corporations. In some cantons these studies are financed by the canton whereas in other cantons a regular subsidy is possible only after a majority of land owners have voted for the project.

4.4.3. LC project participants

The executive power in Switzerland, as mentioned earlier, is the Canton level. The Federation supervises and co-finances the projects. Project supervision actors from the ministries and authorities may differ according to the purpose of land consolidation project (agriculture, roads, railways, etc.). According to Swiss Civil Code (Anon, 2013) (Art. 703) the consolidation of landholdings is regulated by the Cantons. Each Canton has its Cantonal Departments responsible for land consolidation issues. The Departments are in charge for initiation, approval, organization of technical implementation and supervision of land consolidation.

The procedure commences with the participating owners establishing an Association which works in accordance with detailed rules under the supervision of the authorities from the Department. The Association (*Genossenschaft*) creates a common land fund by deduction of the values of the land owned by the members (1-3 percent) and by land acquisition from members who want to sell their land. The Association normally purchases all technical parts of the project from the private engineering enterprises – licenced surveyors (as in France). Licensed surveyors are mainly involved to implement the project procedures. Specialists for land management, agriculture, forestry, civil engineering may be involved as well depending upon the scope of the project. The Association is a legal body and acts until the land consolidation project is finalised.

The Executive Board is responsible for performing all tasks appointed by the Association. According to the Ordinance on Land Consolidation and Boundary Adjustment Law §12(1) the Executive Board consists of between 3 and 7 members who are not required to be members of the Association (Der Kantonsrat des

Kantons Schwyz, 1989). The law stipulates that the Association appoints the Executive Board to be responsible for reallocation, execute assignments, to make claims against third parties and take contributions from participants.

The Appraisal Committee (*Schätzungskommission*) consists of at least 3 members who may not be the members of the Association. This committee is responsible for the execution of valuation along the land consolidation project area and valuation approval with the Executive Board.

For all practical purposes the authorities supervise the whole enterprise and the technical staff (Jacoby, 1959). The public sector organizations supervise the fellowship of the project¹.

4.4.4. Valuation models in LC

During the land consolidation project, an appraiser determines the production value based on soil quality or market price, depending on the classification of the land purpose. The valuation process is performed by private specialists (experts) instructed by the Appraisal Committee. If an exchange based on equal value cannot be achieved the difference is compensated by money taken from the funds of the Association.

4.4.5. The financial issues of LC projects (expenses)

Land consolidation costs (in the case of agricultural LC) in Switzerland are paid by the members of the Association and subsidised by the federation, the cantons and the municipalities. Financial sources and the amount of contribution vary according to the objectives and aims of certain land consolidation projects. Where the objectives seek, for example, environment protection, the protection from hazards, etc. subsidies can reach 80% of the total project costs². In the case where land acquisition is used for infrastructure development (highways, railways, etc.)

^{1,2} Email from Jürg Kaufmann in January 2013.

the interested authorities (i.e. Cantonal road administration) has to pay most of the costs.

Federal authority subsidies are mainly part of infrastructure development, rather than operational expenses or other kinds of overhead costs. Additional subsidies are granted by regional authorities too (Bollinger, 2010).

It is possible to state that land consolidation projects in Switzerland are mainly financed by Cantons. Swiss Civil Code (Anon, 2013) (Art. 954) considers that as the cantons are responsible for setting up the land registries, they may exempt project participants from the land registration fees when implementing land consolidation. There is no support from the EU for land consolidation projects implementation or other assistance programmes which are directly used for LC.

4.5. Land consolidation in Belgium

The Federal State of Belgium consists of 3 autonomous regions: Flanders in the north, Brussels the capital in the centre and in the south the Walloon Region (Wallonia). According to Farland (2006) the regions have powers in the fields of economy, agriculture, water policy, housing, public works, energy, transport (except Railways), the environment, spatial planning and nature conservation. In this respect, land development is in the power of the regions. The government is organized in a three-level structure:

- the federal state and the regions;
- the provinces; and
- the municipalities.

All three levels can deploy measures of land development, but only the region level has legislation on land development projects.

The first land consolidation procedures started in 1956. The traditional land consolidation processes started in the mid '50s were focused on the rationalisation of agricultural production: to provide food security and to guarantee higher income for farmers. Plots were exchanged in order to create regular, accessible

land areas, as close as possible to the farm headquarters. In addition, roads were laid, the drainage modified, etc. Due to growing environmental concern during the '70s and '80s, land consolidation gradually evolved to more integrated projects (Farland, 2006).

Objectives today are much broader than in the past, including measures on issues such as the environment, nature conservation, care for the landscape and forms of passive recreation in order to create maximum opportunities for the sustainable development of an area in all its facets. Agriculture improvement, however, remains the central focus of the instrument, because of project inertia and more important, because of the specific properties of legal procedures (Farland, 2006; GERAR (Syndicat National Des Geometres Experts Amenageurs Ruraux), 2013).

4.5.1. LC legislation (legal act, LC objectives, LC models)

Land consolidation in the Federal State of Belgium is assigned to the regions (Flanders and Wallonia). Land consolidation in regions has different names: in Flanders "*Ruilverkaveling*", in Wallonia "*Remembrement rural*". In the Federal State of Belgium there are three LC models defined in different legal acts:

- Comprehensive land consolidation (1970);
- Voluntary land consolidation (1978); and
- Land consolidation to support public works (1976).

Land consolidation – the regrouping of the arable lands belonging to one or more farmers within a depicted area. The goal is to create adjacent, regular and easily accessible parcels which are situated close to the farm. This way, a profitable and sustainable agricultural exploitation is established. The objectives of rural, spatial, environmental and nature policy are integrated in the process of land regrouping to the maximum extent (Anon, 2009).

According to the §1 in the law regulating Comprehensive Land Consolidation (Anon, 1978), this model is used in order to achieve an improved economic operation of rural properties. This law explains the aims of land consolidation,

which are to create continuous and regular parcels of land that are situated as close as possible to the corresponding place of business and which share a single exit. Such LC has linkages to the construction and improvement of roads, with water management works, with land improvement works, such as land reclamation, irrigation, levelling and development, and works for water and electricity supplies, for landscape conservation and other land development measures. The Law further explains that with the agreement of the owners, usufructuaries and leaseholders who are interested parties to the land consolidation can also be linked to other improvements made necessary by changes in the land development or by the reorientation of production, such as the demolition, construction, enlargement, improvement and the connection of farm buildings, including living quarters, to the electricity and water mains grids, as well as water and electricity facilities in meadows and grassland. The Comprehensive Land Consolidation model has compulsory measures to secure successful project implementation.

The second model – Voluntary Land Consolidation – is an instrument aimed at the simple voluntary exchange between owners and re-allotment of land within the territory of the LC project. This procedure is based on the initiators' agreement. Works on the parcel level are possible (access to parcels, improvement of parcels, etc.), but improvements focused on environment, water systems, nature and landscape are not involved.

The third model, Land Consolidation Accompanying Large Infrastructures focuses on exchanging parcels for the project participants (and all necessary works on the parcel level) to assure efficient farming during and after the construction of an infrastructure. This model includes compulsory measures. Land consolidation accompanying large infrastructures is always followed by a comprehensive land consolidation to make the legal arrangements for the project participants.

4.5.2. Requirements to start LC process

In Belgium there is no requirement for a minimal project area in the law. Land consolidation projects cannot start without measuring what effects it will have upon rural sustainability – so a pre-study (careful investigation) is obligatory. If land consolidation is related with infrastructure development it cannot start without the environmental assessment.

Flanders region

The main requirement as Celen (2007) pointed out is that in Flanders from 2005 has started a new land development procedure, which is based upon a demand driven process whereby every player in the open space (governmental body, private organisation, etc.) who encounters a spatial “problem”, the solution of which is beyond his/her own resources, can contact the Flemish Land Agency (in Flemish region) for such a case investigation. Such an investigation will provide answers to the main question – is it worth starting the project? After evaluation the final decision is the responsibility of the Minister or the State Secretary who is responsible for land consolidation in the Flemish region, which according to §11 in the law, decides if land consolidation is useful or not.

The Minister who is in charge of land consolidation in the Flemish region, initiates land consolidation projects at the request of a certain number of participants. The Minister before determining the project territory will request the opinion of a coordination commission. The Flemish Land Agency has to support the Minister with decision making. To start the land consolidation procedure, the project has to meet the following requirements¹:

- In the case of Comprehensive Land Consolidation, the project has to involve at least 20 participants (landowners and/or tenants);
- In the case of Voluntary Land Consolidation, the project has to involve at least 2 participants (landowners and/or tenants);

¹ Email from Griet Celen in May 2013.

- In the case of Land Consolidation to support public works, there is no requirement for any required number of participants, because the Flemish Government decides autonomously to start LC to support public works.

Walloon region

The Government of Wallonia decides whether it is worthwhile and which land consolidation model to use. Land consolidation is in the competence of the Minister of Agriculture. The Minister may decide upon the investigation of the project's usefulness by himself or at the request of a certain number of interested participants. Project pre-study is performed by DAFOR (Direction of Rural Land Development).

To start the land consolidation procedure in the Walloon region, the project has to meet the following requirements¹:

- In the case of Comprehensive Land Consolidation, the project has to involve at least the Government and 20 participants (landowners and/or tenants);
- In the case of Voluntary Land Consolidation, the project has to involve at least 3 participants (landowners and/or tenants);
- In the case of Land consolidation to support public works, the project has to involve at least the Government, a city council and 10 participants (landowners and/or tenants).

4.5.3. LC project participants

In Belgium, the regions have different institutional bodies that are in charge of land consolidation. It is necessary to point out that in both regions the execution phase of a land consolidation project starts with the formation of the LC Committee and advisory Commission.

¹ Email from Yvan Brahic in May 2013.

Flemish Region

The Minister of Flanders is the prime body who is in charge of land consolidation. He decides if it is worthwhile to start the project and if he decides positively the Committee (from seven members) is established at the meeting of participants. The decision is made with the support of the Flemish Land Agency (VLM – *Vlaamse Landmaatschappij*). The Minister approves the subsidies on a dossier-base for project implementation.

The Flemish Land Agency acts only in the Flemish region. VLM upon the request by the initiators makes an investigation of the territory and provides statements to the Minister whether it is worth using land consolidation in a certain area or if other land management instruments should be used. VLM is also responsible for all technical parts of the project: land valuation, preparing land mobility plans, final land consolidation plan, etc. The Flemish Land Bank (department of the VLM) uses pre-emption rights to support where land is needed – it can also even act outside LC project area. In the case of Voluntary land consolidation, VLM holds only the mediator position between the participating parties.

For the realization of land consolidation projects in Flanders there is a committee and advisory commission.

The Committee is formed from seven farmers not personally involved in the re-allotment. Once the Committee has been formed it has a legal personality with a registered office in the municipality and this body acts autonomously. The Committee is responsible for the re-allotment process and project implementation. The Committee manages subsidies delegated by the Minister during the project (compensation payments, subsidies for works on the field, etc.). The Committee is supported by an advisory Commission consisting of six to ten members. Advisory Commission members are local farmers involved in the re-allotment. Other members are rural and agrarian experts who are appointed by the Minister of Agriculture.

Walloon region

The Walloon Government has a power to start land consolidation in certain areas. Land consolidation is in the competence of the Minister of Agriculture. The Minister is responsible to form a committee (from seven members) which will be responsible for the project's implementation. To make a decision the Minister of Agriculture may be supported by the Direction of Rural Land Development (DAFOR – *Direction de l'Aménagement Foncier Rural*).

In Wallonia, the DAFOR is in charge of land consolidation. The DAFOR is part of the Walloon administration of Agriculture, Environment and Natural Resources. During land consolidation, DAFOR collaborates with some services of the Federal Ministry of Finance (cadastre, registration), other Walloon administration (nature, agriculture, watercourses, etc.), local communities (cities and provinces), local organizations and farmers. DAFOR has pre-emption rights only in the land consolidation project area with some exceptions to contribute agrarian structure improvement by acquiring the properties or user rights to the rural properties. The Direction is authorised to support the committee during the project and also the power to control the activities of designers, contractors and technicians whom the Committee has charged with studies, works or contracts that need to be carried out. It will also provide the necessary credits to the Committee for the implementation of the works and any other expenses required implementing the land consolidation activities within the limits of the funds available to it.

The Committee from the formation has its own judicial power, is autonomous in its decisions and is responsible for the implementation of the land consolidation project's measures. The Committee consists of seven civil servants, which may be advised by an advisory Committee. The advisory Commission is between 6 and 10 members representing local landowners, farmers and experts in agriculture and environment who are appointed by the Minister of Agriculture.

All the technical part during LC in Wallonia is implemented by private surveyors; DAFOR is responsible for ordering such a service. Private surveyors prepare the

land valuation plan, land mobility plan and final land consolidation project drawing.

4.5.4. Valuation models in LC

Land valuation is defined in land consolidation laws:

- During comprehensive land consolidation - §19 of the law of 22 July 1970;
- Land consolidation to support public works - §35 of the law of 21 July 1976;
- Voluntary land consolidation - §29 of the law of the 10 January 1978.

Flanders region

Land valuation is a mandatory procedure in all LC models as the main principle has to be assured – value after the project has to be the same as before the project (if not, it has to be compensated). Valuation is performed by the Flemish Land Agency which prepares all documents on behalf of the committee. The valuation procedure according to the §19 in the law is based on the classification according to the cultural and commercial value of the entirety of the land and the property forming part of the public space included in the block. For valuing an agricultural area, the prepared valuation plan shows value categories according to the soil conditions which reflect market prices. According to the law (§20) when classifying the land, the committee will not take any account of information that has no connection with the cultural or commercial value of the land, such as the presence of buildings, enclosures, single trees or hedges, the existence of a ground lease, of an easement or a transfer of a right of use, or building and planting rights or the commercial state, or information that has no connection with the agricultural purpose of the property, such as the existence of mineral or fossil materials.

Wallonia region

Land valuation is also a mandatory procedure in all LC models in Wallonia. In the region it is realized by private land surveyors, not by DAFOR. Land valuation is based upon the physical-chemical characteristics of soils which follows the regional pedological map. To have a precise land valuation map, a series of soils samples are considered. The Commission advises the Committee about the land

valuation and gives some kind of local knowledge about the quality of soils. During the land valuation process, the Committee doesn't take into account any external elements such as buildings, trees, right of use, etc.

4.5.5. The financial issues of LC projects (expenses)

Both regions in Belgium are trying to keep the costs for the participants (private land owners) as low as possible. Currently Belgium (Flanders and Wallonia) has no direct support from the EU Rural Development Programme for land consolidation projects. In the previous 2004-2006 Rural Development Programme Belgium had support only for the project implementation stage. In the 2014-2020 programme there is no support for LC projects foreseen as well.

Flemish Region

The Law defines (§47) the costs for implementing land consolidation, the Committee's administrative costs at the expense of the State, where appropriate, including: the remuneration awarded to the members of the Committee and the advisory Commission, the expenses and costs envisaged in § 1017, etc. in the Judicial Code that are for the Committee's expense, the costs of the land consolidation deed, the supplementary land consolidation deed and the costs of fencing off land. The Minister of Agriculture is responsible to determine the contribution of the State. §14 in the law says that the National Land Agency opens an account for the activities of each Committee. It provides the necessary credits to the Committee for the implementation of the works and any other expenses required implementing the land consolidation activities within the limits of the funds available to it. The Minister of Finance determines, together with the Minister of Agriculture, the conditions and arrangements for granting these credits. The National Land Agency is responsible for the payments and receipts that the Committee has decided on.

Land consolidation projects are mainly financed by Flemish, provincial and local governments. Only a small amount of costs (5% for agricultural measures) is charged to the landowners. In the event that some parcels gain a significantly

greater or lesser advantage than other parcels as a consequence of works carried out in connection with the land consolidation, such as ground improvement works, construction of new roads and watercourses and other improvements made necessary by changes in land development or by the reorientation of production, according to the §73 in the law the Committee takes this into account when apportioning the costs. The Committee, the owners, the usufructuaries or lessees are exempt from any amount for which they are liable if the amount does not exceed a certain amount (20 Euros) determined by the Minister. The Minister determines reimbursement to the members of the Committee and the Advisory Commission.

Walloon region

Land consolidation costs are apportioned in this structure:

- LC administration costs are completely covered by the Walloon Region;
- Environmental Impact Assessment costs are completely covered by the Walloon Region;
- Public works or important infrastructures (rural roads, storm basins, etc.) costs are covered 60% by Region and 40% by Province or City;
- Site development (plantation of hedges, etc.) costs are covered 80% by Walloon Region and 20% by Province or City; and
- Some specific works can be paid by landowners as well.

4.6. Land consolidation in Finland

According to Konttinen (2007) the history of land consolidation (*peltotilusjärjestely*) in Finland has started in 1757. From the beginning the objective was to promote land usage in rural areas, mainly cultivated land. Starting from the 1750s, the central government has forced landowners to carry out land consolidation in order to improve scattered land division and enhance land usage. This aim is still reflected in the recent Finnish land consolidation strategy (2008-2013) where the priority was farmland consolidations with the main purpose to increase the profitability of the farm industry (Hiironen & Konttinen, 2013, p.101).

The main prerequisite remains the same – the benefits of land consolidation must exceed the costs.

4.6.1. LC legislation (legal act, LC objectives, LC models)

Today the land consolidation procedure in Finland is defined in the Real Estate Formation Act (Finnish Ministry of Agriculture and Forestry, 1995). §67 of this legal act says that land consolidation may be executed if the ensuing benefits exceed the costs and hindrance incurred and if the land consolidation allows:

- improvement of property division and furtherance of the use of real estates;
- considerable improvement in road and drainage conditions of the area; or
- furtherance of the use of an area acquired for purposes referred to in the Act on the Development Fund of Agriculture and Forestry (657/1966), (333/1999).

The land consolidation procedure in Finland has legally regulated compulsory measures which may be used to force land owners to participate in the project if it is essential for realising land consolidation objectives. If it is necessary, according to § 69 of the law, in special cases, even other than agriculture and forestry purpose, land covered by the town plan may be included in the project. According to the Real Estate Formation Act §79 an expropriation procedure, with full compensation, can be used to buy small parcels (mainly less than 1 ha) ¹ that are not viable and cannot be effectively used. Such plots may be used for common facilities development and even for promotion of active land owners in the project territory.

Land consolidation in Finland covers not only agricultural and forest land redevelopment, but during one project: roads, water supply and sewerage equipment needed by the participating property units may also be built within a land consolidation. It is an integral part foreseen in the Real Estate Formation Act §72 (for roads, sewage), §73 (for irrigation equipment, ditches, drainage), §74 (for

¹ Email from Kalle Konttinen in October 2011.

afforestation). Depending on the complexity of the objectives and the magnitude of the land consolidation project the duration is from 1 to 5 years.

4.6.2. Requirements to start LC process

Land consolidation projects in Finland start from a “bottom-up” approach from land owner’s applications, but prior to that a lot of marketing activities by National Land Service has to be done – to persuade land owners in farmers associations, in village meetings, in problematic areas to initiate LC. Such input gives about 10 new applications every year. Land consolidation procedure can be started by having at least one land owner’s application.

When land owners’ applications for land consolidation are received, LC authorities from the National Land Service conduct research into if there are more benefits than costs (calculates potentially achievable results). The pre-study has to show positive outcome (good cost/benefit ratio): project has to improve land owning conditions and it is not allowed to worsen the situation of any single land owner. The current land situation is analysed where the main criteria are average parcel size and distance from the farm to the fields. During pre-study reduction of farming or harvesting expenses is considered as well. The result of this investigation will be a report on the conditions and extent of the land consolidation and a general report on the principles to be followed and the measures to be executed. In order to start project implementation a majority of farmers/land owners has to approve it.

In Finland there is no official requirement for minimal project size, but generally practice shows that the area is more than 100 ha, better results are expected when the area is more than 500 ha. There is no official minimum number of LC project participants as well, but general practice showed that number of attendees should be more than 5; better results are expected when the number is over 20. Land consolidation project implementation time is required (not officially) to be less than 5 years.

4.6.3. LC project participants

Land consolidation is a very welcome instrument by the Ministry of Agriculture and Forestry, and governmental agricultural and forestry organizations. Core actor in Finnish land consolidation is the National Land Survey (NLS) of Finland (*Maanmittauslaitos*). The National Land Survey of Finland explains the power of LC to land owners and when land owners submit an application for land consolidation, NLS performs a project feasibility study for a certain area. The NLS decides to launch a project or not and if decided positively an NLS surveyor (Master of Science) with two trusted men (elected by municipal council) becomes (*Toimitusmiehet*) ruling body in the project. In Finland there are no private cadastral surveyors and this is the reason why drawing the re-allotment plan (based on negotiations with project participants) and land surveying (marking border marks of the newly designed parcels) procedures in the LC project are performed by the NLS surveyor who is a civil servant. If the LC project covers infrastructure development, NLS can order such works from outside, mainly for building planning and building works.

Farmers and local municipal farming secretaries are the key initiators of land consolidation projects. The Assisting Board of Landowners is elected from participating land owners, normally 3-8 persons, which helps the NLS cadastral surveyor mainly in drainage and road building, planning and in arable land valuation. According to Konttinen (2007) the Assisting Board of Landowners has an advisory role (mainly for valuation) and supervisory tasks.

In Finland there is an Agricultural development fund which manages a small land fund in order to support LC projects. It operates about 1.5 - 3 million euros to purchase land per year. Invested money comes back to the state after 1-3 years after LC project is implemented.

If land owners have objections during any phase of a land consolidation project they can appeal to Land Court. If problems of project participants are unsolved, the

Land Court gives a permit to the project participants which allows them to appeal to the Supreme Court regarding their problems.

4.6.4. Valuation models in LC

During land consolidation in Finland, the NLS surveyor uses two factors for land valuation – soil quality and market values. The Real Estate Formation Act §77 defines that “*land consolidation may be executed in such a way that the total value of the pieces of land, growing stock, buildings, fixed equipment and structures, shares of joint property units and special benefits of the real estate to be formed for each joint-owner corresponds to the share of the equivalent value of the entire land consolidation area belonging to the joint-owner according to the basis of division*”. Actually, the soil quality method in Finland is called – the “*grain*” method, where the best field of the project has 100 “*grains*”, whilst others have a lower value (comparative valuation). As valuation is mandatory in Finland, whatever valuation model is applied, the voice from the assisting board of participants is used to classify fields. When valuation is based on soil quality, data from mandatory EU soil research is used as well. The assisting board of participants may ask to use extra compensations for different factors (ph, drainage, stones) according to the project.

When the valuation is based on market price, the NLS surveyor using official data makes a study of market values and determines the final values (with land owner’s help).

4.6.5. The financial issues of LC projects (expenses)

Finland can’t use EU subsidies for actual LC improvements as it was written in the EU accession agreement. Currently Finland uses only national funding for LC implementation. Finland follows a separate act – the Land Consolidation Subsidies Act (1981) which regulates subsidies for infrastructure development in land consolidation projects. EU support is only allowed for public awareness campaigns (marketing activities) and pre-studies which are executed by land consolidation authorities. National funding (around 15 million euros per year) is used for

improvement of cadastral maps and register¹. Pre-studies executed by NLS for land consolidation project feasibility in a certain territory are free of charge to land owners. If land consolidation project objectives are focused only on agricultural land rearrangement, participants have to cover 20% for surveying process and about 50% for drainage and road infrastructure improvement. In forest land consolidation participants have to cover 20% for surveying process and other costs are covered by the State. Summarizing the figures, it is possible to say that land consolidation project participants in Finland have to cover about 45% of project expenses; the other part – is covered by the State. If LC is initiated for infrastructure development, applicants have to cover 100% of the costs. 100% State funding is also possible, but only for pilot projects upon decision of the Minister of Agriculture and Forestry of Finland. Shares to each participant are calculated according to the benefits which each owner gets from the project.

§ 212 in the Real Estate Formation Act says that State funds could be exclusively used to cover cadastral procedure costs of a land consolidation which has been ordered without application (exceptional cases), but in practice Finnish local land management offices have never ordered an LC process without a farmer's application.

4.7. Land consolidation in Cyprus

Cyprus became an independent country only in 1960 and its constitution started safeguarding private and ownership rights. To battle land fragmentation, a serious problem which hampered agricultural development, the Land Consolidation Act was established in Cyprus only in March 1969, and in December 1970, the first land consolidation project began (Demetriou, 2012).

¹ Email from Kalle Konttinen in January 2013

4.7.1. LC legislation (legal act, LC objectives, LC models)

Land consolidation in Cyprus is regulated by “The Consolidation and Reallocation of Agricultural Land Laws, 1969 to 2003”. According to §21(2) stated in the law, the aim of consolidation, which is voluntary, is to create as great a number of holdings as possible the size of which will make them economically viable. “Economically viable”– the holding must be sufficient to support the farmer’s family within the standard of living prevailing in Cyprus as a whole. The value of economic viability is defined by the Director of the Land Consolidation Department for each consolidation area, except in justifiable cases due to the nature of the lands or their utilization or due to their distance from the owner’s residence not more than one plot shall be granted to an owner of a smallholding, not more than two plots to an owner of a medium holding and not more than three plots to an owner of a large holding. The Director of the Land Consolidation Department defines the terms “small” “medium” and “large” for holdings in the affected area and shall specify when a certain case shall be considered a justifiable exception (Land Consolidation Department, 1993).

According to the legislation, land consolidation consists of two main components: land reallocation that involves the rearranging of the land tenure structure and the second one involving the provision of infrastructure projects; mainly a road network and/or an irrigation network.

Cyprus uses three methods of land consolidation for agricultural properties:

- Voluntary, by agreement among the owners,
- Compulsory, by resolution of the majority of the owners¹,
- Compulsory, by government order.

When preparing a land consolidation plan, according to § 21 (4) of the law, it has to take into consideration such objectives as: the rational cultivation of the land; the integration of crop production and animal husbandry; the mechanization of farm

¹ Only this type of land consolidation has been applied in Cyprus since 1969

work; the execution of irrigation and soil conservation works and other land improvement works; the construction of farm buildings; the establishment of permanent plantations; the setting aside of areas reserved for the sinking of public or private wells and the construction of other waterworks; and the setting aside of other spaces intended for public use. Furthermore, the plan should generally facilitate the use of modern and improved methods of agriculture permitting or contributing to an increase in productivity.

There are foreseen technical provisions in § 21 (6) of the law for the land planner of how to deal with the re-arrangement of land parcels for small parcels holders, and when the land owner lives outside the project area. The legislation also identifies the division of shares from common ownership during land consolidation.

Following the land consolidation plan, the Director of the Land Consolidation Department has the power for the compulsory acquisition of small holdings in the project area. Financial compensations are paid to the owners in accordance with the value of the properties as at the date of the approval of the land consolidation plan. Land consolidation measures have to be accepted by a majority of project participants.

In Cyprus the land consolidation procedure, from initiation to implementation, takes approximately 6-10 years. This process does not include any village renewal measures, but is still complex and time consuming due to many procedures. It is only applied to the traditional agricultural land consolidation models. According to the local LC experts, currently Cyprus is working with legislation approval for urban land consolidation.

There are some environmental and nature conservation provisions in the current legislation of land consolidation. For example during land consolidation it is

possible to create a park or refurbish an existing cultural monument located within a land consolidation area¹.

4.7.2. Requirements to start LC process

When applying for the “voluntary land consolidation and reallocation procedure by agreement among the owners” model (refers to § 5(1)) at least two land owners wishing changes may initiate land consolidation by providing an application to the Land Consolidation Authority, which approves the agreement providing the objectives fulfil the provisions of the law. It has to be noted that this LC model has never been applied in Cyprus.

Since 1969, only the “compulsory land consolidation by resolution of the owners” model has been applied. The procedure commences with the election of three LC project participants in a preliminary meeting. Elected land owners together with the LCA act in certain areas as the provisional committee. The decision to carry out land consolidation is taken if the majority (50% plus one) for both the number of landowners and the land value of the corresponding properties are in favour. If a land owner disagrees with the project, he/she may appeal to the Director of the Lands and Surveys Department and after that he/she may appeal to the Court (refers to § 7(1)). In order to start the process, the Land Consolidation Department has to measure the likely project impact and perform a pre-study consisting of:

- A land fragmentation analysis;
- an environmental impact assessment study;
- and a feasibility study.

The Land Consolidation Department executing the environmental impact study is supported by private consultants from this area. In general, all results should be positive to launch a project.

Finally, the third LC model, which according to legislation is possible, but also has never been applied in Cyprus, is “compulsory, by government order”. The Council

¹ Email from Demetris Demetriou in February 2014

of Ministers may initiate this land consolidation model in those cases Government has decided to implement the construction of a significant object such as a dam, expensive irrigation system or other similar projects.

4.7.3. LC project participants

The Land Consolidation Department of the Ministry of Agriculture, Natural Resources and Environment is the main body in Cyprus in charge of land consolidation projects. The Land Consolidation Department not only performs the technical part of the project but also, according to the Consolidation and Reallocation of Agricultural Land Laws 1969 to 2003 (Office of the Law Commissioner, 2010), the Department is responsible for such functions as:

- the co-ordination, administration and execution of measures of land consolidation in accordance with the agricultural policy of the Government and to advise the Ministry of Agriculture, Natural Resources and Environment on the policy relating to land reform measures, including land consolidation measures and all related measures;
- the power to buy, sell, exchange, mortgage and in general dispose of all kinds of immovable property, and to acquire either by compulsory acquisition or otherwise any property for the purposes of any consolidation measure;
- to exercise its functions has a power to advance money and make loans for the accomplishment of the objectives of this Law;
- any other function which may be necessary for achieving the objects of this Law.

§6(1) says that in the area where the land owners requesting land consolidation live, the District Officer will organise a preliminary meeting in which the majority of the owners wishing changes will elect three members who, together with the government officers, will constitute a Provisional Committee for the area. The Provisional Committee investigates all land ownership data and defines the LC project area. §9(5) states that after the adoption of a land consolidation and reallocation resolution, all the owners within the area of land consolidation and

reallocation become members of the Land Consolidation and Reallocation Association.

The crucial role belongs to the Land Consolidation Committee (further identified as the Committee) which is established for each project area and which rules for all land consolidation project stages till implementation. It also supervises how measures of the certain project are achieved. The Committee, which is formed of three elected land owners and five government officials, decides and approves almost all the main matters of the process.

Each Land Consolidation Committee is chaired by the District Land Consolidation Officer and is responsible for organising, monitoring and administering the affairs of the Land Consolidation Association of the particular project area. Its main power is decision making in relation to all the matters affecting the Association, including the approval of all plans prepared by the Land Consolidation Department (Demetriou, 2012).

§12(2) of the Law gives power to the Committee to act as an agent of the Land Consolidation Department and in all matters affecting the Association and its members. This includes the purchase, exchange, sale, lease, mortgage, development and administration of any property within the affected area, the issuing of loans to members and the collection of instalments for loans, other dues and fines from members.

The valuation process in each land consolidation project territory is handled by the project Valuation Committee. This Committee consists of five members, three officials and two members elected by the entitled owners, whose term of office shall be for a period of two years. The Valuation and Land Consolidation Committees exist as long as their services are necessary in the project area.

In Cyprus, the District Courts deal with land consolidation. The land owner has a right to object to any published plan and can even appeal to the court during the project, but primarily objections received from landowners regarding the LC plan have to be examined by the Land Consolidation Committee.

4.7.4. Valuation models in LC

The Valuation Committee follows as far as possible and *mutatis mutandis* the principles provided in §10 of the Compulsory Acquisition of Property Law N15 (1962, 2006) which states that “the value of the property, shall, subject as hereinafter provided, be taken to be the amount which the property, if sold in the open market on the date of the publication of the relative notice of acquisition by a willing seller, might be expected to realise”. This does not take into account the preparation of the plan for new roads or the construction of such roads for the purposes of promoting land consolidation measures in accordance with the provisions of this Law.

The Valuation Committee values all properties (e.g. land, trees, buildings, wells, etc.) in the project area based on market values. Upon completion of the valuations, the Valuation Committee shall prepare and publish a list showing the value of each property together with a map showing the affected area divided into valuation categories.

4.7.5. The financial issues of LC projects (expenses)

According to §35(1) of the law, land consolidation is for the benefit of the national economy, namely the demarcation of new consolidated plots. Members of the various committees and the Land Consolidation Committee are refinanced by the national budget with shares from 70% to 100%. The Government can, in addition, subsidize land improvements realized during the project.

Cyprus does not receive any direct EU financial support for land consolidation projects neither for initiation nor implementation.

4.8. Comparative analysis of LC legal framework in WE countries

According to Van Dijk (2002) achieving objectivity in cross-national comparisons is very difficult, especially when cultural differences are great. Planning

instruments are very complex because they are embedded in the legislative, cultural and administrative context of the society. Nevertheless, selected countries were analysed according to the procedural criteria which are important for framework development. It was observed that in all countries there exists a single land consolidation methodology – that of Western European countries, but with slight differences influenced by national (regional), traditional circumstances in the process exists (Table 3).

Table 3: The main similarities and differences in land consolidation procedure

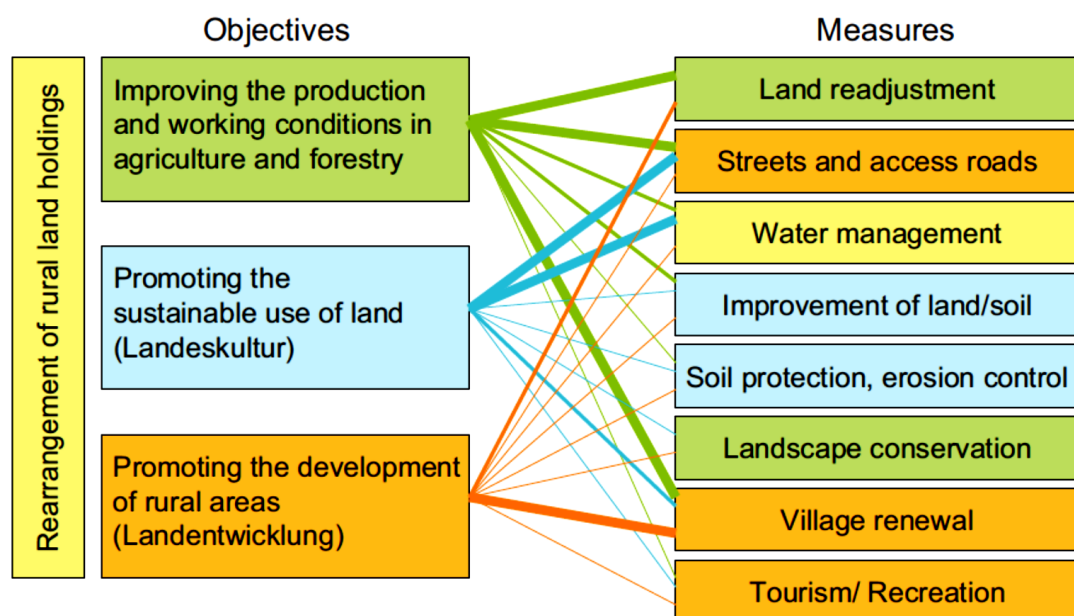
	Germany	France	Switzerland	Belgium		Finland	Cyprus
				Flanders	Wallonia		
LC methods:							
Voluntary	X	X	X	X	X	X	X
Compulsory	X	X	X	X	X	X	X
Scope of the project:							
Agricultural improvement	X	X	X	X	X	X	X
Infrastructure (re)development (road, drainage)	X	X	X	X	X	X	X
Implementation of environment and nature conservation projects	X	X	X	X	X	X	X
Village renewal	X	X	X	X	-	-	-
Rearrangement plan executor (technical part):							
LC authority	X	-	-	X	-	X	X
Private land surveyor	-	X	X	-	X	-	-
Land valuation models for agricultural land:							
Comparative valuation	X	X	X	X	X	X	X
Valuation of soil	X	X	X	X	X	X	-
Market value	X	-	-	X	-	X	X
Financing project implementation:							
EU support	X	-	-	-	-	-	-
Government (subsidy)	X	X	X	X	X	X	X
Participants	X	X	X	X	X	X	X

Source: Self study

The causes of differences can be perceived from the distinctive characteristics of rural areas in Belgium (especially the Flanders region) and Germany (especially

the western parts). Rural areas in these regions are in close neighbourhoods with urban areas and are active and viable communities. Switzerland also experiences high pressure upon land. In France and Cyprus, the traditional agricultural attitude with demand for modern infrastructure development is combined. In Finland farmers are settled and emotionally tied with land, but during land consolidation, rural dwellers focus not only on traditional agricultural measures, but on common wealth (infrastructure development, traffic safety and environmental measures) as well. In these countries land owners, farmers, rural dwellers, various institutions and NGOs (non-governmental organizations) are cooperating for a common objective – betterment of land tenure and vitality of the countryside (Figure 15).

Figure 15: Modern land consolidation as central part of rural development



Source: (Magel, 2008)

A community driven process is the reason why the countries analysed have well established sovereign compulsory measures in legislation regulating the land consolidation process, which allows achieving higher goals and helps to avoid expropriation measures for common public wealth. Thomas (2015) analysing Western European land consolidation models also observed that despite the

traditional concern, in improving the efficiency of farming, further objectives of public concern are taken into account.

The possible methods of how land consolidation can be implemented and objectives reached are set in the legal acts. Belgium, Germany and Cyprus have special land consolidation laws, whilst the other countries analysed – France, Switzerland and Finland have other laws which regulate the process of land consolidation. The legislation identifies the LC models which are possible to apply depending on the goals to be pursued.

As observed above, LC projects can be executed voluntarily on a legal basis through a special law, or as a compulsory administrative procedure or legally-enforced land consolidation (Thomas, 2006b). All of the countries analysed have the usual voluntary model. Voluntary land consolidation based on an application of the interested persons is well known and applied for more than 100 years in such countries as Germany and France. The core objective in voluntary land consolidation is the exchange of parcels between project participants with the idea to merge as many land parcels as possible per owner; and to minimize the distance from farmstead to the fields. During such reorganization, the project executor seeks to improve the agricultural structure and working conditions for agricultural production. Sustainability measures are followed as well. The freedom of the voluntary model may encounter successful project implementation where higher objectives are expected (i.e. infrastructure development, various public facilities). It may also have negative effects on the results and appear to be doubtful especially if it is time and investment consuming. That is why all interviewed international experts followed the position that the compulsory method – legally regulated administrative procedure - is very important since contemporary land consolidation includes measures of sustainability and affects the society. According to Thomas (2015) countries apply a statutory enforced administrative procedure during land consolidation only if a majority of the owners involved appreciate the project and a “high acceptance level” is achieved.

Nevertheless, in countries where compulsory elements are foreseen, project executors during the process have a great challenge in mediation and negotiation with the participants in order to achieve as high a degree of acceptance as possible. In the compulsory method, opposing project participants still have an option to appeal to the (land consolidation) court. Interviewed experts do not see any sense in executing land consolidation where infrastructure (re)development is foreseen without having compulsory administrative procedure measures. Guarantee of project realisation depends on the majority of society insisting for changes, the rest are obligated to participate to favour common needs.

The possibility of using a mixture of methods during project implementation is also included in the German and Flemish legislations, which actually allows shortening procedures and the saving of time. Such an opportunity is well accepted in big linear (highway, railroad, channels, etc.) infrastructure development projects. Compulsory land consolidation can be started by the decree of the official (i.e. Minister of Agriculture) where all land owners will be involved in the LC process by a legal obligation, for example, for public infrastructure (re)development.

In Finland there is a unique situation as they have one land consolidation method which is in between voluntary and compulsory, but still Finnish LC authorities have a possibility to use compulsory measures. According to the local expert, in practice the National Land Service does not use such a right without having necessary acceptance from land owners.

During the land consolidation process readjustment, amalgamation, exchange and compulsory acquisition are used. Compulsory acquisition in Finland and Cyprus are set in the legislation where it is foreseen that small land parcels, if they are not viable and cannot be effectively used, can be acquired during the project for public needs. In Finland, it is assumed that plots smaller than 1 ha are not viable and may be compulsorily acquired. In Cyprus the value of economic viability is defined by the Director of the Land Consolidation Department for each consolidation area individually.

Project duration when implementing voluntary or compulsory land consolidation models is different. If voluntary land consolidation can be implemented in up to five years, compulsory may take fifteen years or even more. Project duration depend on the project objectives, magnitude of project territory and number of participants, etc.

Land consolidation – in whatever design is a powerful tool for solving structural problems and land use conflicts in rural areas (Thomas, 2007) and an important planning tool for implementing environmental and rural development policy (Van Dijk, 2002).

A general land consolidation project consists of three core process phases:

- initiation;
- preparation; and
- implementation.

According to the FAO (2003, pp.22–23) land consolidation procedures vary from one country to another. But generally, in comprehensive land consolidation there are six main phases (Table 4) which the FAO recommends to take into account when designing a comprehensive land consolidation legal base in Central and Eastern European countries.

Table 4: Comprehensive land consolidation process schema

1. Initiation of the land consolidation project

- a) Request for initiation of a project.
 - b) Analysis of the situation and identification of what is needed and wanted.
 - c) Preparation of an initial concept plan that states the aims of the proposed project and approximate estimates of costs and sources of financing.
 - d) Approval of the request by participants and the state.
 - e) Formation of a local management team with representation from the community.
-

2. Design of the project

- a) Selection of consultants to design the project.
- b) Precise definition of the area and scope of the project.
- c) Preparation of cost-estimate and schedule for the project.
- d) Evaluation of projected costs and benefits.
- e) Preparation of cost-sharing formula.

3. Inventory of the existing situation

- a) Identification or adjudication of boundaries and the legal status of parcels, including lease rights, mortgages, and easements or servitudes.
- b) Delimitation of important environmental areas.
- c) Determination of the value of parcels.
- d) Handling of objections related to boundaries, ownership and valuations.

4. Elaboration of the detailed land consolidation plan

- a) Preparation of the draft consolidation plan showing the new parcel layout, location of new roads and other public facilities, and identifying those roads and facilities which will be removed.
- b) Presentation of several plan alternatives with cost-benefit and environmental impact assessments.
- c) Review of the options for consolidation by participants.
- d) Preparation of the final detailed consolidation plan to accommodate comments of participants.
- e) Handling of objections.
- f) Approval of the detailed consolidation plan.

5. Implementation of the detailed consolidation plan

- a) Selection of contractors for construction works, etc.
- b) Construction of public works (agricultural improvements, levelling, drainage, new roads with bridges and culverts, etc.)
- c) Survey of new boundaries on the ground.

6. Concluding phase

- a) Working out compensation and apportionment of costs.
- b) Final updating of the cadastral map.
- c) Issuing and registration of new titles.

Source: (FAO, 2003)

From the very beginning, land consolidation through merging parcels by exchange, was focusing on how to improve the working conditions of rural dwellers in an agricultural sector hampered by fragmentation. Rural areas are the roots of the urban territories and therefore will always be the breadwinner. Social, economic and environmental problems in the countryside are usual and beg for changes. After the introduction of the sustainability aspects (Agenda 21), the objectives of land consolidation have been broadened. However, agricultural improvement still remains the core priority in land consolidation. Improvements focused on agricultural aspects are foreseen in all the analysed countries; notwithstanding that land consolidation has been started for infrastructure development or for environmental protection – special attitude to agricultural sector remains.

Throughout the analysed countries LC legislation defines a priority with an aim to improve the farming conditions. Even if the objectives are ranked not in favour of agriculture, it is recognised that at least the foreseen development must not worsen the present situation of a single land owner. The improvement of farming conditions arises from a bottom-up approach where land owners (users) initiate land consolidation mainly for socio-economic purposes:

- To solve land conflicts;
- To minimize land and ownership fragmentation;
- To minimize the distances between farm and fields; etc.

Analysis has shown that procedures to improve farming conditions can be initiated by a single farmer (i.e. in Finland) or the whole municipality. The scope of the project defines the timeline of project realization. When the central axis of improvements is focused mainly on agriculture, ecological aspects have to be taken into consideration as well.

Rural areas around the world suffer from depopulation, where one of the reasons for this is a lack of infrastructure in the countryside. When discussing the improvement in farming conditions, one must consider rural infrastructure such as roads, drainage and irrigation systems as well. In such cases infrastructure development is an accompanying measure during farming improvements.

Infrastructure development in the countries which were analysed in the scope of land consolidation considers a broader context:

- alternative energy resources,
- recreational facilities,
- water supply and management systems,
- flood prevention buildings,
- IT infrastructure,
- etc.

In the case of development, one of the main aims of the land consolidation project would be directly related to the new infrastructure. During such an operation, land for the infrastructure must be acquired through land banking, land pooling, land exchange, purchase or even through compulsory acquisition. Should the newly developed linear infrastructure potentially hinder farming conditions, the need for land consolidation during that project would be of equal importance.

To maintain a balance between land consolidation, which is focusing on the improvement of farming conditions and the environment, compensatory measures to secure flora and fauna, and saving the identity of natural landscapes have to be taken into consideration. When land fragmentation is minimised through land consolidation, special environmental protection elements like hedges and tree rows are planted. Such elements work as shelter for fauna and are measures for flood protection, soil erosion, etc.

During land consolidation, all countries deal with environmentally sensitive territories (i.e. Natura2000). For example, Germany has a practice of re-cultivating or naturalising former mining land. Belgium, France and Germany also deal with the re-naturalisation of previously cultivated environmentally sensitive areas. In Cyprus there are some environmental provisions, embedded in current traditional legislation, that LC authorities are using for development of parks, refurbishing an existing cultural monument located within land consolidation areas, etc.

Village renewal measures include (re)development of public spaces, renovation of halls, leisure centres, churches, etc. Village renewal measures are practised during

land consolidation in Germany, France and Switzerland. Village renewal measures in Germany are included as homesteads are commonly concentrated in villages (Van Dijk, 2002). Swiss authorities have a practice of applying village renewal measure after natural disasters. In Wallonia “village renewal” is not in the context of land consolidation, while in Flanders village renewal is included in the comprehensive LC model. The Walloon administration and Cyprus have separate “rural development” measures for village renewal, where housing and the renewal of the public objects are included.

During the comparative analysis it was noticed that there are legally regulated different rearrangement plan executors (technical part) when implementing land consolidation:

- land consolidation authorities (Germany, Flanders, Cyprus and Finland);
- private land surveyors (France, Switzerland and Wallonia).

According to the interviewed experts, either a permanent state body as part of the public administration or a temporary committee (i.e. the Board of Participants) are able to buy services (technical part) and the subsequent implementation of the planned and approved common and public facilities from private companies that have licensed employees with legal authorization.

All technical parts of the project (from pre-study till the surveying) in Finland is made by a National Land Survey (NLS) employee. Some parts of the work can be bought from outside of the NLS (mainly construction planning and building works). The Flemish Land Agency (VLM) is responsible for all technical parts of the project: land valuation, preparing land mobility plans, final land consolidation plan, etc., whilst in Cyprus, land consolidation authorities are responsible for the technical part of the project. In most of the LC authorities in Germany, the surveying works are outsourced to licensed surveyors. In France the state plays an increasingly minor role in the process, to the benefit of local authorities (commune, department). French surveyors (Geometre Expert) help the LC committee during the process in areas such as soil classification and the development of rearrangement maps and border marking. In Switzerland licensed surveyors from private engineering enterprises handle the technical part of the

project. In Wallonia, the LC authority – Direction of Rural Land Development - orders the implementation of the project’s technical part from private surveying companies.

In all the countries analysed, LC officials supervise associations formed from participants in various committees. They have different responsibilities (Table 5). Whether the technical part (plan preparation) of the project is implemented by a private land surveyor or a land consolidation authority, one must work hand in hand together with land consolidation project entities. Project implementation – plan realization mainly belongs to the participants.

Table 5: Various actors representing project participants

Country	Actors	Main responsibilities
Germany	Body of Participants	To construct and maintain common facilities; To effect the necessary soil improvements; To regulate contribution for project implementation.
	The Board of the Body of Participants	To convene meetings; To represent participants and common interest in various procedures.
	Association of Bodies of Participants	To carry out preparatory work; To purchase or take on lease land for LC purposes before LC has started.
France	Commune LC Committee (CCAF) or inter-communal LC Committee (CIAF)	In charge of the statutory, administrative and technical control of the LC process.
	Land Consolidation Association (AFR)	To manage and implement the works within LC
Switzerland	The Association	To coordinate LC process implementation;
	The Executive Board	To supervise reallocation; To execute assignments; To make claims against third parties; To take contributions from participants.
	The Appraisal Committee	To coordinate land valuation process.

Country		Actors	Main responsibilities
Belgium	Flanders	The Committee	To manage re-allotment process; To take care of project implementation; To manage financial issues.
		The Advisory Commission	To support Committee with decisions.
	Wallonia	The Committee	To manage re-allotment process; To take care of project implementation; To manage financial issues.
		The Advisory Commission	To support Committee with decisions.
Finland		The Assisting Board of Landowners	To advise (mainly in valuation) and supervise project executors. To carry on project implementation;
Cyprus		The Provisional Committee	To investigate land ownership data; To define LC project area;
		The Land Consolidation Association	To support LC and Valuation Committees
		The Land Consolidation Committee	To supervise project implementation; To decide and approve project measures;
		The Valuations Committee	To coordinate land valuation process.

Source: Self study

Land valuation is the core part in all LC processes in all countries, because this procedure is the basis for rearrangement – and the land owner has to receive a land parcel with the same value which he brought into the LC project. Committees (Valuation Committees) have a power to decide which method will be used for valuation. Land valuation is a technical part of the project that can be executed by experts from the land consolidation authority or by a private expert. Land valuation especially is a mandatory procedure when compulsory methods are applied to assure justice. There are three land valuation models in the analysed countries:

- valuation of soil;
- estimation of market value;
- comparative valuation.

Whatever type of valuation is used it has to be accepted by all project participants. When valuation is applied to the buildings and infrastructure – the market price is used in order to distribute financial compensations for the contributions. Valuation

of agricultural land is based either on “pure” soil fertility or a mix between natural soil fertility and economic frame conditions by managing and cultivating the fields¹. When it concerns agricultural land, the procedure is carried out by agricultural experts, agronomists and the soil quality method is generally selected. In the case of agricultural land close to densely populated urban areas, the nearby market price valuation is preferred and performed by professional valuers.

In Germany the pure soil fertility method is applied for agricultural land. It has to be highlighted that the Comparative Valuation method is the simplest model which is based on consensus of participants, not requiring precise data. In Flanders land valuation is a mandatory procedure in all LC models. The National Land Service of Finland uses market valuation and soil quality classification whilst in Switzerland, Wallonia and France valuation in rural areas is normally based on soil quality. In Cyprus, the land consolidation model, which is widely applied from 1969 is based on actual market value.

Land valuation methodologies vary according to the soil quality, but these issues will not be touched within this thesis. It must be briefly mentioned here, that there are some ambiguities within soil quality valuation methods especially when it comes to the environmentally sensitive areas – i.e. “agriculturally useless areas” (wetlands, riversides) are ecologically very valuable sites for the public.

There is no direct support from the EU Rural Development Programme for land consolidation projects in the analysed countries except Germany. EU support partly re-financing the expenditures of the State and the Federation by subsidizing incurred implementation costs. It must be highlighted that some LC models in some States of Germany are excluded from financing; it depends on the agreement with the European Commission. Actually each state in Germany and each province in other countries has their own regional rural development programmes under the national umbrella which finances land consolidation projects. In other analysed countries there is indirect support not attached to land consolidation (i.e. for

¹ Email from Joachim Thomas in February 2015

infrastructure development, village renewal and development, LEADER) which are not covered here. For instance, in Finland it is not allowed to use EU funds in RDP 2007-2013 for implementation of LC, only marketing activities and pre-studies are covered.

Though countries mainly administrative costs of land consolidation are covered by the government, project realisation (i.e. drainage, road (re-)construction) costs fall on the Committee (Body of Participants) which distributes the amount of contribution for each participant. During comprehensive land consolidation, rearrangements affect all territories, this is the reason why local authorities from the municipality also are providing contribution to public interest. When land consolidation is related to big linear infrastructure projects (highway, railway, channels), such infrastructure constructor is covering almost all the cost as he saves time and money avoiding expropriation procedures.

4.9. Land consolidation and the UK

As Home (2009) stresses, the UK is one of the most crowded countries in the European Union, and indeed the world: the UK's population passed 60 million in 2005. The population of the UK is expected to keep rising over the next half century and is projected to be the most populous state in the European Union (Rees et al., 2010; Office for National Statistics, 2011).

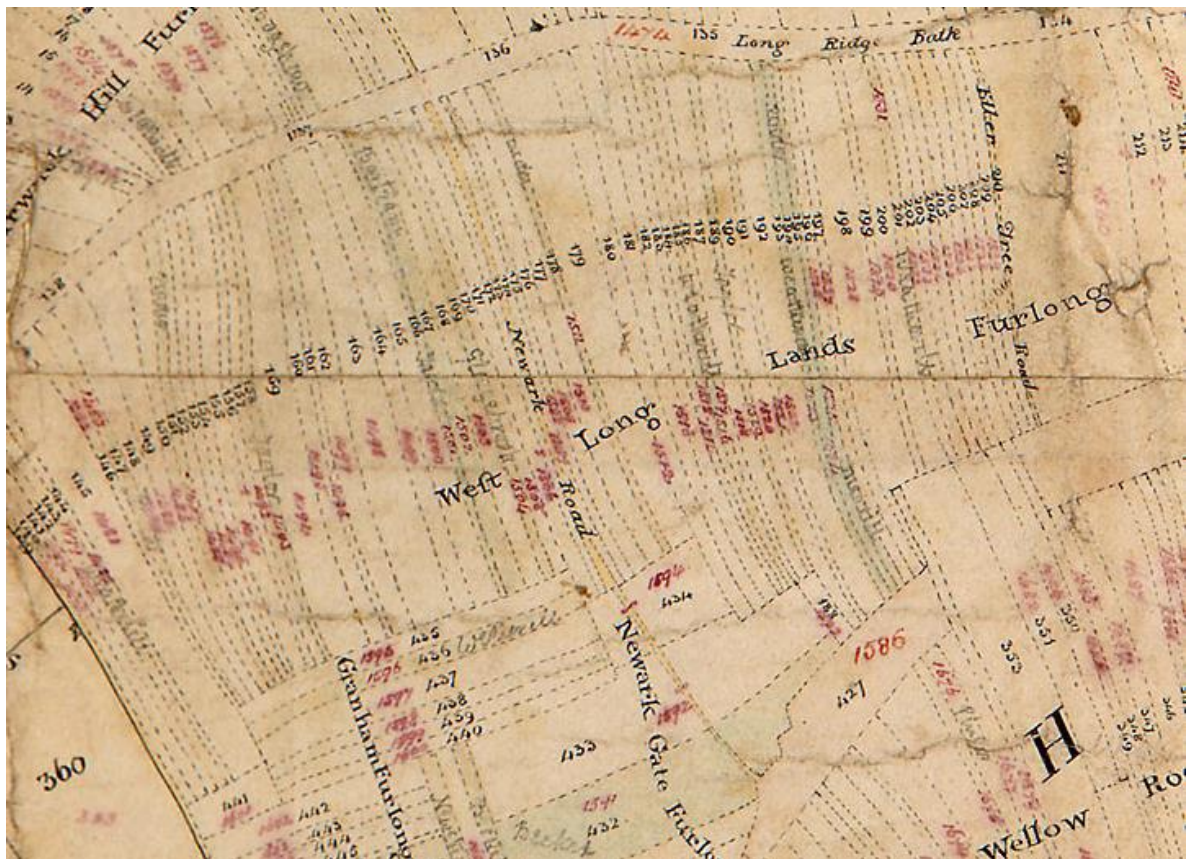
In England, and throughout much of the UK, a very strong cultural element related to the attachment of land ownership or tenancy has resulted in a tacit understanding that land is power and a direct way to authority. The origin of the current status of the agricultural holdings rises from some historical key factors:

- Anglo-Saxon laws protected land from subdivision;
- A preference for primogeniture (land is bequeathed to the eldest son);
- The process of Parliamentary Enclosure (process of property redistribution).

This section describes the most significant historical facts which influenced the fact that land consolidation didn't appear in the UK earlier and classical LC has very low potential in our days.

Before the nineteenth century there was a prevalent open field system – common or communal land. Rural inhabitants rarely owned their own land, but were tenants of Lord of the Manor (large landowner) or landowner. In areas suited to arable culture, tenants cultivating long linear land strips, which as scientists from the University of Nottingham (2013) observed were long and thin, because this was the easiest shape that a man could plough using oxen or horses. Each strip of land in the open field was owned or leased by an individual landowner/tenant, although the boundaries were not marked by hedges or fences Figure 16.

Figure 16: Long land strips in hand-drawn map excerpt of the parish of Laxton, 1820



Source: (The University of Nottingham, 2013)

The situation have started changing dramatically after the introduction of enclosures (often spelled “inclosure” in original documents), which was the process of hedging or fencing off pieces of land (The University of Nottingham, 2013). Enclosed pieces of land were known as “closes”, and were usually square or rectangular in shape, rather than long and thin (ibid).

Land was owned by a number of institutions, essentially the Crown, the Church or the Lord of the Manor. Some people had communal rights (rights to the land without owning it) i.e., the right to fish, or to graze cattle or pigs. During the process of Parliamentary Enclosure, those rights were actually transmuted into parcels of land that they then owned. The period of the enclosure, which radically changed the picture of the countryside, coincided with the industrial revolution, which needed the workforce to work in factories, coalmines, and mills. During this period many rural dwellers left the countryside and moved to towns where they were able to earn more money in forms of employment that were easier than agriculture. Fairlie (2009) calls this period (between 1760 and 1840) as the most significant time stamp to the countryside of the UK which touched almost all the population. Trying to balance the situation influenced by the industrialization and seeking to stop migration from the countryside to the towns, the Smallholdings Acts of 1892 and 1908 were introduced which allowed rural councils to acquire land which they could lease to agricultural workers (Parliament of the United Kingdom, 2013). Agricultural and the industrial revolution has made radical transformations to the landscape of the UK by introducing improvements of land quality, to road and canal networks, and also the substantial modification of the drainage system to improve the land (Sweet et al., 2008; Fairlie, 2009).

Further agricultural reorganization in England and Wales was emphasized by Sturmeay (1955) – the post-war period when the area of land cultivated by the owners rose from 13.5 percent in 1900 to 37.5 percent in 1950. The other significant period related to spatial planning in rural areas of the UK – the period between 1945 and 1950, during which the land was effectively nationalised through a combination of increased planning controls and interventions in state subsidies to farmers and spatial planning such as the 1947 Town and Country

Planning Act (and successors), the National Parks Acts – which created the National Parks, Areas of Outstanding Natural Beauty and National Nature Reserves, which applied very strong controls on land and the countryside in these zones. Notwithstanding the enlargement of land parcels, currently, it is estimated that the land in England and Wales is split into about 21 million land parcels (Dixon-Gough & Hunt, 2007).

The spatial development and town and country planning as well as the compulsory acquisition of land in the UK is performed according to the Planning and Compulsory Purchase Act 2004 (Parliament of the United Kingdom, 2004). As Home (2007b) noted, this act has made adjustments to existing compulsory purchase procedure, but did not undertake the more radical experiment that “assisted land pooling” or land readjustment (LR) would have represented. In assisted land pooling landowners combine their interests in order to participate in land assembly, servicing and disposal in accordance with a plan, but this procedure is assisted by the Government (Doebele, 1982; Larsson, 1993; Connellan, 2002).

Most developments take place in an almost field-by-field basis – consolidation (enclosure) followed by fragmentation (development). The fragmented holdings can once again be consolidated by applying land readjustment. LR evolved out of the rural land consolidation as a legal instrument to assist in urban growth situations. It seeks to facilitate development in three ways:

- combining the assembly and re-parcelling of land for better planning;
- financial mechanisms to recover infrastructure costs;
- and distribution of the financial benefits of development (sometimes known as betterment) between landowners and the development agency (Home, 2007b).

Even though there is no land readjustment in the UK, in the 1930's, British planners transferred the idea of German LR to India and Australia (Hayashi, 2000).

According to Hayashi (2000) many other countries are trying to study the land readjustment project in almost all parts of the world, where the urban issues are seriously caused by the land issues, such as the shortage of housing, traffic

congestion, environmental issues, etc. Home (2007a) suggests that LR could be an attractive alternative to existing approaches in Britain, commenting that, this is particularly the case where public funds for compulsory purchase and infrastructure provision are limited.

The dominating structure of farms implies that the classical model of LC in the UK is in the past and unnecessary, but a complex land consolidation model could be introduced as an option. Enclosure was accompanied by agricultural land improvements, which changed the rural landscape unrecognisably. Complex land consolidation could have success in future developments, as in the Netherlands, for the natural restoration during the various environmental projects, flood risk zones as well as for green belt and urban sprawl maintenance. A previous housing development with distinctive fragmentation causes us to consider the environmental considerations concerning the position of nature and environmental sustainability. Also complex land consolidation in other old European countries is welcomed by highway and rail transport infrastructure developers as it is not so time consuming as compulsory acquisition.

4.10. Chapter summary

- Throughout the countries land consolidation differs in various aspects, it could be implemented according to “bottom-up” or “top down” approach, on a voluntary or compulsory basis (Thomas, 2006a; Thomas, 2006b), involving two land owners, or one village or even several cadastral territories, focused only on land parcels rearrangement or rural infrastructure creation with environmental protection measures, etc.
- In WEC, over a long period, land consolidation became empowered by a well-established legal framework with clear goals, objectives, process workflow and responsibilities allowing the development of prosperous rural areas.
- Analysing the situation in the selected six Western European countries (Germany, France, Switzerland, Belgium, Finland and Cyprus) it was identified that in all the analysed countries there exists one land

consolidation methodology – the methodology of Western European countries, but with slight differences influenced by national (regional), traditional circumstances in the existing process. Nevertheless, in Germany, Belgium, Switzerland generalized acts regulating the land consolidation process exist and regions have a power to act in their own way.

- The analysed countries widely apply simple voluntary or comprehensive compulsory land consolidation models (or even a mixture of them). The main requirement which has to be fulfilled during compulsory model is the high acceptance of project participants. Following WEC practice nowadays, land consolidation assures that in whatever design it is established – is a powerful tool for solving structural problems and land use conflicts in rural areas (Thomas, 2007) and an important planning tool for implementing environmental and rural development policy (Van Dijk, 2002).
- In the United Kingdom, the dominating structure of land ownership shows us the power of Anglo-Saxon laws which through the ages has formed competitive farms. Land readjustment, land pooling and comprehensive land consolidation are possible instruments which could be introduced as an alternative to the existing approaches in Britain, helping to allocate land where necessary.

Chapter 5

Land consolidation in Lithuania

5.1. Introduction

Lithuanians from the roots are emotionally attached to their land and their glorious history shows they cherish it. The greatness of Lithuania reflects historical facts when the most powerful feudal state of Lithuania was during the Grand Duchy of Lithuania (12th – 18th centuries) times, especially in the 15th century when it was recognized as largest European State on the map – from the Baltic to the Black sea (Magocsi, 1996, p.127; Bideleux & Jeffries, 1998, p.122).

Later, in the late 19th till almost the middle of the 20th century (until Soviet annexation), Lithuania in the international foreign trade arena was characterized as a reliable and stable partner for its agricultural production export. Whereas the Great Depression had affected many highly industrialized countries, it did not impair export in Lithuania as the backbone of Lithuania's economy was agriculture (Rooth, 1993; Hartman, 1997). The longest emotional break between people and the land was during Soviet occupation, but nevertheless during the Soviet regime, Lithuania has retained a good reputation for a high quality agricultural production, especially for dairy and meat products and therefore it was considered that Lithuania feeds Moscow.

Since independence in 1990, the issue of land reform in Lithuania has been of great importance. In September 1991, the Republic of Lithuania's Supreme Council – Reconstituent Seimas (Parliament) – passed the Law on Land Reform, which was a starting point in the restitution process of ownership rights of land, forest, water bodies, residential houses, and commercial buildings (National Land Service under the Ministry of Agriculture of the Republic of Lithuania (NLS), 2004). Three methods were applied for the restoration of land ownership rights to the former

owners who had owned this land until 1940, and of their successors - in kind, in equivalent and in compensation (Daugalienė, 2004).

Following independence, the collective and state farms started to collapse. The Supreme Council of the Republic of Lithuania (1990) enacted a resolution on the creation of land plots for farming families, which was intending to create more favourable conditions for those rural residents, mainly the employees of agricultural enterprises and pensioners, to provide small individual farms (*asmeninis ūkis*) of up to 3 hectares per family. For other persons living and working in rural areas there would be an allowance of up to 2 hectares per family, to provide an opportunity to farm as close as possible to their homes in order to maintain a family and livestock. After setting such an order, the new small individual farms initially rented land, later privatized, as they had the priority against former owners and successors. This was an attempt to protect agriculture from the recession and ensure rural viability. Successors or former owners of land not vacant have received compensation or a right to obtain an equivalent value of land in another location (anywhere in the country). Daniliauskas (2013) noted that the first decade of land reform was when the laws were changed, amended and cancelled depending on the political situation in the Parliament. Thus over time has formed three types of farms in Lithuania: small individual farms, agricultural companies and individual (family) farms (Daugalienė, 2004). Democracy and a sense of security were finally embedded in article 23 of the Constitution of Lithuania (1992) where it is set out that the rights of ownership are protected by law and property is inviolable.

The beginning of the land reform demanded a large number of specialists. Land reform was conducted by land management authorities at different levels. The State Land Survey Institute was the main player whose employees were preparing land reform projects. Much work went to the parish agrarian office where most of the land surveyors were local agronomists from the collapsed state or collective farms, foresters, constructors and other specialists who had no proper education. Pressure from politicians to force restitution was felt and the priority was given for speed, but not for the quality. Land surveyors from the parish agrarian office were

measuring land with two metre triangles or fifty metre measurement tapes. After such measurements where the topography is hilly, there are, as a rule, many inaccuracies. Since it was a rush to complete the land reform private surveying companies were also established. Both the State and private land surveyors introduced significant measurement errors, as there were minimal requirements on accuracy. Land reform surveyors did not force the pace of implementation, as it assured them of a guaranteed income. On analysing the land reform plans, it was noticed that there was economic value in creating land fragmentation; land reform surveyors got paid a fee per prepared land title document, so there was no incentive to restore land ownership rights for a land owner in one unified land plot (Pašakarnis et al., 2013a). Such consequences of hasty land reform have generated long-standing disagreements between neighbours which will lead to court cases.

Formally, in 2000 it was announced that land reform had been completed and the highest government officials had rewarded all persons who carried out restoration of justice, but the actual situation was far from at an end. In 2004 it was indicated that 87% of ownership rights in rural areas were restored and by 2013 almost 99% of applications submitted by citizens had been restored (National Land Service under the Ministry of Agriculture of the Republic of Lithuania (NLS), 2004; 2013). However, it would seem that this process has no end. The remaining requests to restore ownership rights are frequently non-implementable due to disputes. The best (arable, forests) and “good looking” (valuable from recreational perspective) parcels of land were already privatised before 2000, when land parcels without functioning drainage systems, failed farms, swamps and scrublands, etc. were left to the State. In the legislation such land is defined as *“vacant land stock - areas of land, forest and a water body which are not attributed to the land taken and purchased by the State and which the citizens entitled to the restoration of the rights of ownership do not desire to be given back in kind, as well as areas of land, forest and a water body which are left over after the restoration of the rights of ownership to the land, forest or water body of maximum size (150 ha in rural areas) which are subject to restitution...”* (The Parliament of the Republic of Lithuania, 2013). During the restitution process and up until 2000, many rural dwellers did not consider the lakesides and riversides potentially valuable land

from the perspective of leisure and recreation. Their main concern was where they would grow their basic crops. However, during this period many shrewd businessmen from the city, supported by land surveyors, were using this opportunity to privatize these attractive areas. None of the rural dwellers believed that they would be left without an access to water until the high walls appeared. Rural dwellers still feel let down and blame the land surveyors since all their problems appeared after land reform.

1st of May, 2004 was an important historical change for Lithuania, which together with another 10 countries became a full member of the EU. This fact had made a significant impact on the Lithuanian agrarian policy. Now Lithuania had to follow the European agricultural model, which is focused on the multifunctional concept, of nature and environment-friendly farming. Lithuania has started following the EU's CAP principles and introduced a simple system of direct payments and market regulation measures (Liepienė, 2006).

According to the recent data from Statistics Lithuania (2013), the land is largely divided between agriculture (61%, approximately 3.95 million ha) and forests (30%, approximately 1.98 million ha) of a total land area of some 6.53 million ha. The Law on Territorial-Administrative Units (1994) defines that rural areas in Lithuania are considered to be all land, which does not fall under the category of urban territories, or territories of urban-type settlements. Lithuania's rural areas cover more than 97% of the country's land (Lithuanian Institute of Agrarian Economics (LIAE), 2011b) and one third of Lithuanian citizens live in rural areas, almost half (48%) of them working in agriculture (The Ministry of Agriculture, 2012). Agriculture is the fifth largest economic sector in Lithuania. It employs 15% of employable people (Liepienė, 2006). The average size of a farm before World War II was 12.4 ha (National Land Service under the Ministry of Agriculture of the Republic of Lithuania (NLS), 2004), and in recent years, the average size of farms has slightly increased from 10.4 ha (2003) to 15.0 ha (2010) (Statistics Lithuania, 2011). Nevertheless in Lithuania, agriculture is one of the priority sectors and it plays an important role in the economic, social and environment context, however, at the same time, the amount of abandoned land has increased from 400 to 900

thousands hectares. This land is used neither as an economic nor as an agro environmental resource, which reduces the country's agricultural development, hinders land resource management and undermines the country's image (Lithuanian Institute of Agrarian Economics (LIAE), 2011a). As the result of unfinished land reform the structure of parcels is inefficient because of fragmentation, land parcels are far from each other, and quite frequently the land parcels do not have access/road (neither legally nor practically). Such an unfavourable situation affects the farm's economic activities and doesn't assure efficient use of natural resources and agricultural machinery and, since in rural areas there is a strong dependence on agriculture, such a situation leads to the rise of abandoned plots and rural to urban migration of the younger generation. After land reform the State land (including vacant land stock) is also in the unenviable situation as it is very scattered and spread all over cadastral territories which hampers the sale of State land and its effective usage.

Performing land reform in a short time, which created many fragmented and small land plots and failure to connect with the infrastructure left from a previous central planned economy, was the trigger for the government to introduce a new land management instrument – land consolidation, a well-known and widely used instrument in Western European countries as a remedy for the existing situation in agriculture and to assure a viable countryside development following the EU CAP.

5.2. Historical roots developing legal and institutional environment for land consolidation

The first land consolidation experiences in Lithuania were from the Danish–Lithuanian bilateral land consolidation pilot project in the Dotnuva area (Kėdainiai district) between September 2000 and January 2002 (Danish Ministry of Food Agriculture and Fisheries, 2002). This project was focusing on improving farm structures and the formulation of legislation for LC (Hartvigsen, 2006). Having experience from the first pilot land consolidation project, the Government of the Republic of Lithuania (2001) placed a resolution in 2001 for a negotiating position regarding negotiations for the EU membership where it detailed that following the

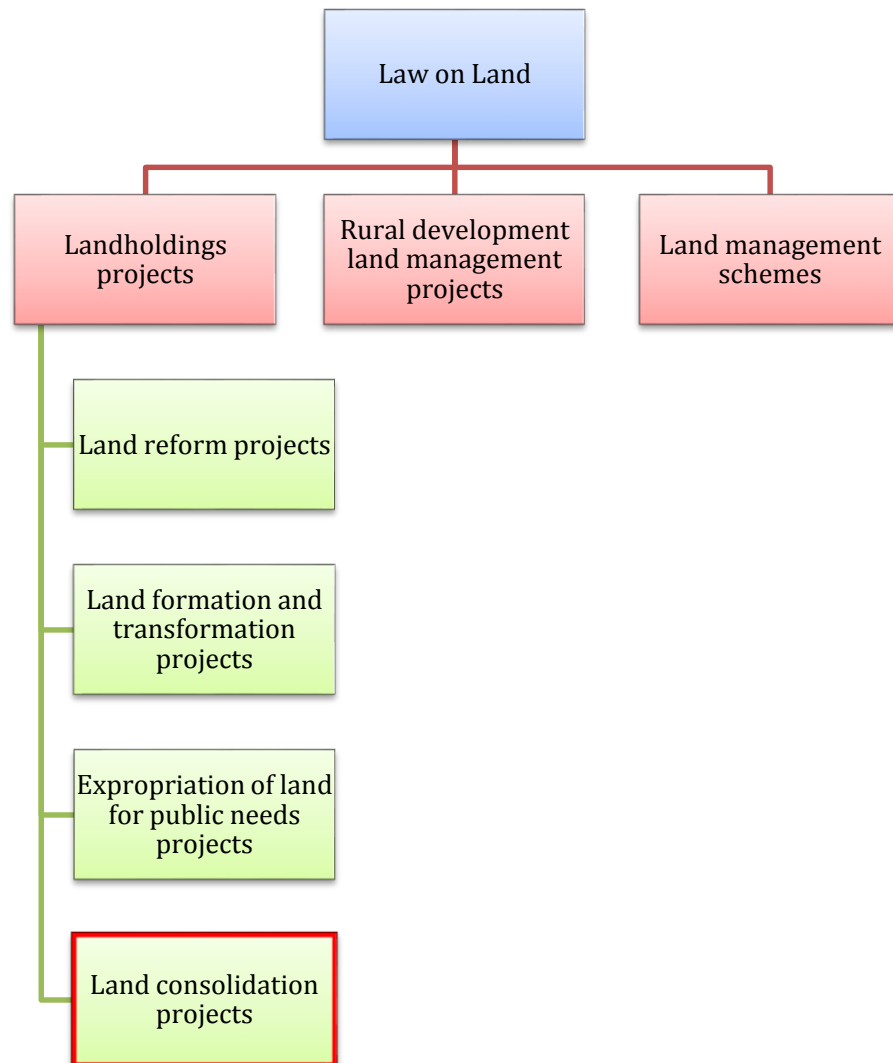
completion of the restitution of land ownership rights, a second and very important stage will start – land consolidation.

The second experiences of LC in Lithuania were three other pilot projects with a more comprehensive approach. These projects focused on sustainable rural development to give input in order to develop a Lithuanian land consolidation model and to prepare land consolidation legislation (Danish Ministry of Food Agriculture and Fisheries, 2004). In 2004 these projects were completed followed by a draft LC legislation model (originally created during this wave of pilot projects), which was improved by integrated rural development measures. The implementation of these pilot land consolidation projects proved that land consolidation could be an instrument for sustainable rural development. When combined with a regional planning process, the agricultural structure and infrastructure is improved, the public interests are discussed and satisfied, and contribution is made to the environment and countryside, cultural heritage and other valuables located in the specific area and conservation thereof (Government of the Republic of Lithuania, 2008). Land consolidation legislation was adopted in 2004 by the Parliament as part of the extensive amendment of the Law on Land.

In the Law on Land is set out the system of land management documents, which consists of three special planning land management documents (Figure 17). Rules from the preparation and implementation of land consolidation projects and projects for expropriation of land for public needs are approved by the Government, while others by the Ministry of Agriculture. Land consolidation in the Law on Land is defined as *a complex readjustment of land parcels when their boundaries and location are changed according to a land consolidation plan prepared for a certain territory, with an aim to enlarge land parcels, to form rational land holdings of farms and to improve their structure, to establish necessary infrastructure and to implement other goals and tasks of the agricultural and rural development as well as environment protection policy* (The Parliament of the Republic of Lithuania, 2004). However, as there is no separate land consolidation law (which some WECs have), it has only one model. Contribution from EU structural funds or other measures of the Rural Development Programme should

be necessary to implement any estimated rural infrastructure improvements during a land consolidation project. Land consolidation projects in Lithuania are free of charge for the participants as projects are considered as public, non-profit and that is why they are totally financed from the EU and the national budget. The process is implemented on a voluntary basis using a “bottom-up” approach and has no compulsory measures, since as Ossko & Sonnenberg (2002) observed land owners from Central and Eastern European countries could have “bad memories” from Soviet occupation time.

Figure 17: Position of land consolidation in the system of land management documents



Source: Self study

In 2005, the Government of the Republic of Lithuania has approved a resolution on the Rules for the Preparation and Implementation of Land Consolidation Projects and how LC projects should be developed from the initiation up to the implementation. Later in 2013, some parts of this resolution were changed as the organizational structure was reorganized (Government of the Republic of Lithuania, 2013). The provisions for the implementation of land consolidation projects based upon these rules identify only the core steps of the process, without any detailed guidance as to how to act in the case of a project's land valuation (which valuation model should be used in different cases), how to proceed with land exchanges between land owners, the order in which cases of notary agreement are necessary, etc. As these rules are still far from perfect it is likely that they will be changed repeatedly.

In 2005, the Head of the National Land Service under the Ministry of Agriculture agreed to supplement the rules and has approved three decrees regulating:

- the content of the land consolidation project (rearrangement) plan;
- the content of the land valuation plan;
- GIS database specification for LC project drawing of solutions.

In developing the land consolidation legislation, the Lithuanian land management authorities were supported by the FAO under the UN and international experts (especially from Denmark). A series of seminars, and training programmes were carried out for politicians, land management authorities and land surveyors. From the early stage, the FAO emphasized the importance of developing a land consolidation strategy. As Palmer (2008) from the FAO warns, as any tool, land consolidation must be properly used, it will not automatically produce beneficial results: examples can be found where projects resulted in no improvements and even caused harm. A National Land Consolidation Strategy was approved by the Government taking into consideration the 2008 FAO recommendations. The implementation period for this strategy is expected to be between 2008 and 2028 (Government of the Republic of Lithuania, 2008). As required, the approved strategy follows EU RDP 2007 – 2013 measures assuring comprehensive rural and regional development and that it meets the EU and national strategic guidelines for

rural development for the period of 2007 – 2013. Furthermore, it follows that the development of a methodology for sustainable and comprehensive land consolidation, which fits into EU RDP 2014 – 2020 objectives, is still missing. Therefore at this moment, specified objectives to improve the future process of land consolidation (for the period of 2014 – 2020) are expected in the National Land Consolidation Strategy. As the land consolidation strategy in Lithuania is approved, changes in the legislation will result in:

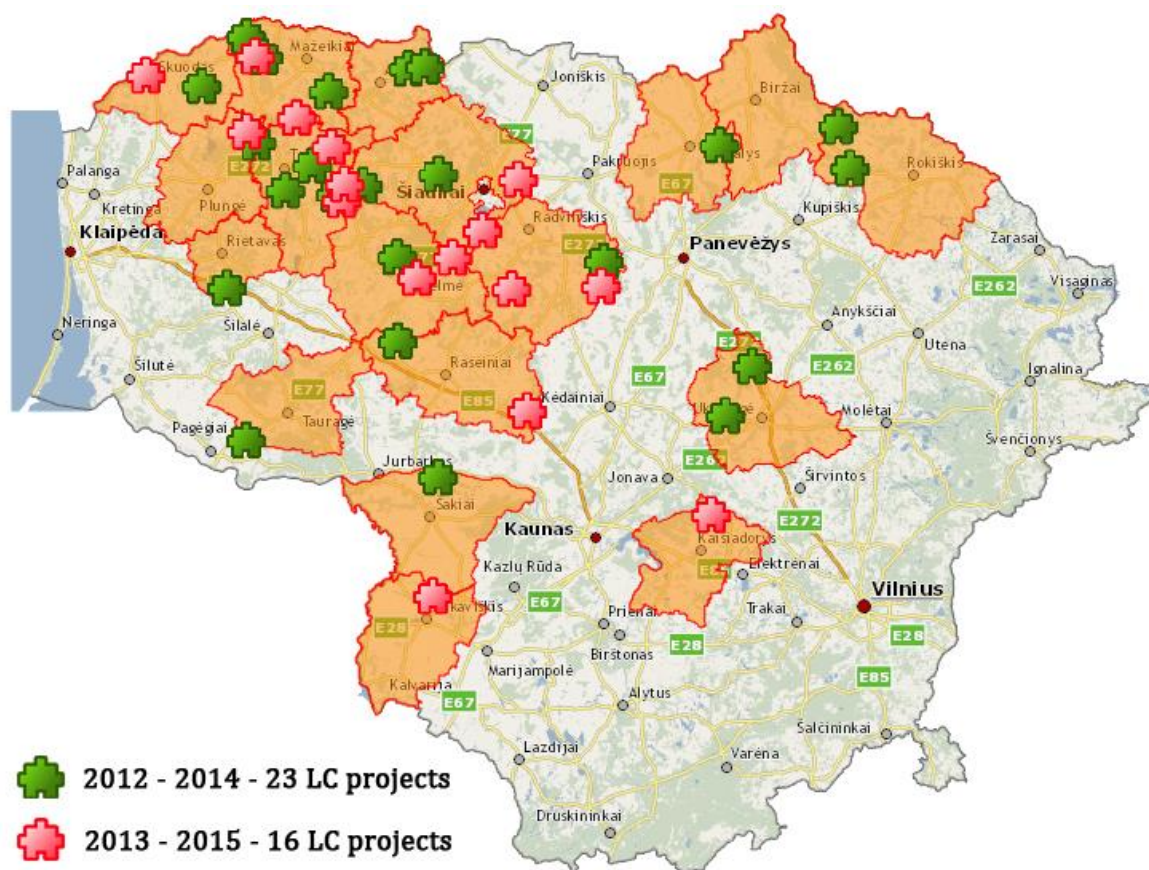
- enabling land consolidation to become a more flexible tool, giving more benefits for the participants and the whole rural community;
- establishing a clearer link between the land consolidation as a tool for territorial planning with agricultural, rural and regional development;
- providing the link to the existing different financial sources that could be used for the final implementation of land consolidation projects – a visible result of improvement of quality of life in rural areas (Jagt et al., 2007).

Land consolidation projects are, as yet, not very popular since there is a lack of understanding at different levels (from politicians to land owners). Therefore it is difficult to expect that private funds will be used to support the implementation of projects. In 2005, following legislation the financing of land consolidation projects was behind the Single Programming Document (SPD) of Lithuania for 2004 – 2006 priority *Rural Development and Fishery Priority* measure “*Promotion of Adaptation and Development of Rural Areas*” activity “*Reparcelling land plots*”, the support from the European Agricultural Guarantee Fund (EAGF) was provided for the organisation, preparation and implementation (newly formed land plots legal registration) of land consolidation projects. The total support for the activity “*Reparcelling land plots*” was estimated to be 2,225,000 euro, financed from the EU (79%) and national budget (21%), with a maximum support of 500,000 euros per project (The Ministry of Agriculture, 2005). Since many were unfamiliar with the concept of land consolidation of the total available support, only 753,000 euros were used to implement the first 14 land consolidation projects.

In the approved National Land Consolidation Strategy, it is set with the aim that by 2013 there will be 54 land consolidation projects, but in fact by 2013 only 39 LC

projects have been started. Land consolidation will be supported according to the Lithuanian Rural Development Programme for 2007-2013, AXIS I *“Improving the competitiveness of the agricultural and forestry sector”* measure 8 *“Infrastructure related to the development and adaptation of agriculture and forestry”*, sub-measure 2 *“Land consolidation”* by European Agricultural Fund for Rural Development (EAFRD). For the 2007 – 2013 period total support for LC is estimated to be 16,160,000 euro, financed from the EAFRD (75%) and national budget (25%), with maximum support of 400,000 euro per project. Implementation costs cannot exceed 260 euro/ha. Dedicated support may be effectively used and also measures from different axis has linkages between each other; for example, sub-measure *“Land consolidation”* in this period have linkages with *“First afforestation of non-agricultural land”*, *“Early retirement”*, *“Encouragement of rural tourism activities”*, *“Setting up of young farmers”* and *“First afforestation of agricultural land”*. It is expected that linkages between the mentioned measures, implementing one project, will give better results seeking objectives of sustainable rural development. It is too early to talk about the results as 23 projects have started only in 2012 and 16 in 2013 (Figure 18). Actual results from these projects will be assessed in 2015. It is very important that in the Rural Development Programme for the period of 2007 – 2013 no additional support for land consolidation will be given on the same territory.

Figure 18: Thirty nine land consolidation projects from RDP 2007-2013 period



Source: Self study

Land reform is going to end and future land management will be related to the complex process of rural redevelopment seeking rural revitalization through land consolidation. Lithuania will continue supporting land consolidation projects from the European Agricultural Fund for Rural Development, with the preliminary expectation that there will be a 9,847,000 euro subsidy for the period of 2014-2020, (75%) from the EU and (25%) from the national budget, with maximum support of 400,000 euro per project.

In the previous period (2004 – 2006), in the finalising period (2007 – 2013) and the planned period (2014 – 2020) the eligible costs are for such activities as organisation, preparation and implementation. Land consolidation project implementation differs from Western European countries as it finishes with cadastral measurements according to the land consolidation project plan and

notary agreement with new property rights registration at the cadastre. Project implementation costs don't cover actual improvement tasks such as the renovation of drainage, road construction, etc. After implementing the land consolidation project, according to the National Land Service, land owners and the local community will have the priority to receive the funding from other structural EU funds, in order to fulfil anticipated improvements. For example, if local rural communities have considered (in their development strategies) any infrastructure development, they could even use the Leader measure.

From 2010, when the County Governors' administrations were abolished, the institutional structure (authorities) involved in the land consolidation process in Lithuania is only at national level. The main players are the National Land Service under the Ministry of Agriculture (supervisor) and the State Enterprise "State Land Fund" founded by the Ministry of Agriculture (organizer) (Figure 19). The National Land Service is also responsible for the methodical guidance of the preparation and implementation of land consolidation projects. Service certified private land surveyors may also wish to develop projects as well. The NLS is doing much to promote LC and is attempting to fill in a huge information gap that is still a major reason for LC not being implemented more enthusiastically.

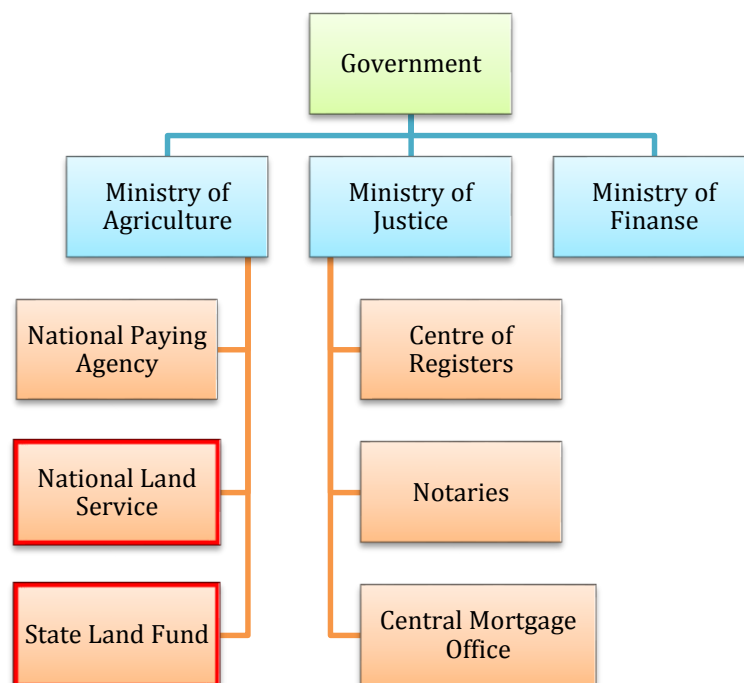
The State Land Fund (SLF) was reorganized in 2010 out of the previous State Enterprise "Land Survey Institute" which was, and still is, the biggest land reform contractor. From this date, the SLF may only organise LC projects, but cannot implement them (Government of the Republic of Lithuania, 2013). The State Land Fund participates in the land consolidation project from the initiation until the project implementation. During the project, the SLF represents the position of the State regarding vacant stock land in the LC project territory. Only the SLF is authorized to place an application for the support of the National Paying Agency under the Ministry of Agriculture.

The Ministry of Agriculture forms the long-term agricultural and rural development policy and manages the financial support with the Ministry of Finance, which indirectly participates in this process as the body that is

responsible for the allocation of the funds (i.e. national budget share for LC during 2007-2013 period – 25%).

As a land consolidation project is completed, with new title deed formalization at the notary (if necessary also at Central Mortgage Office) and the registration of newly formed land parcel boundaries registration at cadastre (Centre of Registers) it is possible to say, that LC has an indirect relation with the Ministry of Justice.

Figure 19: Institutional structure (authorities) involved in land consolidation process



Source: Self study

The Ministry of Environment, the Ministry of Transport and Communications and the Ministry of Culture are not shown in Figure 19 as they are not directly involved in the process. These ministries only participate through their subordinate bodies in the project arrangement process. Municipalities have the same status as the usual land owners participating in the project, but they only represent public interest. Prepared projects, as special planning documents, are approved by the

municipal architects and are recorded at the territorial planning documents register.

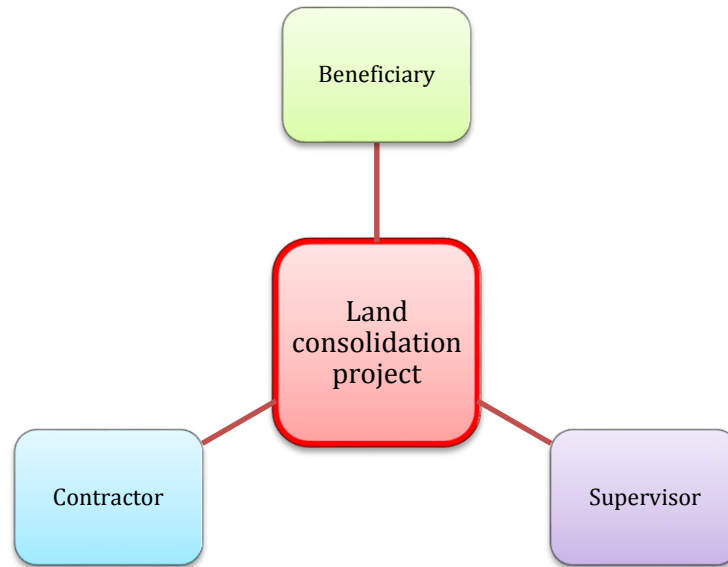
5.3. Review of the land consolidation project workflow

Land consolidation is a complex, costly and time-consuming project involving a large number of participants. Notwithstanding all benefits made available by this land management instrument, a lot of marketing activities and efforts are necessary in Lithuania to attract land owners to participate in such projects with the “bottom-up” approach. Land owners, as they have recently received their restored ownership are not very trusting and not inclined “to play” with their land (Graefen, 2002). Land management authorities (National Land Service, State Land Fund) are responsible for spreading the information regarding LC benefits. Considering the rules, LC projects are free of charge for project participants, but to be supported it is necessary to fulfil eligibility criteria and other requirements for support: when a minimum of five private land owners or managers of state-owned land signify their willingness to consolidate their holdings to the State Enterprise “State Land Fund”, then the organising stage of the project is started. In addition to the minimum requirement of having five land owners in the scheme, each must have at least one land parcel, with a total area of more than 100 ha which must be in a rural area where land reform is finished and a district general plan is approved (LC project belongs to special planning documents and has to consider foreseen development priorities for certain territory in the district general plan).

The three main players acting immediately in the development of land consolidation project are:

- Beneficiaries (land owners/users);
- Contractors (Private surveyor with real estate appraiser); and
- Supervisors (State Land Fund and National Land Service) (see Figure 20).

Figure 20: Main players in land consolidation project



Source: Self study

Beneficiaries (land owners/users) can be farmers, agricultural companies, rural communities, heads of municipalities or parishes, municipal councils, non-governmental organizations, etc., wishing to redevelop the existing structure of agricultural and forest land and reorganize rural infrastructure in certain project areas.

Everyone who has ever had a connection with LC definitely will agree with Backman & Österberg (2004) who highlighted the significance of the surveyor as the main actor in a land consolidation project. Currently in Lithuania there are 111 land surveyors with qualifications who are accredited to perform land consolidation projects (National Land Service under the Ministry of Agriculture of the Republic of Lithuania (NLS), 2013b). Only a few of these specialists have so far had practical experience of implementing land consolidation projects. There is no regulation in the legislation on the juridical status of land consolidation surveyors. Land consolidation surveyors (contractor) can be private or governmental companies. The State Land Fund before becoming LC projects organizer in 2010 was the Land Survey Institute and during 2005-2008 was implementing land

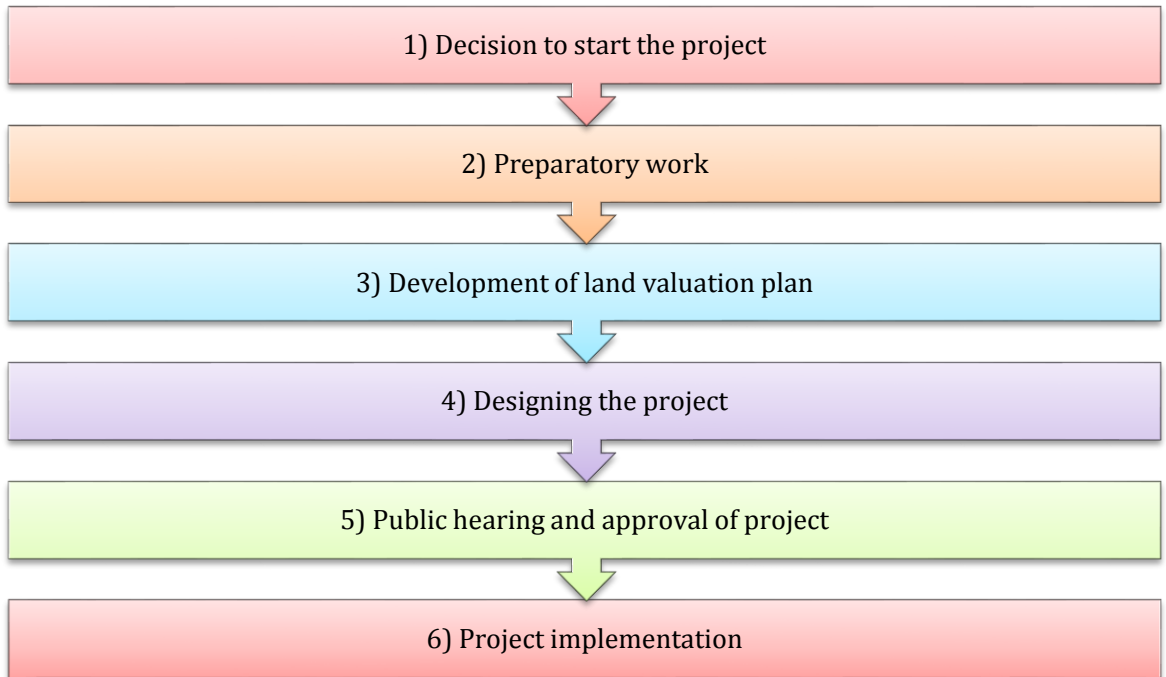
consolidation projects (organizers were counties). In Lithuania, land surveyors implementing LC project don't have a statutory acting role, if problems appear they are reported to the NLS.

Real estate appraisers working together with land surveyors have to develop a land valuation map which assists in ensuring a fair exchange of land parcels between the project participants when performing land re-allotment in the project territory. According to the report from the Property Valuation Oversight Agency (2013) in Lithuania there are 273 accredited real estate appraisers. Where project participants, in the scope of a land consolidation project, have requested any rural infrastructure (re-)development, an architect has to join the contractors' team.

The State Land Fund being the project's organizer has preparation, support, mediation and supervision roles during the project. The National Land Service under the Ministry of Agriculture has the position during the project of controlling the methodical guidance and all process supervision.

There are six main stages of land consolidation process which are defined in the Governmental resolution on the Rules for Preparation and Implementation of Land Consolidation Projects (Figure 21). It is natural that these stages are almost the same as in other countries, as the Lithuanian methodology was developed by FAO (experts from Denmark). Hereafter will be a review of the cornerstones of the land consolidation process.

Figure 21: Stages of land consolidation process



Source: Self study

Decision to start the project – stage No. 1

The SLF having the required number of applications, prepares the preliminary project map of the area, encourages neighbouring owners to join projects and performs the feasibility investigation (pre-study), where it evaluates the significance of arguments provided by applicants and possible improvements to the whole project area. Land owners falling within the area of the project are free to decide to participate in the project or not. Some land owners do not want to participate in LC projects in spite of the incentives to do so (Jagt et al. 2007). Their holdings are not included in the project territory which makes gaps appear in the LC project plan. There is no legislation regulating the requirements of how the pre-study should be performed, but the SLF considers the measures provided in the RDP 2007 – 2013 eligibility criteria and the requirements for the support, as it will have to demonstrate to the National Paying Agency that the land consolidation project will improve the project area. Without the initial requirements mentioned above, eligibility criteria and requirements for the support approved by the Ministry of Agriculture gives the priority to the territories where:

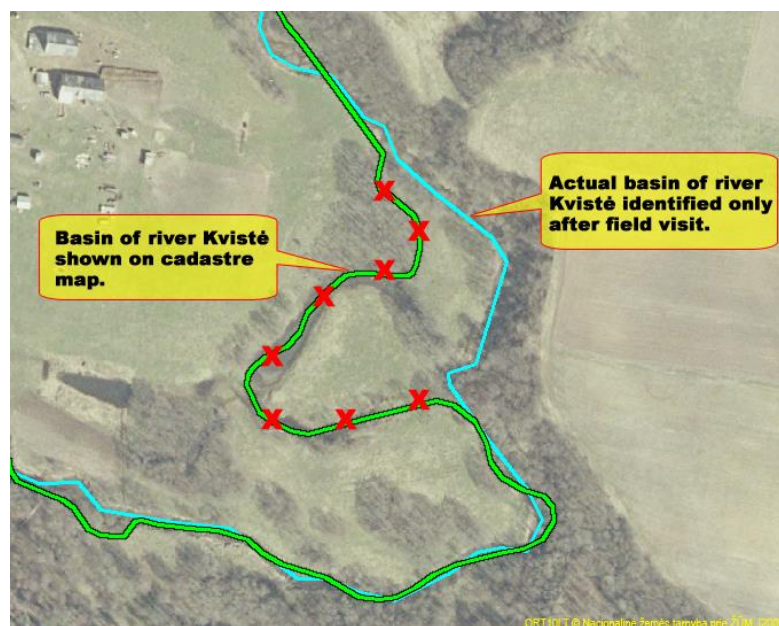
- A land consolidation project shall meet environment requirement when its implementation is completed. The environmental impact assessment, where necessary, shall be performed in the manner stipulated by legal acts;
- Land parcels under reparcelling shall be in rural areas. High nature value areas (including Natura 2000 areas) are excluded from the eligible area;
- Projects embrace a higher number of persons participating in land consolidation project;
- Projects related with other objectives of the integrated territorial reorganization: development of the rural infrastructure, afforestation of agricultural land, implementation of the strategies of local rural communities and implementation of other goals and objectives of agriculture and rural development, as well as environment protection policy (this should be reflected in the Local Rural Development strategies or in equivalent documents) (The Ministry of Agriculture, 2011).

Preparatory work – stage No. 2

After the area to be included in the LC project has been investigated and support approved, the SLF selects the project contractor using the usual public procurement processes and provides it with the planning specifications and tasks (prepared by municipality, regional environmental protection department, regional department of cultural heritage, etc.). Land surveying companies wishing to tender for LC project work must frame their bids within a maximum budget of 260 Euro per ha (The Ministry of Agriculture, 2011), and once an overall sum has been agreed for a project it cannot be changed. However, experience suggests that the rigidities of this tendering process may cause gaps and tensions to appear in the delivery of the project itself. For example, being tied to a fixed global budget for the scheme means that land owners who may have been hesitant or absent at project initiation cannot be accommodated should they wish to join in later. Similarly, the precise area of the scheme may only be established after a comprehensive survey has been completed. Should the area be bigger than originally thought, the global budget will remain fixed and will simply have to be spread more thinly. Again, adverse topographical details may only become apparent after the detailed surveys which the project requires to have taken place.

They still have to be dealt with within the fixed global sum. By way of an example (Figure 22), illustrates a case where the bed of a river was assumed (from the orthophoto map) to be in one location, but which turned out in reality to be somewhere else. There may also be cases where a landowner dies and drops out of a scheme, or where a new landownership comes into being through inheritance and the new owner wishes to join an existing scheme. In cases such as the above, there ought to be flexibility built into the legislation which would allow (with appropriate safeguards) the adjustment of the global budget to take into account changing circumstances.

Figure 22: The project planner can expect inaccuracies if data is analysed without recourse to a field visit



Source: (Pašakarnis et al., 2013a)

When the project contractor has been selected, all their planning activities commence with the collection of all the necessary data: raster (orthophoto maps, drainage system plans, land usage identification maps, soil quality maps, land reform plans, restrictions of activities plans, forest taxation maps) and vector data (the land cadastre and other similar maps and plans). The State Land Fund and the National Land Service gives all other data related with land rights (usufructs,

easements, mortgages, etc.). All this data will be necessary to prepare at least three project drawings:

- the plan identifying the utilized agricultural land in land consolidation project territory;
- the valuation plan of the area of the land consolidation project; and
- the land consolidation project solutions plan.

The land consolidation project planners may use all gathered data to inform their discussions with affected land owners concerning their expectations for the project. Subsequently a land mobility map may be drawn up showing all “immovable” territory elements like road network, water bodies, the actual location of the affected land parcels together with supporting notes about the owner’s expectations and any problems to which the parcels may be subject. During all planning process planners closely interact with all participants and other interest groups such as the municipality which represents public needs, because it is necessary to hear and understand everyone’s needs.

If there is an active local community, then it is realistic to elect a committee of stakeholders who could reflect the wishes of all the community. The purpose of the committee is to reflect the wishes of all participants, organize meetings with the project planner, participate in the valuation process, etc. However, when the project includes land owners who live at a distance (or are entirely absent from the area), such committees tend to be ineffective; the local land owners rarely have enough contact to act as a conduit into the committee, and the project planner must spend valuable time and money travelling to meet every affected landowner and securing from each properly formalized agreement to the plans. All of which adds to cost.

Development of land valuation plan – stage No. 3

Having gathered the opinions of all parties, the project planner analyses how to realize the scheme. Should the exchanges of land between owners become necessary to a project, then a series of land valuations will be undertaken. The law requires that land exchanges should involve the transfer of plots of equal value

regardless of their location. Only appropriately licensed appraisers may undertake such land valuations which are carried out using the Market Value and Income Capitalisation approaches. As there is only one LC model in Lithuania and there is still much vacant land, it is not allowed to use soil quality valuation model that is widely used, for example, in Germany, Finland and other countries. The aim of this appraisal is to evaluate the LCP area, according to the rules prepared by the NLS: to make the zoning of the LC area to identify the average value of zones, and to identify value for each land parcel participating in the LC project. It is a precondition that there is an existing land market in the area, meaning that there are various potential buyers for each plot offered for sale. It is very important to make agricultural land use analysis where the valuer determines the content of utilized agricultural land, crops, and detects what improvements have been done in the territory. Soil quality, drainage status, and forests usage analysis is also an issue. With this data, the valuer prepares the area of the project's value zone partition map and determines the average value for each zone. After the inspection of land parcels they are grouped into valuation zones (land plots having similar characteristics). The boundaries of zones coincides with land parcels boundaries and the average zone value is determined in 100 LTL¹/ha precision (1 LTL = 0.2896 Euro).

When the land consolidation project appraisal plan is ready, the project executor (land surveyor/project contractor) invites all participants and introduces the valuation methods, determined values and presents the evaluation plan. If all participants agree with determined values, they should confirm it with signature and, if all LCP participants agreed with the valuation it has to be approved by the SLF and the contractor can start the projection stage.

Designing the project – stage No. 4

This is the most time consuming phase of the project as everyone involved in the project must be aware. The LC draft map is always changing during the negotiations between surveyor and all interested parties. The main task of the LCP

¹ LTL – Lithuanian litas

contractor (surveyor) is to ensure that every participant is satisfied. The LC plan preparation is established on the principles of the rural situation amendment focusing on designing of compact, consolidated land parcels, with convenient access to the road, closer to farmstead, etc. Surveyors designing the LC plan seek an ideal result – to create one land parcel per owner, as far as it is possible. The road network, water bodies and other landscape elements, as well administrative unit borders, etc. often prevent this from happening.

To assure transparency and to avoid any misunderstandings, every verbal transaction has to be documented and as practice shows recorded on tape (Dictaphone) or video. When the holding of a non-participating land owner is in the project territory, the surveyor has to investigate it anyway, just to be sure, that the owner has a viable plot, properly defined in the property documents with appropriate access to road and other necessary infrastructure. If the excluded holding is of greater extent than is defined in the property documents, the surveyor has to fix this land reform mistake and redesign the boundaries accordingly. As might be expected, land owners affected by such diminution of their holdings can become very angry after such corrections. For those land owners who live outside project territory and rent their land, the main intention of participation in such projects is to make geodetic measurements for free and sell their parcels, because without geodetic measurements it would be complicated to do so. For this reason, as Thomas (2006a; 2006b) stresses even for LC experts it is particularly in CEECs very difficult to look through whether an implementing procedure is indeed “land consolidation” or not.

The land consolidation surveyor, planning land also for public needs follows given planning specifications, tasks, and the wishes provided by the participants. A very important stage is (re-)planning of a convenient local road network and rural infrastructure, setting servitudes. It is especially critical with local (field) roads; everyone drives as he wants, sometimes through neighbours’ land parcels even when this roads network is expected due to land reform. Some land owners participating in the project have emotional bonds to the territory and do not want any exchange, just simple borders’ correction – such land parcels become

immovable elements in the project. The inclusion of the vacant land stock in LC projects is entirely rational too. These unattractive land areas are consolidated and, with support from the government could be returned to the market. Alternatively they may be used where appropriate to ease some of the problems (such as access) that appeared after the land reform.

Land consolidation projects are assigned to special land planning documents where it is necessary to prepare the Environmental Impact Assessment report. The explanatory text together with an Environmental Impact Assessment Report has also to be presented and approved in this public meeting. Although an Environmental Impact Assessments (EIA) report has to be prepared, an examination of the available evidence suggests that these amount to little more than “tick box” exercises. Whilst it could be reasonably expected that there would be some negative aspects arising from LC projects whose sole objective was the merger of land holdings, none was found. However, every possible positive impact is reviewed and publicised from the point of view, that land parcels were enlarged, distances were reduced, local road network developed, etc. There is lack of information about negative impacts which could be expected from land consolidation which is focused on just merging the land parcels. Explanatory text consists of a presentation of the project tasks and objectives, information about participants, valuation methods used, description of land exchange implementation, prediction of possible positive and negative factors, etc.

When the land surveyor prepares the land consolidation project solutions plan, it has to be approved by all participants. To do so, the SLF organizes the public meeting where the project contractor must present all improvements. Although many in society express a passive interest in undertaking LC projects and it is difficult to translate this into active participation. This may be particularly the case when the documentation presented at the meetings is unfamiliar and complex. The project solutions plan will be the basis to prepare a cadastral data file for each land owner/user.

Public hearing and approval of project – stage No. 5

The project plan has to be approved by 12 different institutions (municipality, institutions responsible for infrastructure and utilities, environment protection, etc.). The land surveyor has to be a person who helps all institutions to reach a common conclusion in the land covered by the project. It is critical to open communications with all institutions at the earliest possible stage of the project if the planner wants to finish the project on time. Even before the detailed planning starts, at the initiation stage, these institutions could offer advice as to the best areas to be included in future projects. Notwithstanding there is State Land Fund, currently this body is passive in coordinating effective communication between all institutions. As Ayten et al. (2008) state, land consolidation consists of a set of works in which many institutions must work together, each having regard to the activities of the others. For this reason, communication and coordination between the institutions is of paramount importance if authorization chaos is to be avoided and the projects are to continue along a healthy path.

When the project passes the expected arrangements the National Land Service takes it for revision and approval. Only after the NLS approves the LC project, can the executor start implementation work.

Project implementation – stage No.6

This final land consolidation project implementation stage covers cadastral measurement (demarcation), notary services and registration of new property units in the cadastre where each land owner get new cadastral data files. The project contractor explains how boundary marking will be implemented, highlights when notary transactions and registration will be done and provides recommendations for land owners, when they can move to newly designed land parcels (recommended in spring or autumn to avoid loss in agricultural production). Some exception after registration for immediate usage of “new land parcel” could be applied for those farmers who have registered “ecological farms” as they cannot change the location for the period foreseen in the agreement. In this case notary agreement between land owners could be used.

If the project has successfully passed all stages mentioned earlier, this is the final stage. Actually in Lithuania a very useful element in this process chain is missing – the land consolidation court (board), which proved significant in Western European countries solving all disputes which occurred during the land consolidation process. The court is the only institution in Lithuania where disputes during LC are tackled.

5.4. Findings of Lithuanian practice of implementing land consolidation

Foreign experts helped develop the Lithuanian model through implementing the initial land consolidation projects (2005 – 2008) called the “learning-by-doing” approach (Jagt et al., 2007). As land management authorities had little practice, there were breaches in the legislation, for example, land exchange between State and private owners was forbidden, no (State) Land Fund, a lack of knowledge of the institutions involved, etc. The results from these first land consolidation projects looks very poor by the land consolidation definition which is set in legislation (it will be explained further in this chapter). At the same time as the projects, based on the “learning-by-doing” strategy were in progress, the main actions were focused only on how to enlarge farm holdings and create convenient local roads network (only on plan) and perform geodetic measurement. It must be noted, that land consolidation procedures with the sole aim of improving agricultural production and working conditions are likely to have negative impacts on the environment (Thomas, 2006a; Thomas, 2006b). This rather limited ambition for the instrument needs to be raised to a much more sophisticated level if, as is inevitable; the question of “value for EU money” is to be convincingly addressed. This suggests the need for institutional involvement at the very highest level. Local land management authorities are not very active in the promotion of LC and for many of them this is an unexplored area. The 10 out of a total of 48 district offices who have experienced LC projects between 2005 – 2008 have not shown much enthusiasm to take on new projects, because they know what to expect. This could be related to the fact that after starting a project the duties and responsibilities of the specialists involved begin to escalate, whereas their salaries

stay the same. In almost every part of the country there are many cases where ineffective land reform in the 90's introduced a set of problems that will require the application of LC to resolve. For local land management authorities who are inexperienced in LC the prospect of having to initiate a scheme and deal with the consequential uncertainties is not a happy one, and is indeed regarded as a problem best avoided. The situation here has changed in recent years, as from 2010, the responsibility for the promotion and organization of LC projects became the State Enterprise "State Land Fund".

Unfortunately, in the case of attitude, not much has changed from these first LC projects, as even now with 39 on-going projects, which aim to promote sustainable rural development, the actual situation is different. In official announcements published in national or regional public media all disguised with sublime objectives, but in local public media, the reality is slightly different – an accent is that during land consolidation farmers can enlarge farm holdings, perform simple cadastral (geodesy) measurements or land formation and transformation. Such land owners are very welcoming, as the announcement says – everything will be free of charge. Common public opinion is that LC will create large collective style farms again, like it was during the Soviet Regime, therefore making the main message even less attractive. Acting legislation does not necessary link the process of LC projects from the idea to the reality. There are quite a few politicians, land management specialists, academics, land owners and land users (municipalities; road, forest, environmental administrators, etc.) etc., who know about this instrument (Mr. Saulius Bumblauskas (LC project surveyor), as found during an informal interview that took place in Gabšiai, Raseiniai district of 6th November 2008). They do not know that they can participate in such projects and solve important issues from their point of view. The reason is simple – only recently these institutions have started implementing special management solutions (some based on GIS) to administer their properties. The main issue is that if you do not know what you have, you are not able to manage it properly. Lithuanian experts agree that public involvement could be achieved by round table discussions about complex land consolidation projects and solve multipurpose objectives. Such a situation is changing, but very slowly. That is because there is no tradition and

insufficient knowledge at all levels concerning this instrument that is widely used across most Western European countries. Mass public awareness campaigns, which explain the substance of the process and the best practices from NLS and SLF, are still very urgently required. It is vital to spread information among different governmental institutions (ministries) right from the initiation stage and not just when the project is on-going, as well as getting involved in the coordination of projects that will be useful for the whole process of rural improvement. There are currently no local experts to consult with, and nobody from whom to seek guidance in the solution of anomalies that appear during the planning process.

The second problem which hampers active participation in such projects is that even today land managers are quite often an escalated topic in the public media and are considered as land plunderers for the lack of transparency in land ownership rights restoration, corruption, etc. Such an attitude discussed in public hinders the close and trustful communication between land managers and land owner. Land owners as a result are suspicious of accepting every innovative suggestion and almost every first meeting between the land owner and land management authority starts with a discussion about past land reform mistakes. Only after the problems have been identified, are land managers able to offer an opportunity to solve the problems in all areas during an LC project.

During the implementation period (2005-2008) of LC projects, local land management authorities asked land owners to assure that land parcel boundaries are properly marked prior to starting. According to the legislation, land owners have a duty to protect land parcel border marks, which were established during land reform by land reform surveyors. If there are no land parcel border marks in the fields, the land owner can expect a penalty. Many land owners have restored their ownership rights more than a decade ago. During the land parcel demarcation process in rural areas, wooden border marks were mainly used and it is natural that they have vanished after some years. There were cases when during land reform, surveyors failed to mark all land parcel borders as firstly, it was difficult to reach some points, secondly, some land owners wanted to have only the

papers without knowing their precise parcel boundaries, and finally there were a range of other minor reasons (i.e. frozen ground). Land reform planners (surveyors) were paid by the government to establish land parcel border marks (~1.40 – 2.40 euros per border mark depending on soil structure hardness). Some land reform planners only made the cross on the ground by foot, leaving the land owner to mark the border mark properly. A common situation was that land owners who purchased or inherited land from previous owners did not know the exact parcel borders therefore before starting the LC project they had to finance such costs on their own, re-establishing missing land parcels border marks and, for such a service, paying from 7 to 14 euros per border mark. Where land consolidation project contractors were the same land surveyors that they had had during land reform and who failed to mark all the borders, the land owners were concerned that the surveyors will actually get money twice for same service which had been done badly on the previous occasion. The situation with land parcels border marks is ambiguous, as farmers who are using their own and rented adjacent land parcels, harvest it as one big land parcel (farming consolidation) without taking care of inner land parcels border marks. Farmers eliminate such inner border marks, as they want to protect agricultural machinery from damage. Only the outer land border marks are in the fields, which are used to declare agricultural crops to receive direct payments from the National Paying Agency.

When analysing projects data, it was noticed that big farmers were the main catalysts in the first 14 LC projects as they found fragmentation caused most inconvenience to them, having their land parcels spread all around their neighbours. Now in Lithuania there are actually 10 huge landlords, who each own more than 10,000 ha of agricultural land. They provide yield and dairy production for the whole Lithuanian market. Some of them participated in LC projects with the idea to lift small and stubborn land owners from their “windowsill” and to consolidate their own land. Another intention – the state land (vacant land stock) - which is not privatized yet. They expect that during LC, state land will be gathered to one big, attractive land parcel and after that these landlords will be able to acquire it. Even today, in a new LC projects wave, one agricultural holding already officially declared that this strategy will be applied in 4 LC projects. The settlement

of such huge landlords is resulting from the disappearance of family farms and as FAO (2009) has reported, family farms in the future will be taken over by "big players" like agricultural companies resulting in further depopulation of the countryside. Recently, in the government of Lithuania, active debates are on-going regarding the prolongation of restrictions to allow foreigners to buy land. Such restriction until 2014 was arranged during the joining process to the European Union. The main argument was to protect small farmers and help them to acquire enough land to be viable and be able to compete with "Western" farmers. In parallel, the government is legalizing penalties for unattended and abandoned land. Authorities create a picture that abandoned land is a shelter for agricultural vermin and calculating how much it is possible to earn from that land returning it to agriculture, without thinking about other threats – intensive agriculture affecting biodiversity, pollution and resource consumption. Up till now, the Lithuanian landscape is recovering after the intensive Soviet agriculture model, vanishing species are dominating, water pollution has been reduced, etc. Small farmers are in fear that penalties will force countryside depopulation and will help local huge landlords, without any competition, to acquire land cheaply.

In Lithuania there are 7 scientific institutions (2 universities and 5 collages) that have lectures dedicated to land management and could train future land consolidation specialists. Land consolidation as a theme in Lithuanian scientific institutions is studied passingly. It is very important to strengthen this topic, preparing high quality land managers for the future as land reform is going to end. Land managers of this generation have to be prepared to harmonize elements of sustainability in the countryside. Students during a practice period could help spread the information about LC; using questionnaires prepared together with local land management authorities and interviewing land owners. They could identify future project territories and this data could be used for their studies. At the moment, none of these possibilities has been carried out.

For the analysis, how LC looks in practice, the first 14 land consolidation projects were chosen, because there are no new LC projects implemented yet; there are 39 new projects underway which will be implemented in 2015. Having the definition

of land consolidation in the Law on Land in 2004 and the rules for LC projects' preparation and implementation in 2005, during 2005–2008, the first 14 land consolidation projects (Table 6) in 4 counties had started on the “learning-by-doing” basis in the area of 4.827 ha with the participation of 388 land owners involving 731 land parcels. The budget was 753 thousand euro. Projects were financed from the Single Programming Document (SPD) of Lithuania for 2004 – 2006 priority *Rural Development and Fishery Priority* measure “*Promotion of Adaptation and Development of Rural Areas*” activity “*Reparcelling land plots*” where the support from the European Agricultural Guarantee Fund (EAGF) (71% from the EU and 29% from national budget) was used.

Table 6: Fundamental facts about the first 14 LC projects

Project / total area (ha)	Total No. of land owners	Total No. of plots before LC	Total No. of plots after LC
Telšiai county, LCP I / 670 ha	44	115	67
Telšiai county, LCP II / 638 ha	55	111	81
Telšiai county, LCP III / 362 ha	29	52	40
Telšiai county, LCP IV / 341 ha	20	46	33
Telšiai county, LCP V / 136 ha	11	23	17
Marijampolė county, LCP I / 607 ha	31	57	41
Marijampolė county, LCP II / 482 ha	74	101	82
Marijampolė county, LCP III / 199 ha	9	8	8
Marijampolė county, LCP IV / 192 ha	28	40	24
Panevėžys county, LCP I / 397 ha	22	57	41
Panevėžys county, LCP II / 270 ha	18	26	17
Panevėžys county, LCP III / 192 ha	21	31	39
Tauragė county, LCP I / 208 ha	14	38	10
Tauragė county, LCP II / 133 ha	12	26	9
Total	388	731	509

Source: (Pašakarnis et al., 2013b)

Van den Brink (2009) states that development planning is based on coalitions between public and private parties and on innovative financial arrangements. It makes use of urban-rural relations, instead of focusing on rural and urban areas

separately. It is also about public-private partnership, i.e. creating alignments between land use functions, interests, professional disciplines and financial arrangements. In other words, it is a co-production between public and private actors, interest organisations, advisors, designers and users. It is difficult to admit, but in many CEECs local government is weak. Communication and partnership between municipalities and local communities are rarely efficient. It is necessary to strengthen this missing part, as effective communication is crucial, that is why countries are using EU support to fill this gap. Public and private synergy is very important when seeking to achieve better long-term results in rural areas. When various projects raise rural viability, it reduces the need for social allowances, which the municipality could redirect for other needs. When seeking common objectives in rural areas, local communities should ally with local government as they both are taking beneficiaries' roles. Local government has to understand what rural development objectives could reasonably be stated during land consolidation and how they can be achieved. Seeking the best possible results, local government could even support the realization of objectives that it was unable to implement using support from LC. Results achieved during LC are the best partnership indicator of how communication between land owners and municipality works in practise. Further results will answer to this question.

In order to find out how LC meets the objectives (to enlarge land parcels, to form rational land holdings of farms and to improve their structure, to establish necessary infrastructure and to implement other goals and tasks of the agricultural and rural development as well as environment protection policy) and works in reality the analysis was performed by:

- questioning landowners who are project initiators (beneficiaries) (face-to-face interview using questionnaire);
- questioning municipal specialists (online structured questionnaire using Bristol Online Survey platform), and
- interviewing face-to-face of private land surveyors (contractor).

5.4.1. Land owners attitude to the LC project results

To identify land owners' changes of attitude and the fulfilment of their expectations from the LC process, during 2006 – 2008, face-to-face interviews based on a structured questionnaire were conducted with participants in LC projects in Telšiai county (Telšiai county LCP II), Mažeikiai district, parts of Židikai and Ukrinai cadastral areas covering four villages. The survey was focused upon the private land owners' attitude at stages:

- Before starting the LC project, and
- After the LC project was implemented.

Questions were mainly focused on the social and economic benefits of the project as the awareness of environmental measures during project implementation among the land owners was very low. Of the 46 private land owners who participated in the project, 32 participated in this survey. The average age of land owner participating in this survey (in 2008) was 55 years, (mode = 41, oldest = 85, youngest = 30).

The studied project was implemented in a 638 ha area, where 46 private land owners and one trustee of State land were participating. A total of 111 plots are covered in the project, 104 of which were private. The target was to achieve an average plot size in excess of the 6 ha which existed at the start of the project. The biggest plot in the project was 39 ha, the smallest 0.11 ha. Most farmers or agricultural companies were growing rape seed to supply oil to a nearby bio-fuel factory. The project area was not densely populated, containing only seven homesteads in total. The cost estimated by the National Paying Agency for the implementation of this project was 99,829 euro (156 euro/ha) and the project implementation duration was approved at 21 months.

After the LC project had been implemented, the number of private plots was reduced from 104 to only 74 (see Table 7). This rearrangement effect was achieved as a result of the close cooperation between the professional surveyors and the property owners. Working together, the surveyors and the owners managed to

increase the average plot size from 6 ha to 8 ha. Before consolidation the largest plot was 39 ha; after LC project implementation this value has risen to 61 ha. The true benefit of this type of exercise may be illustrated by the experience of one particular farmer whose 24 plots dispersed over the entire area covered by the project was consolidated down to eight plots at its conclusion.

Table 7: Land consolidation project effect

	1 plot per owner	2 plots per owner	3 plots per owner	4 plots per owner	≥5 plots per owner
Before LC	26	11	4	3	2
After LC	31	9	4	1	1

Source: (Pašakarnis et al., 2013b)

Bigger and more active land owners having plots spread over the affected area quickly got the idea and wanted to participate in the project. Local land management departments were projecting a post-project vision of life after the LC project had been completed, not only rearranged and merged land parcels, but with a newly established local road network (with hard surfacing), repaired drainage systems, the possibility of adding vacant land stock adjacent to their plots, etc. However, not all of these improvements have been implemented. On the other hand, the process has been the trigger for smaller land owners to have their holdings measured and formally delineated which in itself has raised the land value.

Land owners from these first 14 projects in the applications presented common problems (identified through questionnaires) to the governors of the affected counties who then attempted to resolve them through land consolidation (before 2010 county governors were projects organizers, after 2010 – SLF). Typically, this involved enlarging farm holdings, improving farm structure, compacting farms, improving the local road network, reducing distances between cultivated plots,

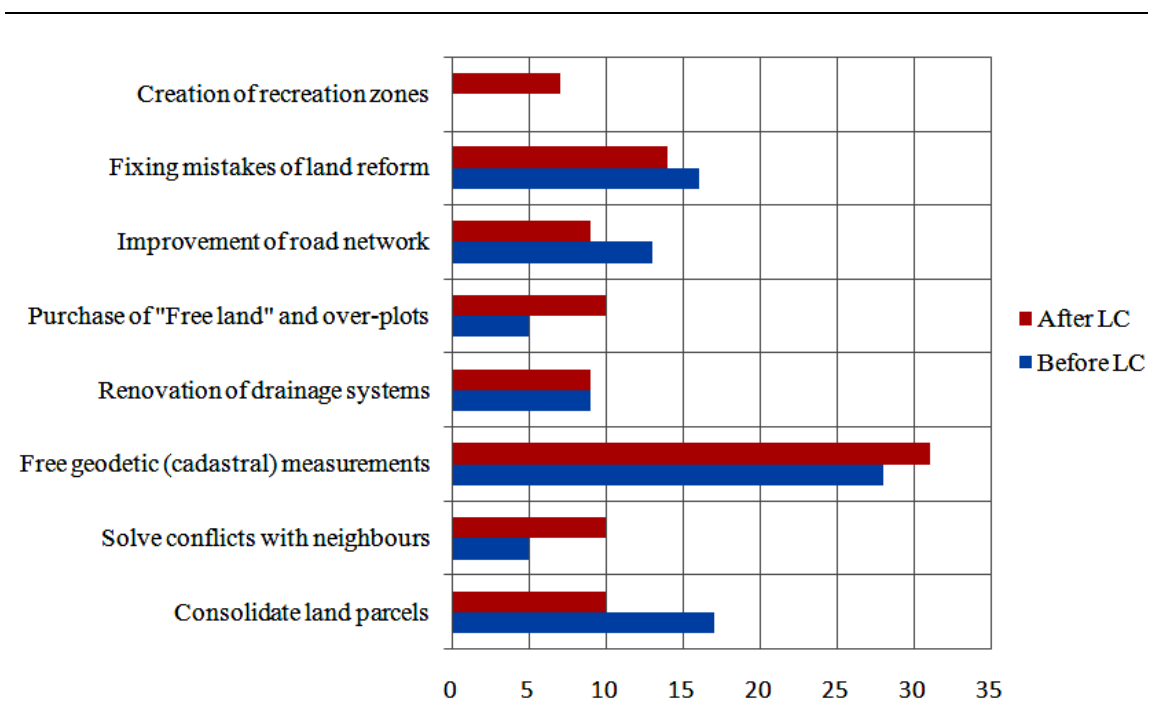
creating a territorial base for infrastructure improvement, and identifying the areas where land improvement is necessary (mainly repair of drainage).

Many land owners from the first 14 land consolidation projects were disappointed after local land management authorities promised greater advantages than were actually possible under the current legislation. A lack of clarity about project objectives and opportunities was noticed in every project. Land owners were expecting to restructure rural infrastructure, create a more convenient road network, repair drainage, establish new farmsteads, and develop electricity networks. More active farmers were expecting to consolidate surplus land (vacant stock land) from their own or neighbours' land surplus into their own holdings and to acquire private title to such acquisitions (Anon, 2008). As we can see objectives provided by the land owners are almost the same in all projects, this due to the land management authorities' "support" helping land owners to fill applications for land consolidation. The explanation is simple: to show as much as possible generous objectives what assures direct way to subsidy, which is 100%.

Interviews that were conducted in 2006-2008 with 32 private land owners from 46 (70% response rate) who had participated in the LC process from its outset revealed that only three of them (active land owners having many plots in the affected area) had any knowledge of incentives on offer whilst the balance did not get to learn of them before 2005. Their reasons for engaging with the consolidation process stemmed from a long course of persuasion from local land managers – “a top-down” approach. Land owners having only a single plot, especially those who were living far away from the project area had no motive to participate in the consolidation process, as they had nothing to consolidate. The reason why they nevertheless still participated was because they were promised that their cadastral (geodetic) measurements would be done for free; such a service normally costs approximately 350 euro/ha. As the market price per hectare of land was about 1,200 euro at the time, this was sufficient incentive to trigger participation by private land owners.

To identify changes in participants' attitudes towards the LC project, the questionnaire was administered on a before (2006) and after (2008) basis (see Figure 23). It quickly became apparent that the main motive for participation before the project commenced was the prospect of “free geodetic (cadastral) measurements”, and indeed this remained the case after project completion. Figure 23 also reveals that the weakest expectation from the project lay in the “creation of recreational zones”. Land owners in the affected areas had few thoughts about alternative land uses when they could derive an assured income from growing rape seed which they could sell to the nearby bio-fuel factory.

Figure 23: Changes in land owners' attitudes to the LC project



Source: (Pašakarnis et al., 2013b)

In an attempt to clarify the impact of the LC project upon the behaviour of land owners over the next five years, further questions were asked of them with regard to the anticipated development of their businesses. Five possible scenarios were offered for the next five years and landowners were invited to select the one which they thought best reflected their own prospects. The results are given in Table 8 below:

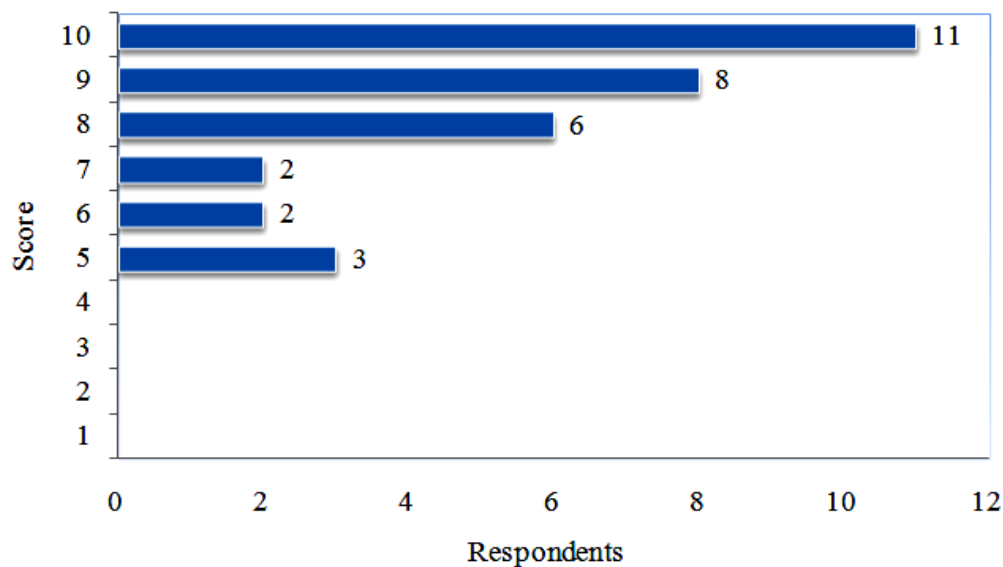
Table 8: Future perspectives influenced by LC

Future perspectives for 5 years provided by land owners	# of land owners
to expand their farms	4
to sell their land in the near future	4
to rent all their land	3
to use their land further without any investments to expansion	10
do not know	11

Source: (Pašakarnis et al., 2013b)

And finally, land owners were asked to evaluate the project's efficiency, focusing on how it was organized and how the main goals were achieved. The rating marks were from 1 (very bad) to 10 (very successful). The results are shown in Figure 24 below. None of the land owners gave rating marks of less than 5.

Figure 24: LC project evaluation provided by private land owners



Source: (Pašakarnis et al., 2013b)

The lowest rating (5) was given by the three private landowners who already knew about LC before the project commenced and clearly compared unfavourably the actual outcomes with the advertised outcomes. They were disappointed that the project implementation did not go as far as actually renovating drainage

systems, building new roads and installing new electricity lines, etc. The rating of 5 was their way of saying that only half of their expectations had been met. The highest mark (10) was given by land owners having one plot in the scheme and whose main concern was to access the free geodetic survey. The average rating (8.47) suggested that for most participants the project lived up to expectation. However, when these expectations are low, the project cannot be sustained which suggests that a necessary precondition for success is that the participants are brought to a full understanding and acceptance of what it is possible to achieve through land consolidation.

5.4.2. Local government attitude to the LC projects

In an effort to evaluate local government understanding regarding this new land management instrument, the author prepared and circulated an anonymous questionnaire for the municipalities of Lithuania. In Lithuania there are 60 municipalities, of which 53 are district municipalities. In December 2010 using Bristol Online Surveys (an internet based questionnaire solution) a questionnaire for specialists dealing with rural areas from district municipalities was launched in order to find out more about their attitude to LC. For this survey specialists from "agriculture departments"¹ or "architecture departments"² were chosen as they were in direct touch with rural dwellers regarding the grants and implementation of rural development permits. The duties of these departments lie in managing the implementation of the district's master plan and the collection and collation of the associated data requirements. The survey was distributed to the GIS (geographic information system) specialists within the departments on the grounds that they were the custodians of the regional database and were closely concerned with the regional development strategy. The survey invited responses to questions concerning the extent of LC in their districts, the availability and accessibility of information about LC schemes, the perception of such schemes, and rural development progress in general within their districts.

¹ Žemės ūkio skyrius

² Architektūros skyrius

Responses were received from 42 of the 53 (79% response rate) district municipalities. Reasons for non-response included a stated lack of knowledge about LC issues or simply that the matter did not affect their regions which were more than half covered in forests.

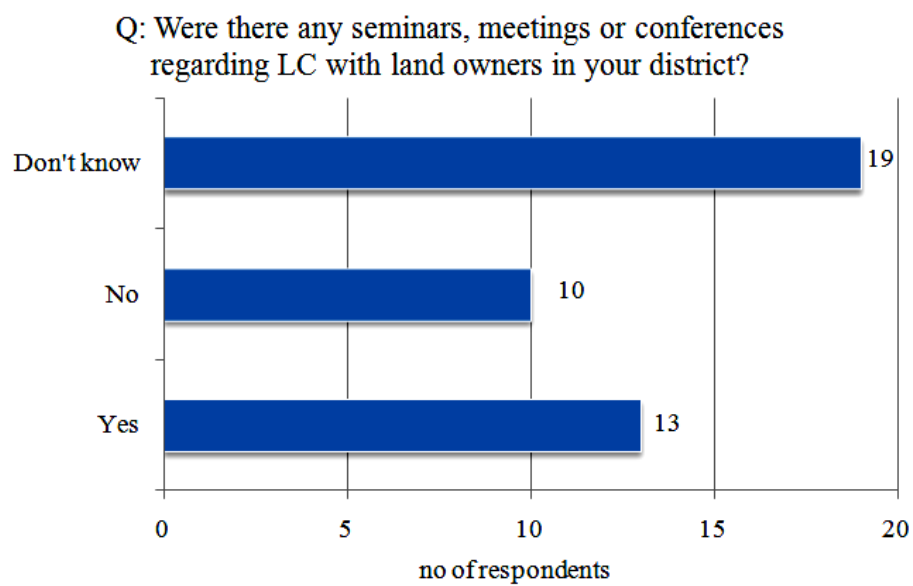
As land consolidation is not a new term in Lithuania, one of the first things that the author wished to establish was the extent to which specialists within the municipalities had knowledge of any LC projects in their districts which had been implemented during 2000-2008. Of the 42 specialists who were asked, 17 answered that they did not know, 19 answered that they had no such projects, and the remaining 6 responded positively. Separate questions were provided for these 6 respondents asking them to answer whether or not project solutions (drainage renovation, road construction, etc.) were implemented using other EU structural funds or from the municipal budget. To this additional question, three specialists responded negatively and the other three answered that they did not know.

The Municipality representatives were asked whether they knew enough about land consolidation and its aims and objectives to be able to present it to a typical farmer of their district. Only three representatives answered that they did not feel sufficiently knowledgeable to be able to make such a presentation, 31 thought that they knew enough, and the remaining eight were fully confident in their expertise.

The specialists chosen for this survey are in continuous communication with land owners, giving suggestions and permits for development. For this reason, they have to be regional beacons providing as much information as possible and directing land owners towards land consolidation. Only two respondents replied that they had been asked by citizens in their districts to provide more information about land consolidation. One specialist was asked about land consolidation by 25 land owners, and the other by five land owners. The main reason why land owners were asking about land consolidation was that they had heard about the free geodetic measurement. This suggests that the land owners have a very narrow view of land consolidation.

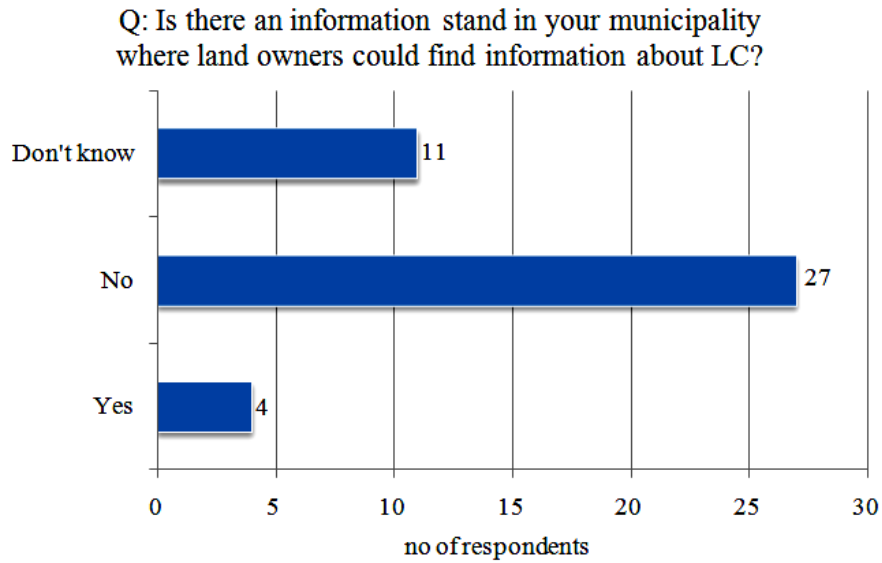
The next phase of questioning focused upon the degree to which professional staffs within the municipalities were aware of the need to make LC information available to potentially interested parties within their district. The most effective way to spread information about land consolidation and its objectives is through live seminars and meetings with key groups. Survey participants were asked how information about land consolidation is managed in their district municipality (see Figure 25 and Figure 26).

Figure 25: Accessibility to information about LC in district



Source: (Pašakarnis et al., 2013b)

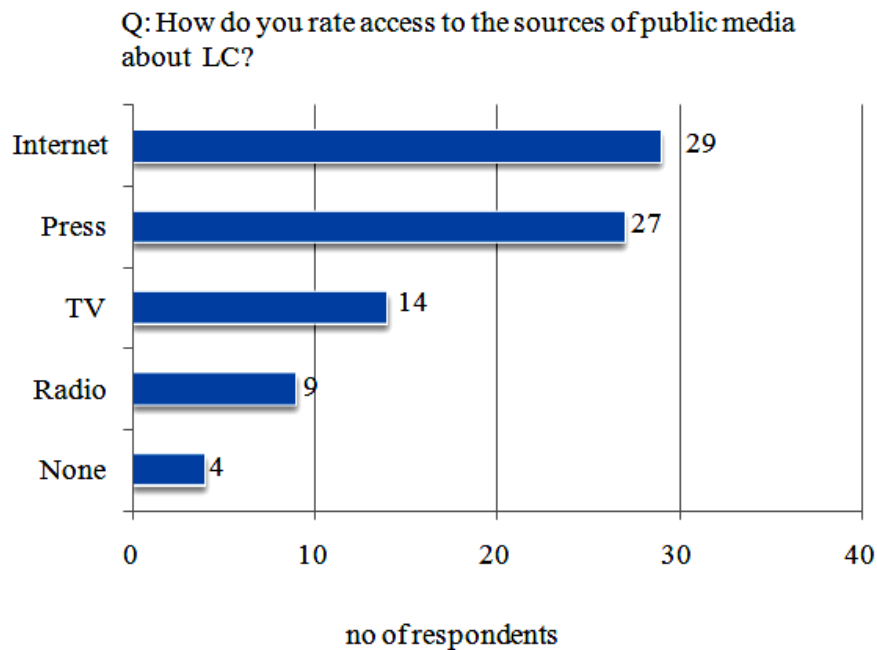
Figure 26: Accessibility to information about LC in municipality offices



Source: (Pašakarnis et al., 2013b)

These figures show that it is necessary to launch an effective public awareness campaign involving as many of the interested parties as possible and presenting to them the many advantages that can flow from the adoption of the LC packages. The primary platform for such a campaign should be through the public media (press, TV and radio), followed by the District municipality offices where land owners and local communities could find all the necessary information. Having advisors within the municipal offices that are competent to offer detailed assistance at the local level would complete the information loop. Municipality specialists were asked to specify all possible variants of the sources of mass media where information about LC was found. The responses revealed that the highest rating was given to the Internet (29), followed by the Press (27), Television (14) and Radio (9). Four respondents had not come across any information at all in the public media (see Figure 27).

Figure 27: Public media sources of information about LC accessed by respondents



Source: (Pašakarnis et al., 2013b)

The above pattern of responses flags up the need to use the Press more actively, given that the older generation rarely use the Internet although a large part of Lithuania is covered by broadband Internet.

The next stage of questioning concentrated on the extent to which the municipality professionals appreciate the rural development progress in their district. Every district is distinctive as the municipalities near major cities feel pressure from urban development, whilst the outermost districts feel abler to cherish the landscape. To evaluate the pressure of LC demand from farmers it was necessary to identify dominant farms within the districts. Enquiries yielded the following results (Table 9):

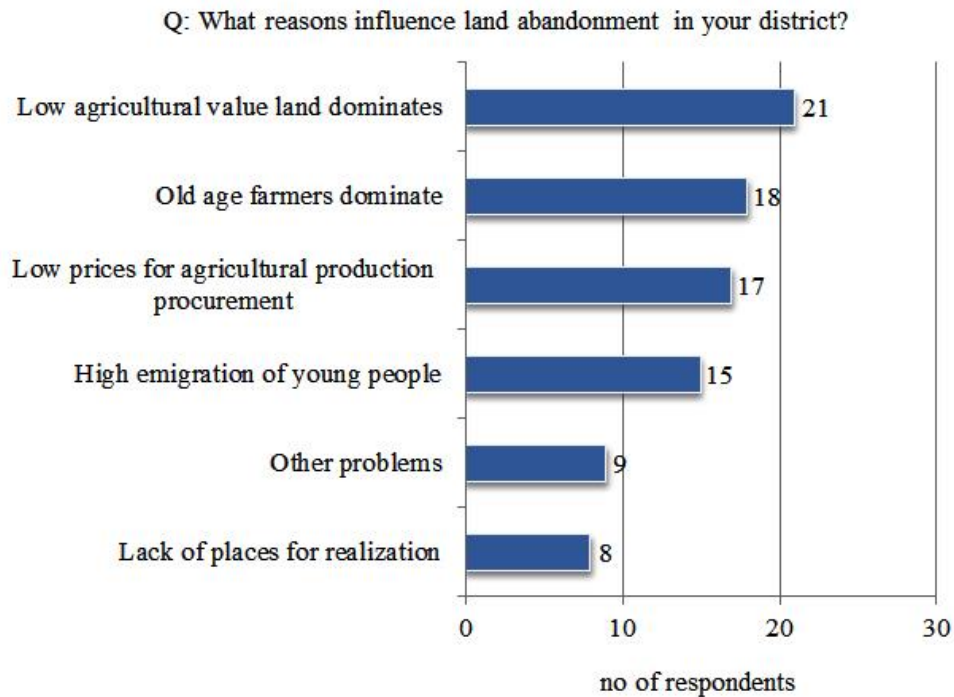
Table 9: Dominating farm sizes

Size of farm	Value (ha)	Number of respondents
Small	<10	21
Medium	10-50	18
Large	>50	3

Source: (Pašakarnis et al., 2013b)

Land abandonment is identified in almost all CEE countries as a very important issue. Chosen respondents are familiar with these figures, as they are doing field surveys with GNSS (Global Navigation Satellite System) and uploading this information to their GIS database. From these survey results it is possible to conclude that land abandonment for local government is not so big a problem as expected. Twenty-seven respondents stated that there is a relatively small number of abandoned land plots, twelve said that there is a considerable number, two said that almost all land is used, and one did not know exact situation. Participants were asked to identify the main reasons why they thought land abandonment occurs in their district. In addition to the reasons given in Figure 28 below, under “Other problems” respondents suggested that land may be left fallow by city-dwelling owners who were holding it as an investment against the time when prices had risen sufficiently to justify a disposal. The main indicator of rural viability and vibrancy is the growth of population. Unfortunately, this is simply not happening as younger people migrate to the cities leaving the countryside to be dominated by a cohort of increasingly aged farmers.

Figure 28: Reasons given for land abandonment

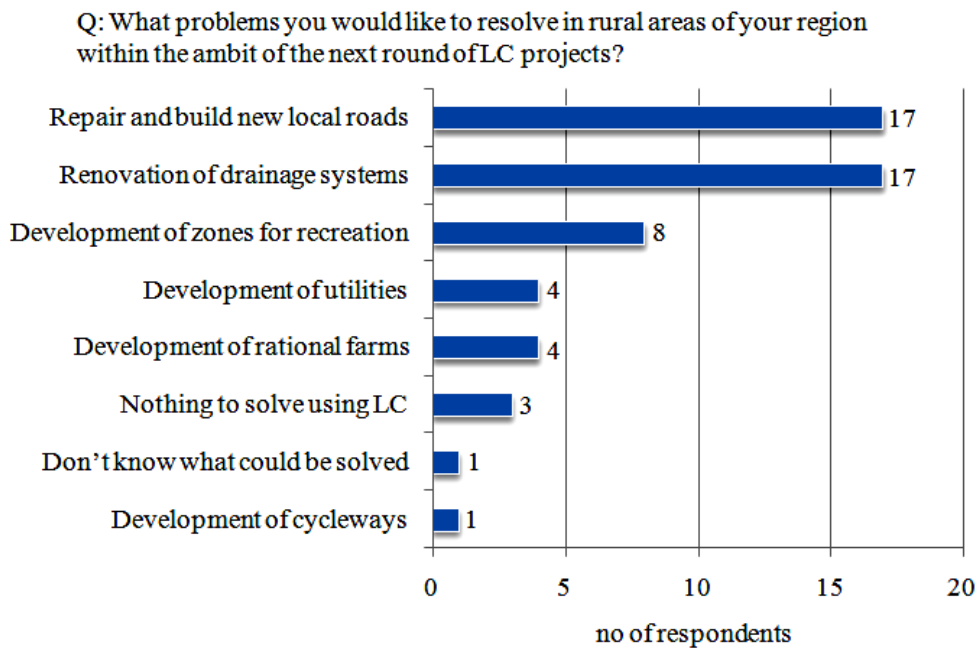


Source: (Pašakarnis et al., 2013b)

The professionals were asked about the role of Local Action Groups (LAG) in their municipalities under the LEADER initiative to assist rural communities to implement a strategy of the development in their areas. Twenty-six respondents answered that they have a Local Action Group which is active in this respect in that they are trying to minimise the difference between urban and rural areas. Eight answered that they did not have a Local Action Group, and the final eight answered that they did not know what a LAG was.

And finally, it was very important to find out the attitude to land consolidation of the municipality specialists and whether they appreciated LC as a tool for complex development. Respondents were asked to indicate what problems they would like to resolve in rural areas of their regions within the ambit of the next round of LC projects (see Figure 29).

Figure 29: Infrastructural and agricultural issues to be solved through LC



Source: (Pašakarnis et al., 2013b)

These answers reflect the preoccupation that rural dwellers have with infrastructural problems (bad drainage systems, local roads condition) as relayed through the specialists. Through partnership, the ambitions of both the municipalities (for infrastructure improvements), and the rural dwellers (for agricultural improvements) could both be realised.

The reality has, however, fallen short of this expectation. The fundamental reason for this appears to have been a lack of congruence between the objectives of the primary parties involved in the process. The findings of this analysis are that there is still quite a wide gap between aspiration and actuality as the public and private sectors (both are beneficiaries of the projects) do not formulate common objectives to avoid future degradation of rural areas. Whilst the private land owners were inclined to concentrate upon the short term gains such as free cadastral surveys, their public representatives were more focused upon longer term infrastructure development. Clearly progress is conditional upon all parties agreeing mutually beneficial objectives and then pursuing them single-mindedly into the longer term. Until this matter is resolved, it is difficult to envisage the

development of mutually compatible policies which, if adopted and implemented, would deliver a sustainable flow of benefits to the public and private sectors.

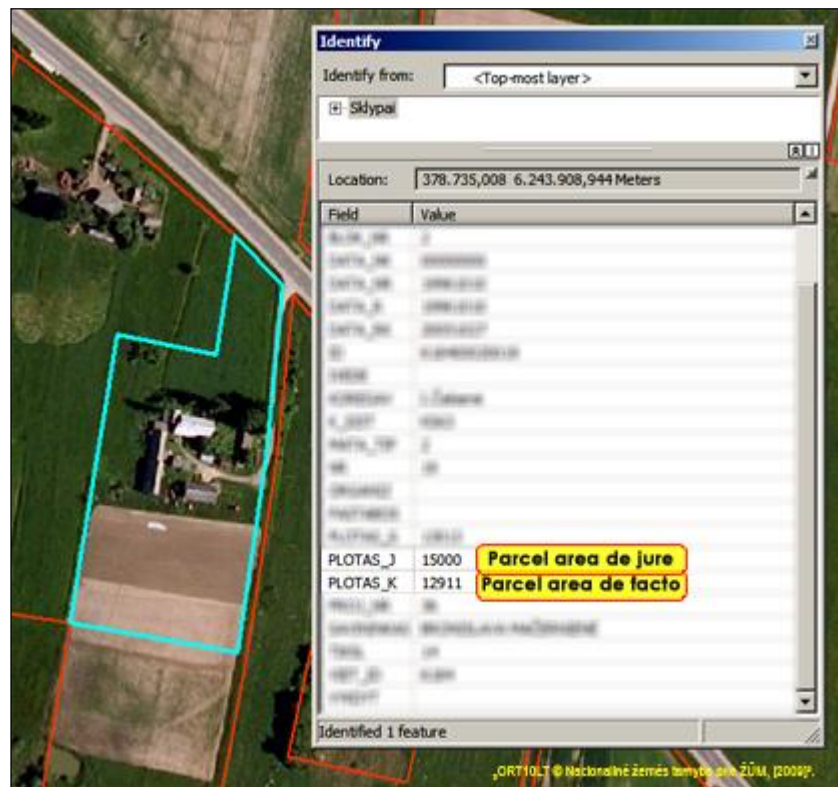
5.4.3. Land surveyors attitude to the LC process

During November 2008 all (eight) land surveyors, having practice of implementing LC projects in 2005 – 2008, were interviewed face-to-face about how the LC legal framework works and what difficulties they faced. It has to be highlighted that all these land surveyors had gained a theoretical background about LC during 2006 – 2007 as they were participating in the training course on preparation of land consolidation plans "*Support to the preparation of an operational land consolidation system*" organised by the FAO and the National Land service under the Ministry of Agriculture.

According to half of the respondents generally more effective outcomes result when the project planner is from outside of the area and has had no previous association with the land reform process in the project territory. A reason for this may be that land owners are able to credit such people with more objectivity and professionalism and to negotiate with them accordingly.

All surveyors working in the projects have to deal with many problems appearing as a result of there being no requirements for precise measurements in the project brief. Such measurements as were made were performed using only measuring tape, without precise geodetic instruments. Analysing the data, one can observe, that measuring land for neighbours' different marginal distances is provided on preliminary plans. Only by performing precise geodetic measurements are land owners able to detect land reform mistakes. The most common and painful problem experienced by land surveyors is that the land owner actually had less land (*de facto*) than is written in the documentation (*de jure*) (Figure 30) (in this case the shortage has to be compensated for in another place using vacant land stock or in money), and vice versa. When a land parcel is found to be larger in area than its *de jure* extent, then the surplus land reverts to the state – it becomes vacant land stock.

Figure 30: Parcel area differences noticed analysing attribute data of cadastre map



Source: (Pašakarnis et al., 2013a)

A second type of problem occurred when a land owner detected that his land parcel is designed without access to the road network and he has no rights-of-way (servitude) over neighbouring land parcels. A possible solution to problems such as these is to perform geodetic measurements for every land plot and use land identified as surplus to rectify access difficulties. Without such action, “island” plots would gradually drop out of cultivation and ultimately be abandoned altogether.

All of surveyors’ hands were tied, as implementing projects was missing a very important player in this process – a Land Fund with a fully working land banking mechanism. State land (including vacant stock land) exchange between private participants was forbidden. Due to such obstructions the project success became doubtful (especially related to vacant stock land exchange), resulting in the following outcome in one project as shown in Figure 31.

Figure 31: Restrictions in legislation has very much limited LC project results



Source: Self study

Project planners, after detecting far away from the project territory living and roving land owners, common ownership, old age farmers with serious illness and other factors which hamper and prolong project implementation procedures, had to offer to write notary delegation or transfer ownership rights to others. Many stress situations had land surveyors as many land owners were more than 60 years old and was a high risk that some of participants can fall out from the project – it was urgent to secure the project. Also many old age farmers had parcels bigger than they are able to cultivate; their children are living in the cities and are not willing to come to a rural area. One land consolidation project planner had an opportunity to deal with such a situation, when an old age land owner who was planning to make radical exchanges in the project territory had died and all inheritors were citizens from other countries. All planned exchanges collapsed and it was necessary to exclude all land parcels of the deceased as the inheritors were not willing to change nationality (it is still forbidden for foreigners to acquire agricultural land).

Land valuation during the land consolidation process according to the rules has to be performed using marked value and income capitalization approach. Surveyors' practice has shown that it is hard to find a valuer who agrees to value agricultural

land using an income capitalization approach as it is complicated to get accurate data. Most of project participants' aim was to perform geodetic measurements for free. In this case it is not rational to use valuation services for land owners having only one land plot, and who has no inclination to change location – such parcels are immovable objects. It was noticed, that such land owners are not participating in public meetings for defined value consideration. Money dedicated to land valuation in such cases could be saved and used more rationally for other purposes. Valuation can be performed only for those, who are willing to make exchanges. Land valuation takes time and is quite an expensive service (i.e. for land valuation services, one planner, have payed about 15% of total project amount). Valuers had to prepare a digital map with valuation zones, but only several valuers had practice working with GIS software, therefore valuers were working together with project planners.

Valuation methods and the prepared project territory valuation plan have to be approved by the project participants. When in the project territory where there is an active local community, it is realistic to elect a committee of stakeholders who could reflect the wishes of all community members. During LC project implementation, many project planners, who were preparing projects, have confirmed that the LC project committee (as the body) is not working and is not necessary. The purpose of a project committee is to reflect the wishes of participants, organize meetings with the project planner, participate in the valuation process, etc. When the project territory has many absent or far away living land owners, tenants – project land committee is ineffective. Local land owners rarely have the contacts of faraway living land owners, a fact which hampers meetings. Project planners have to visit every far away living participant (who is not attending meetings due to illness, etc.) several times: to find out expectations and wishes; to present the valuation plan; to present the LC project plan; etc. All mentioned stages must be properly formalized and signed by each land owner or representative. Such obligations raised project estimates for many project planners.

When in the LC project area there are on-going land parcels exchanges, previous owners have to get restrictions for all activities which lower the property value before moving to the new place. There was a case in one LC project, when the previous land owner cut wood before moving to a newly formed land plot. Such a situation nearly destroyed all plans for the project planner. After such a situation, the project planner was capturing the actual situation on photos or a video camera to fixate land status before land swapping. Surveyors highlight that penalties have to be introduced to land owners to avoid such abuse. To avoid disputes, land swapping should be done after harvesting is finished as well.

Implementing a land consolidation project in a minimal project area (according to the legislation - 100 ha), the organiser (SLF) cannot expect complex problem solving and to reach sustainability measures as the space is very limited. The minimal project area, is suitable only for simple voluntary land consolidation (merge parcels and perform geodetic measurements) which can be implemented during one year. Such land consolidation projects definitely cannot be free of charge. To develop rural infrastructure and solve land reform problems, the project territory should be at least all cadastral territory. Today, the biggest demand felt by land owners is to develop optimal local road networks. Convenient access and shorter distances to reach land parcels are the most favourite indicators provided by land owners. During land consolidation, agricultural land could be saved from land degradation, soil erosion, intensive agricultural usage or land use purpose conversion. To avoid further fragmentation, restrictions to subdivide parcels should be provided right after the project is implemented. Land owners have to take such responsibility as they are 100% supported from the EU and national budgets. Land owners should be restricted to change land use purpose for a certain time as well. Recently, it is very popular in Lithuania that land owners living far away from their ownership prefer to plant forest, as it does not require so much care. Land owners prefer to plant oaks (using EU subsidies) on the agricultural land. Such chaotic expansion decreases agricultural land and affects drainage systems.

Land surveyors are frustrated by the non-coordinated situation between all involved institutions, mostly lacking support from the National Land Service. Land management authorities from the territorial NLS departments were holding a passive position in coordination as there was a lack of knowledge. Immediately after starting the project it became clear that the cadastral record of each land owner actually does not work. These records had to guarantee and protect each property from uncoordinated sale (change of land owners). When the owner of the property changes, all data has to be updated, which requires additional investments. Land surveyors, from the project budget, had to pay for cadastral records of each land owner, but notaries were not informed how to treat these records. Other governmental organizations were not well informed about land consolidation in their region as well. Project planners had to officially ask twice for digital data which was necessary for project implementation and provide explanatory work. Planners had to coordinate public awareness campaigns too. Project development took almost two years, during this time some land owners got encumbrances from the banks or mortgage to their properties (for previous position). If a surveyor had done some improvements to such a parcel (changed location, shape, etc.) it was his responsibility to argue with the bank or mortgage provider, that their security assurance will not be affected as they will get the plot with the same value (even higher as it will have precise measurements). Also, it was necessary to assure that all constraints from an affected land parcel will be transferred to the newly formed parcel.

Such a long lasting procedure cannot pass without disputes between participants and the land surveyor as well. The surveyor's team had to be prepared to manage with stress, had to have a good background in negotiations and be psychologists. Where the duration of the project takes a long time, the land surveyor becomes an interested person; there is an urgent need for impartial authority, one step before the court. Project participants (land owners) were solving various disputes with the surveyor or with NLS authorities, who actually had weak legal grounds.

All land consolidation project land surveyors were supporting each other and sharing their knowledge and all agree it is very important to strengthen

knowledge, it is necessary to create a network of experts, where they could share their findings and *know-how*. The network has to spread its findings not only regionally, but also internationally involving all participating parties in this process. Field and study visits are very important not only to students, but for local land management authorities, municipality specialists and surveyors having licences for such projects' implementation, but who have not dealt with LC yet.

5.5. Chapter summary

- In this chapter the author made an overview about historical roots in agricultural sector which is very economically important and sensitive after Lithuania has regained the independence from the Soviet Union. Further the author draws the picture of the countryside, observes the development of most important legal acts related to securing land ownership rights.
- Analysed the reasons in the agricultural sector and countryside which led to the demand to search for an effective land management instrument which is able to redefine the actual picture of the countryside and agricultural destiny.
- International support and input helping to introduce land consolidation in to the Lithuanian land planning system from the FAO was revealed. Overview of the 4 pilot land consolidation projects and their objectives was performed.
- Acting legal framework related to the land consolidation process in the context of land management was analysed (law, rules, methodology, national strategy, support schemes).
- Institutional structure related to land consolidation and participating in the land consolidation project development process was reviewed.
- Land consolidation in Lithuania is only on a voluntary basis and free of charge for project participants. Project development is covered by EU support and national budget. LC support schemes and support amount from SPD 2004-2006, RDP 2007-2013 and RDP 2014-2020 was investigated.
- According to the main legal act, which describes the LC process – Rules for Preparation and Implementation of Land Consolidation Projects, a deep

analysis (systematization and generalization) on project workflow was performed.

- As there are 39 on-going land consolidation projects (not finished until now), here, were analysed only 14 LC projects which were implemented in 2005-2008. It has been noticed that during this process only several objectives were achieved – agricultural improvement and land re-arrangement.
- Quantitative and qualitative analysis based on different types of questionnaires were performed with LC project participants from the Mažeikiai district (Telšiai County, Lithuania) and with all district municipal authorities managing GIS data of the regions.
- Research has revealed that land owners having only one land parcel in LC project territory are participating with an idea to get precise geodetic measurement for free; those who are active farmers and have a significant number of land parcels in the project territory have higher objectives as they are affected by many difficulties. Authorities from the municipal sector revealed their objectives which are focused mainly on infrastructure redevelopment.
- A very basic problem which the research revealed is the lack of knowledge and understanding of the programme amongst the affected parties. Until this matter is resolved, it is difficult to envisage mutually compatible policies emerging which, if adopted and implemented, would deliver a sustainable flow of benefits to the public and private sectors.

Chapter 6

Analysing the potential for land consolidation

6.1. Introduction

As land consolidation projects are time consuming and expensive (especially in CEE countries where the contribution of project participants is small or even equal to zero), it is very important to perform a project feasibility study before launching an official procedure to be sure that positive effects will be greater than project costs. This procedure is essential for project preparation as it provides information for decision-making land consolidation authorities, communities and other officials distributing subsidies. Using the outcomes of this analysis can help prioritise the projects to be sure that public financing is objectively and analytically allocated to the “best” sites (Hiironen et al., 2010). Backman (2010) highlights that participating land owners wish to be sure that the benefits exceed their costs for the procedure as well. Such studies can answer the question as to whether the right land consolidation model was selected and to measure the expectations of all parties involved in the prospective territory after project implementation. If the results are negative then the land management authorities have the opportunity to postpone the project and look for alternative land management instruments, or accept high project implementation costs if the objectives are to redevelop strategic territory. Van Huylenbroeck et al. (1996) offers several methods to analyse land consolidation projects: Cost-benefit analysis (CBA) that measures project contribution to economic growth, Environmental Impact Assessment (EIA) that focuses on positive or negative influences on the environment, and Social Impact Study (SIS) where equity and distributional effects are of highest concern.

Weiken (1958), in his publication mentions that for hundreds of years the German Länder has practise to execute thorough investigations to identify the extent of LC projects and the degrees of urgency in the need for action in individual areas. The methods and criteria used to evaluate project expediency depended upon the

policies and the attitude taken towards rural areas. Notwithstanding trends, one has to take into account the fact that agriculture occupies most of the land in rural areas and remains the most important economic activity (Van Huylbroeck et al., 1996), which is why most of the objectives are focused on agricultural improvements. Before the introduction of sustainability measures into the planning processes, the main focus was on social-economic aspects. Analysis conducted by Schirmer (1958) revealed that in the Federal Republic of Germany during the 1950's, preliminary investigations of sociological and structural conditions of the community were analysed. The main idea behind this categorisation of the inhabitants of the territory using criteria such as profession and age, was that these were of paramount importance in estimating the future trends of local development. The author explained that most attention was paid to the younger generation and their attitude towards agriculture, and to ascertaining those leading personalities who later on could assist in the carrying out the projects. Weiken (1958) shared the insight that land consolidation is more advantageous in areas with good soil than in those with poor soil.

The growing number of objectives has increased the project's planning complexity and execution process. It requires comprehensive analysis before starting the project, monitoring how stated objectives are met and results evaluated (Van Huylbroeck et al., 1996). Weiken (1958) indicated that during 1951 - 1953 a procedure (questionnaire with criteria) was developed where different degrees of urgency for consolidation were determined in all communities of the German Länder which could be shown on precisely identified maps. The questionnaire had to find out whether it was the first LC project in the community or not, and to assign priorities (three levels) based on the weighted average urgency figure defined for the communities. The highest priority was given according to the six criteria (urgency criteria No. "1"):

- Fragmentation of holdings;
- Scattered location;
- Shape of lots;
- Location on slopes;
- Location in mixed lots;

- Roads, drainage and irrigation.

Several decades later, the same criteria plus an “assessment of cropping patterns”, according to Van Huylenbroeck et al. (1996), were used to assess the effects of adjustments in the structural parameters. The model was run for the situation with and without LCP.

For example, in the 1960’s in North Rhine-Westphalia territories the potential for land consolidation was identified in conjunction with big projects dealing with water surplus, drainage, etc¹. Such practice still exists in some Federal States of Germany i.e. Lower Saxony and Rhineland-Palatinate where the authorities use a tool to pre-assess the possible outcomes of land consolidation projects and to rank them. In Lower Saxony, following a relatively agricultural-orientated direction, potential land consolidation projects are rated on a cost-effective analysis supplemented by intangible effects (i.e. ecosystem services such as air being purified as a result of afforestation, etc.).

The FAO (2003) prepared recommendations as to what criteria have to be considered by land consolidation authorities when selecting a potential community for the implementation of pilot land consolidation projects. The synergy of objectives between the central government and the local communities is an important precondition. Possible criteria developed by FAO experts for pilot areas are:

- An already exhibited interest in land consolidation activities by farmers and local government, and the absence of strong opposition to land consolidation.
- A relatively small number of absentee owners.
- The existence of adequate records documenting land ownership and the absence of factors such as land disputes.
- The availability of land from a land bank or other sources to allow for the expansion of holdings and for the construction of new public facilities, etc.

¹ Email from Ralph Merten in June 2014

- The potential for land consolidation to result in significant improvements. For example, if farmers already have established marketing channels they should be able to benefit immediately from increased production that would result from land consolidation.
- Location within a designated growth area of the country. This would allow benefits from consolidation to be linked to benefits arising from other development initiatives.
- Environmental considerations such as the protection of specific natural resources.
- Plans of other ministries which are responsible for the construction of public facilities, environmental protection, etc. (FAO, 2003, p.34; FAO, 2004c, p.16).

Experts from Denmark, who were helping many Central and Eastern European countries to develop land consolidation legal frameworks, methodologies, and strategic documents, were carefully selecting potential territories where to execute pilot land consolidation projects. Haldrup & Hartvigsen (2005) stressed that the selection of the best possible pilot site is a precondition for a good outcome of the project, and that is why the criteria applied to their selection should embrace a wide range of different aspects such as:

- The existence of family farms with potential for commercial farming and a desire to form contiguous parcels and eventually enlarge the farms.
- The fragmentation of land parcels.
- An existing land market (presence of both potential sellers and buyers).
- The availability of free state-owned land for inclusion in the project (sales and exchange).
- A relatively small number of absentee owners.
- A high level of completion of land reform/privatization and registration of land ownership.
- A relatively high level of satisfaction among local landowners and stakeholders with the privatization process and outcome.
- Few land disputes, no problematic ones.
- Soil with good potential for agricultural production.

- Location within a designated economic growth area of the country (land re-parcelling can be linked to other development activities).
- The existence of (digital) cadastral maps and other thematic maps.
- Plans/measures for sustainable local rural development and infrastructure improvement.
- Initiative and commitment from local government.
- Local capacity for land re-parcelling design and land use planning.
- Proximity to capital city or other base for the land re-parcelling lead agency.

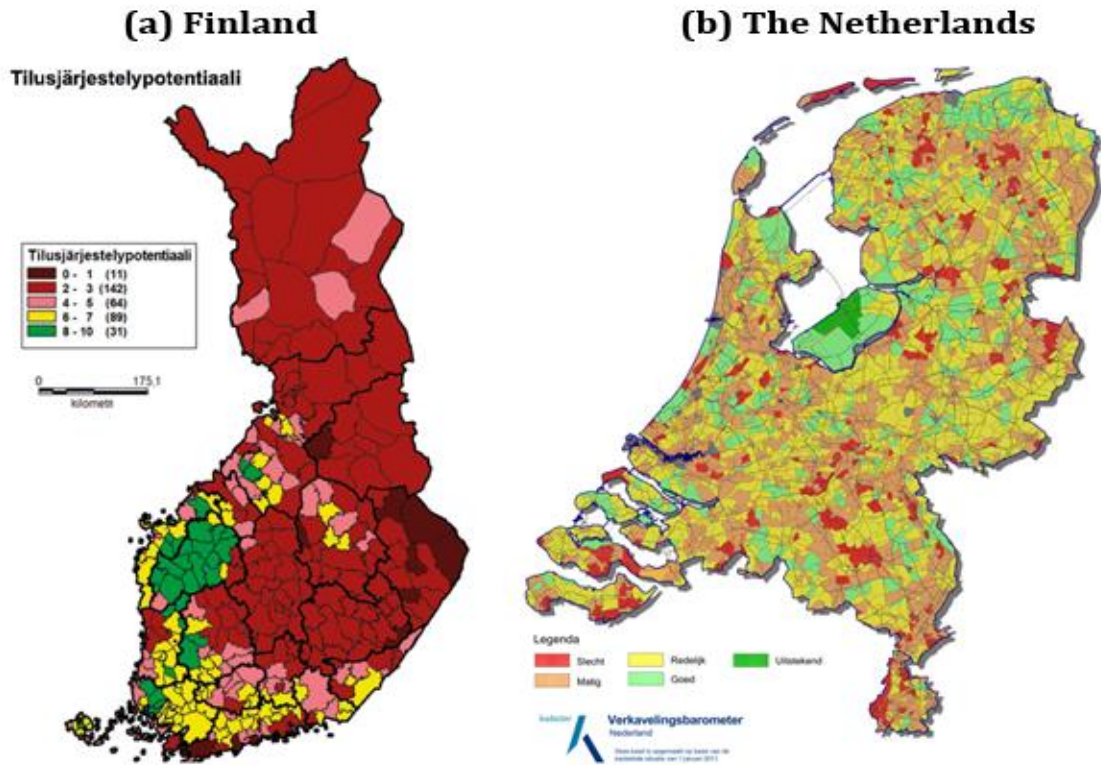
As the selection process of potential territories is narrowed down from the regional level of the country to the specific project level, additional criteria to compare the candidate areas are included:

- Size of community (in hectares) and number of land owners.
- Average plot sizes and extent of land fragmentation (average number of plots per landowner).
- Size and number of free state/community owned plots (number of plots and size).
- Brief description of agricultural structure (main production, percentage of uncultivated land, owner-lease ratio) (Haldrup & Hartvigsen, 2005).

One of the most important criteria showing the potential of land consolidation is land fragmentation. To specify land fragmentation several indices are used: the Januszewski index, the Simmons index and the Global Land Fragmentation index recently introduced by Demetriou (2012), etc. The above mentioned indices have a range from 0.001 to 1.000, where the smaller index value shows the higher degree of land fragmentation.

During comprehensive literature analysis and interviews with land consolidation experts it was noticed that certain countries (i.e. Finland and the Netherlands) use maps (Figure 32), where potential territories (regions) for land consolidation are shown. However, criteria vary from country to country and are heavily influenced by the national as well as regional policies and strategies.

Figure 32: Country maps showing the potential for land consolidation



Source: (Maanmittauslaitos (National Land Survey of Finland), 2013, p.29; Kadaster, 2011)

The Finnish National Land Service has developed a map showing the "Potential for Land Consolidation" by municipality. Investigation was done only with agricultural land (fields) using two main criteria to prepare the map: land parcel size and distance from the farmstead to the parcel (real distance based on the road system). Based on this material, land consolidation experts from the National Land Service organize marketing and informational tours showing land owners what are potentially achievable parcel sizes.

The Dutch Kadaster¹ has developed an interactive map called the "allotment barometer" (in Dutch "*verkavelingsbarometer*") that shows the potential for land consolidation. Before making it available online, the Kadaster visited stakeholders and informed land owners how it together with the Land and Horticultural

¹ Kadaster is a public body responsible for registration of real estate, etc. in the Netherlands.

Organisation (LTO) as well as the Agency for Land & Water Management (DLG) could improve the agrarian structure and achieve other objectives in a quick and efficient manner. From the end of 2013 this webmap has been published on a website and has on average 400 unique visitors per month as in most provinces financial incentives still exist to stimulate voluntary re-allotment (Louwsma et al., 2014). Such a map facilitates a “bottom-up” approach involving farmers to undertake actions if they want improvements. The improvement of the agrarian structure is of prime concern to farmers, whereas the realisation of other objectives i.e. related to the environment is often desired by society as a whole rather than by farmers alone.

In order to draw the "allotment barometer" the Kadaster has applied spatial multi-criteria analysis to identify the quality of the agricultural parcel structure for more or less homogeneous areas based on four relative and absolute criteria:

- The average percentage of parcels with farm buildings (built-up areas, mainly farm centres which are the focus of activity for other parcels).
- The average percentage of parcels within a single ownership which are distant from the farm centre (it is especially important for dairy farmers).
- The average number of parcels which are far away from the farm centre taking into account all owned parcels (i.e. one large land parcel from six owned land parcels is far away from the farm centre which actually influences intensity of agricultural traffic and safety);
- The average size of parcels which are distant from the farm centre (i.e. distant parcels may be too small to have an economic benefit after bringing them near to the farm centre) (Louwsma et al., 2014).

The Dutch "allotment barometer" is not a detailed analysis as it is based only on a few parameters giving a good overview of the quality of the agricultural structure in an area. It serves as an indication of the possible savings for a farmer should this structure be improved whilst, at the same time, catalysing discussion among citizens and authorities, as to whether it is reasonable to start projects, be they formal land consolidation or voluntary re-allotment (Louwsma et al., 2014).

In this chapter the procedures which precede the commencement of a land consolidation project in selected countries have been analysed. Also analysed was the methodology for the selection and ranking of potential regions and territories for land consolidation based on identified criteria showing the potential for land consolidation using spatial multi-criteria decision support system.

6.2. Pre-study procedure in land consolidation

In order to compare international practice at the LC project initiation phase, the author has performed comprehensive qualitative interviews during the period of July 2013 and April 2014 with land consolidation experts from France, Germany, Finland, Switzerland, Austria, Belgium (Wallonia and Flanders) and Cyprus. This study has revealed legal aspects of the procedure, types of analysis and executing bodies (Table 10).

Table 10: International practice performing project feasibility study before land consolidation

Country	Land consolidation model	Obligatory/ optional (free to decide)/ N/A	Decision making body to request the study	Body financing preparation of the study	Areas of investigation in the study	Body preparing the study
Germany	Comprehensive Land Consolidation	Obligatory	Municipality	Municipality, subsidised by land consolidation agency	An integrated rural development strategy (<i>Integriertes ländliches Entwicklungskonzept</i>) consists of a SWOT analysis of a region and can include: <ul style="list-style-type: none"> • the improvement of the village periphery or agrarian conditions, • the development of sustainable use of energy resources, or • the creation of new job opportunities in the regional marketing and rural tourism (Jagt et al., 2007). 	Working groups within the municipalities under leadership of an experts bureau
	Simplified Land Consolidation	N/A	N/A	N/A	N/A	N/A
	Land Consolidation Procedure in the Case of Permissible	Free to decide, normally N/A	When Yes: LC Agency together with the developer	When Yes: Developer	When Yes: Analysis of the affected farm holdings	When Yes: Experts bureau

Country	Land consolidation model	Obligatory/ optional (free to decide)/ N/A	Decision making body to request the study	Body financing preparation of the study	Areas of investigation in the study	Body preparing the study	
	Compulsory Acquisition						
	Accelerated Land Consolidation	N/A	N/A	N/A	N/A	N/A	
	Land Exchange	N/A	N/A	N/A	N/A	N/A	
France	Classical land consolidation	Obligatory	General Council	The <i>Departement</i> Council	<ul style="list-style-type: none"> Land management study; Environmental study; Land Management and perimeter propositions. 	Geometre-Expert and specialist of environment	
	Land consolidation for linear infrastructure	Obligatory	General Council	Central government	<ul style="list-style-type: none"> Land management study; Environmental study; Land Management and perimeter propositions. 	Geometre-Expert and specialist of environment	
Belgium:	Flanders	Comprehensive land consolidation	Obligatory	The Minister	The qualified Flemish ministerial department	<ul style="list-style-type: none"> Feasibility study; Environmental study; Cost estimation. 	Flemish Land Agency advised by a coordination commission
		Voluntary land consolidation	Obligatory	The Minister	The qualified Flemish ministerial	<ul style="list-style-type: none"> Feasibility study; Cost estimation. 	Flemish Land Agency

Country	Land consolidation model	Obligatory/ optional (free to decide)/ N/A	Decision making body to request the study	Body financing preparation of the study	Areas of investigation in the study	Body preparing the study
Wallonia ²				department		
	Land consolidation to support public works ¹	N/A	N/A	N/A	N/A	N/A
	Comprehensive land consolidation	N/A	N/A	N/A	N/A	N/A
	Voluntary land consolidation	N/A	N/A	N/A	N/A	N/A
	Land consolidation to support public works	N/A	N/A	N/A	N/A	N/A
Switzerland	Agricultural land consolidation	Obligatory	Committee of landowners or local authority	Cantonal agricultural authority, subsidized by Federation, Land owners	<ul style="list-style-type: none"> • Feasibility study; • Environment audit; • Cost estimation. 	Expert, private office specialized in land management activities.
	Land acquisition for roads and railways	Obligatory	Committee of landowners or local-	Federal or Cantonal road administration	<ul style="list-style-type: none"> • Feasibility study; • Environment audit; 	Expert, private office specialized in land

¹ In this model pre-study is not legally described.

² In Wallonia legal act regulating project feasibility study during LC is still under development. Today project feasibility study is based on ground knowledge.

Country	Land consolidation model	Obligatory/ optional (free to decide)/ N/A	Decision making body to request the study	Body financing preparation of the study	Areas of investigation in the study	Body preparing the study
			authority		<ul style="list-style-type: none"> • Cost estimation. 	management activities.
	Construction land development	Obligatory	Committee of landowners or local authority	Municipalities and land owners	<ul style="list-style-type: none"> • Feasibility study; • Cost estimation. 	Expert, private office specialized in land management activities.
	Modern Melioration	Obligatory	Committee of landowners or local authority	Initializing authority, subsidized by different stakeholders, land owners.	<ul style="list-style-type: none"> • Feasibility study; • Environment audit; • Cost estimation. 	Expert, private office specialized in land management activities.
Finland	Field Land Consolidation	Obligatory. Required major support of land owners	The National Land Survey after land owners application	The National Land Survey from State budget	<ul style="list-style-type: none"> • Parcels size (fragmentation analysis); • Distance from home to the parcel; • Cost estimation. 	The National Land Survey
Cyprus	Voluntary, by agreement among the owners	All involved land owners are free to decide	Land Consolidation Department after the suggestion of the relevant landowners	N/A	N/A	N/A
	Compulsory, by	The decision is	Land Consolidation	Land Consolidation	<ul style="list-style-type: none"> • Land tenure study 	Land Consolidation

Country	Land consolidation model	Obligatory/ optional (free to decide)/ N/A	Decision making body to request the study	Body financing preparation of the study	Areas of investigation in the study	Body preparing the study
	resolution of the majority of the owners ¹	taken if the majority (50% plus one) for both the number of landowners and the land value of the corresponding properties are in favour	Department	Department	(fragmentation analysis); <ul style="list-style-type: none"> • Environmental study (environmental impact assessment study); • Feasibility study. 	Department. In the case of environmental impact study Land Consolidation Department with the involvement of private consultants (after the public tenders).
	Compulsory, by government order	Obligatory	Land Consolidation Department	Land Consolidation Department	<ul style="list-style-type: none"> • Land fragmentation analysis; • An environmental impact assessment study; • Feasibility study. 	Land Consolidation Department
Austria	Comprehensive land consolidation	Obligatory (If LC scheme is in protected areas – free to decide by the LC authority to	Land consolidation authority	Regional (provincial) government. (Formalized pre-studies are also financed by the	<ul style="list-style-type: none"> • Land fragmentation analysis; • Land use analysis. (For formalized pre-study – at least one criteria).	Land consolidation authority

¹ Only this type of land consolidation has been applied in Cyprus since 1969.

Country	Land consolidation model	Obligatory/ optional (free to decide)/ N/A	Decision making body to request the study	Body financing preparation of the study	Areas of investigation in the study	Body preparing the study
		perform formalized pre-study)		public.)		
	Simplified land consolidation	Obligatory	Land consolidation authority	Regional (provincial) government.	<ul style="list-style-type: none"> • Land fragmentation analysis; • Land use analysis. 	Land consolidation authority

Source: Self study

The survey which was undertaken with international land consolidation experts who were engaged in the execution of pre-studies revealed that the major differences that exist between the countries included in the study could be summarised as:

- Differences in the scope of the study arising from the LC model used.
- Differences in initiating, financing and executing bodies and legal regulation.
- Differences in the regulation of the procedure; in some of the countries which were analysed it was obligatory, in others it was subject to free choice whilst in the rest there were no procedures envisaged at all.
- Differences in the use of private experts (eg. in Switzerland), or of the land consolidation authority (eg. in Flanders) to prepare the study.

The requirement to execute the study, as part of the land consolidation procedure may be obligatory and set into the legislation with the aim of finding the effects of the project, or it may result from an initiative by a land consolidation authority which is free to decide if such a study or part of it is needed. Analysis has revealed that in Wallonia the legislation regulating project feasibility studies is still under development and currently is based on criteria of the LC authorities' own choosing¹.

Germany, of all the analysed countries, has the most LC models, but only in two of them are pre-studies executed. In the case of "Land Consolidation Procedure in the Case of Permissible Compulsory Acquisition" the land consolidation authority is free to decide to execute a pre-study or not, but usually in this case pre-studies are not executed². Such a model is related to large infrastructure developments and special thematic studies are executed before land consolidation with the regulation of other legal acts. In cases where the "Comprehensive Land Consolidation" model is applied, the municipality orders and finances (subsidised by LC Agency) the execution of the study. The pre-study is executed by the working groups according

¹ Email from Yvan Brahic in July 2013

² Email from Joachim Thomas in March 2014

to the “Integrated rural development Strategy” (ILEK) within the municipalities under the leadership of an experts’ bureau. In FARLAND book (Jagt et al., 2007, p.44) ILEK is described as *“a strategy that evaluates financial flows but, more importantly, aims to improve the participatory nature of problem-definition and allow the simultaneous employment of multiple instruments, not only from agricultural, but also from social and economic origins”*.

In France there is an obligatory requirement for all types of consolidation models to contain a comprehensive pre-study to analyse the potential project territory. The General Council orders the study to be prepared by private surveyors (Geometre-Expert) together with environment specialists. In the case of “Classical land consolidation” the procedure is financed by the *Departement* Council, however, if “Land consolidation for linear infrastructure” is applied, the Central Government finances it.

In Flanders a land consolidation project cannot be started without first measuring what effects it will have on rural sustainability and therefore a pre-study is obligatory. Today, only in one land consolidation model (“Land consolidation to support public works”) a pre-study is not legally prescribed in LC law, but this is generally bundled in with large scale public developments (such as a motorway), which have to be coordinated with the Flemish Government and where special thematic studies have to be undertaken. The pre-study is executed by the Flemish Land Agency. A project feasibility study is obligatory regardless of which LC model (comprehensive or voluntary) is anticipated. If land consolidation is related to infrastructure development, it cannot start without an environmental assessment. Voluntary land consolidation projects can start without an environmental assessment.

In Switzerland, where land is intensively used, the obligation to undertake a pre-study is set out in the legislation. In every case the cantonal authorities must take into consideration multiple aspects such as agricultural production, environmental protection, easements and servitudes and land use planning, etc. The executive power is at the cantonal level where the lead is taken by the cantonal agriculture,

transport and environment or land authorities. The procedure is supervised and co-financed at the Federal level. The study execution work is normally outsourced to the private sector – a specialized private land surveying office (exceptionally an engineering company) – which has specialized in land management activities and during the execution works hand in hand in cooperation with the authorities¹. The execution of the study can be financed by the stakeholders (i.e. infrastructure developers) depending on the project objectives.

In Finland it is obligatory (set in the law) to execute a project feasibility study before launching the project. When applications from land owners for land consolidation reach the National Land Survey, it triggers the procedure of investigation. A project feasibility study is undertaken by the National Land Survey. The investigation has to show positive results and assure project feasibility. This pre-study is absolutely free to landowners.

In Cyprus, since 1969 only “Compulsory, by resolution of the majority of the owners” land consolidation has been applied. In this model a pre-study can be executed if a majority of the participants so wish, as there is no provision for a pre-study in the land consolidation legislation. The Land Consolidation Department initiates the study preparation and finances its execution. If the decision to prepare a pre-study is made, then it is based on three investigations where results have to be positive in order to launch a project:

- A land fragmentation analysis.
- An environmental impact assessment study, and
- A feasibility study.

The feasibility study and the land fragmentation study are carried out by the Land Consolidation Department to support the land consolidation project (or not) and to submit a proposal to the Minister of Agriculture, Natural Resources and the Environment for approval. An environmental impact assessment study is set in another law, which regulates how the procedure has to be applied during land

¹ Email from Jörg Amsler in September 2013

consolidation. The land consolidation legislation involves only a provision for taking measures to protect the environment or preparing a so-called “landscape plan” that may involve any plan for improving an existing ecological or cultural element or creating a new one i.e. a park or a small wood¹.

In Austria the possible benefits of land consolidation in a municipality have to be reported by the LC authority before starting the project. The land consolidation authority is responsible for initiating and executing the pre-study. A pre-study is obligatory in both models (Comprehensive and Simplified) as the land consolidation authority has to check that the all basic requirements to start an LC procedure are met. The LC authority in some cases can freely decide to execute the pre-study or not. For example, where there exists the potential for conflict i.e. with nature conservation, the authority may choose to avoid those conflicts and to define ecological measures / criteria beforehand². The pre-studies are free of charge for project participants.

A procedure called “project feasibility study” or “pre-study” is performed right after the applications from the initiators (mainly land owners and farmers) are lodged. Louwsma et al. (2014) noted that earlier in the Netherlands the authorities initiated land consolidation to implement sustainable rural development. Nowadays, however this role is given to the farmers themselves. Other situations can be noted in CEE countries whereby land owners and even authorities still need information regarding all possible impacts of land consolidation. Maps showing the potential territories for land consolidation can facilitate a bottom-up approach and inform the decisions of authorities allocating financial support.

6.3. Defining the criteria for identification of potential territories for LC in Lithuania

Despite the fact that Western European countries have long traditions and practice in organizing and implementing land consolidation projects, they still undertake

¹ Email from Demetris Demetriou in July 2013

² Email from Walter Seher in August 2013

various marketing activities, information campaigns and use other methods to raise public awareness regarding the results that are possible from land consolidation in all its forms, either singly or in conjunction with other instruments. It is highly likely that such promotional activities influence the number of submitted applications which in turn generate the detailed investigations and analyses (pre-studies).

The Lithuanian Ministry of Agriculture, the National Land Service and the State Land Fund in Lithuanian municipalities are organising various marketing campaigns in order to raise public awareness and stimulate the submission of applications for land consolidation. The direction of these efforts should take into consideration the fact that some regions may have a higher potential for land consolidation than others. The introduction and application of MCDA could enable authorities to identify and prioritise those key regions where more active promotion would be more logical. It is, however, important to highlight that what may be an important criterion in one country (or even in different regions of the same country) might be of less importance in other country / territory.

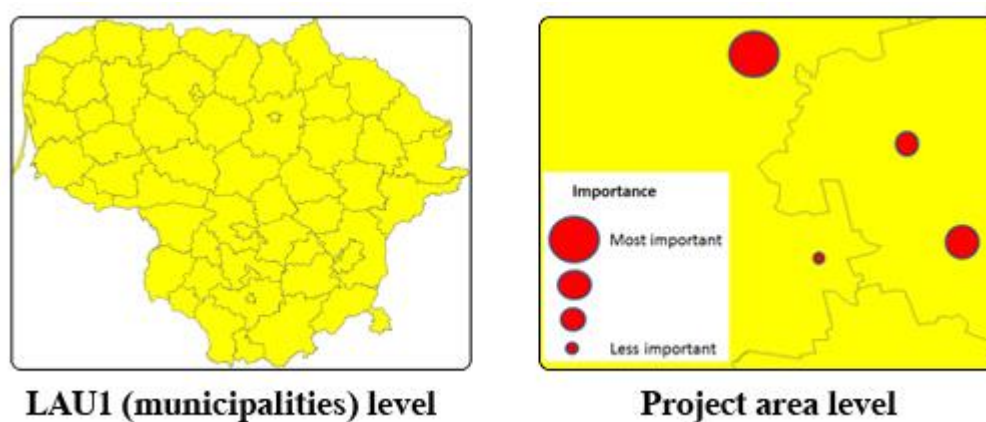
After defining the regions or territories with the highest potential for land consolidation, and after active marketing campaigns, applications from land owners will definitely be forthcoming. For countries like Lithuania, receiving EU support for land consolidation projects, scrupulous allocation of funds to the best project territories (solving most important problems) is very important as EU support is limited. Instead of precisely calculating a cost-benefit ratio at the early stage it should be possible to “filter” by ranking all applications according to the significant criteria and make a decision to undertake cost-benefit ratio calculations only for those alternatives ranked highest by this process.

Further important criteria (based on sustainability factors) will be presented showing the potential for comprehensive (also known as multi-purpose or integrated) land consolidation. These were identified during the period of 2nd of June to 10th of August, 2014 using an online questionnaire published using the Bristol Online Survey system. The author invited 194 international land

management experts from 40 European countries who have knowledge of land consolidation (scientists, practitioners) to share their opinions about criteria which could help to define potential territories in Lithuania for comprehensive land consolidation (Figure 33):

- 1) to define potential territories (municipalities – LAU1/NUTS4 level) and
- 2) to support decision making when selecting project areas (project area level) for implementation.

Figure 33: Structure of criteria significance



Source: Self study

An invitation to participate in the survey was sent via email with a covering letter and attached short instruction (describing the survey aim, giving some survey sample questions and with a hyperlink to the survey). The timing of the survey (during the summer and holiday period) influenced the response rate which was 36% as only 69 responses from European experts were obtained.

The online survey had 51 questions in total, the first three questions being for classification purposes only:

- The profile of respondents' expertise;
- The number of years of expertise in land consolidation, and
- The respondents' country of residence.

A total of 20 criteria at municipal level and 26 criteria at project area level were provided for experts to provide their opinion. Intentionally both of these levels had

optional text box space where experts could suggest any additional important criteria that they felt could be added to the list at particular levels which showed the potential for comprehensive land consolidation. Respondents were asked to declare whether the value of the suggested criteria had to be bigger or smaller (which is equal to the function “Maximize” or “Minimize”).

The survey results showed that most of the respondents assign themselves as “Scientists” (34.8%), other respondents assigned themselves as “Practitioners” (27.5 %), “Both” (24.6%) and the remaining 13.0% as “Other” (see Table 11). Experts who characterized themselves as “Other” specified that they were policy makers, advisers and lawyers. Considering these clarifications and after performing a rigorous evaluation it would be possible to assign these “Other” respondents to the “Practitioners” as they have knowledge of how the land consolidation process in their countries is performed.

The largest part of all respondents (24.6%) had “1 - 5 years” expertise in land consolidation, others: “6 - 10 years” – (23.2%); “More than 20 years” – (20.3%); “16 - 20 years” – (17.4%); “11 - 15 years” – (13.0%); “Less than 1 year” – (1.4 %). The type and experiential duration of the expertise of the survey respondents is detailed below in Table 11.

Table 11: Expertise characteristics of survey respondents

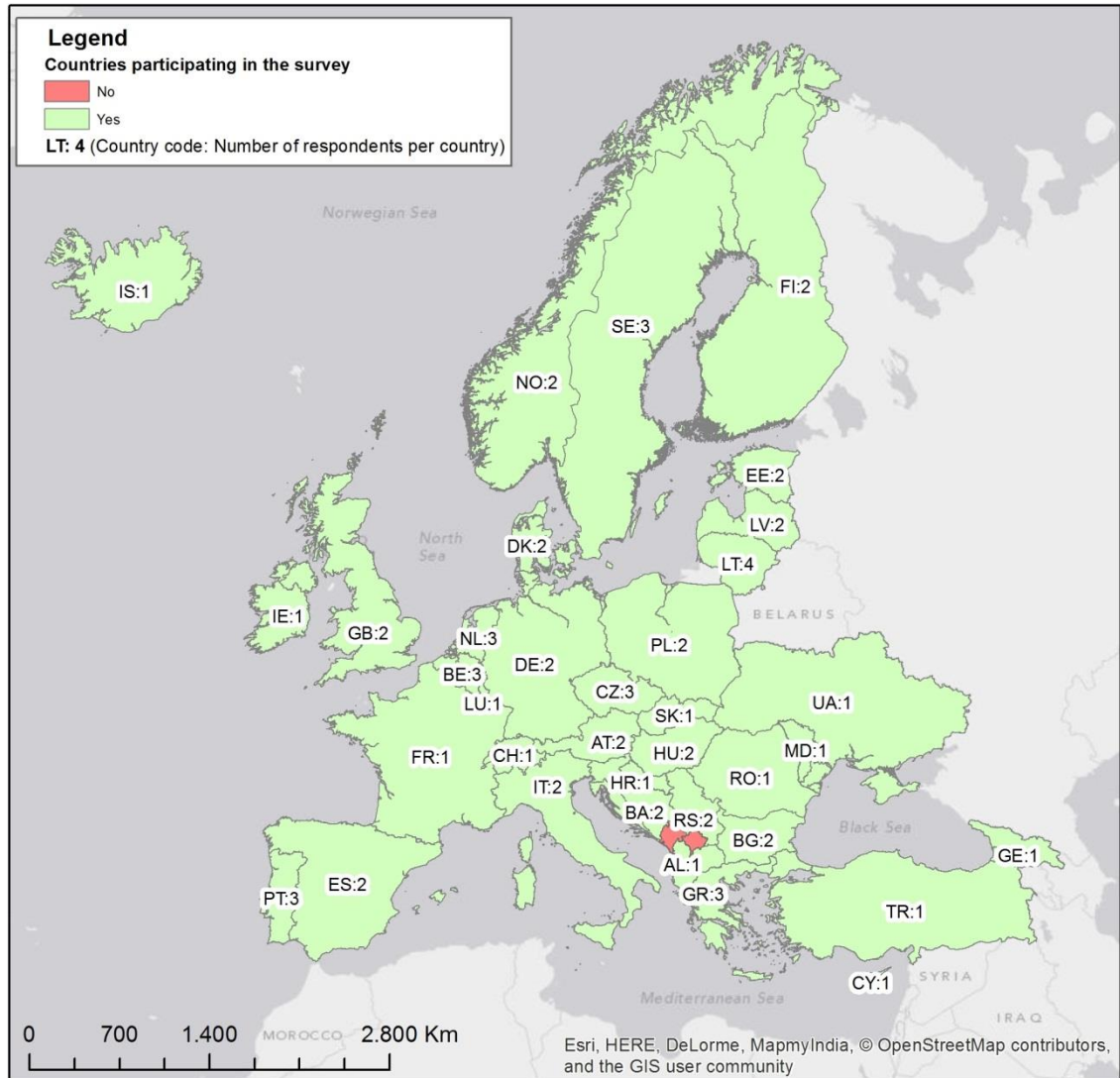
	Practitioner	Scientist	Both	Other	Totals
Less than 1 year	0	0	0	1	1
1 - 5 years	5	8	3	1	17
6 - 10 years	2	6	6	2	16
11 - 15 years	1	6	1	1	9
16 - 20 years	3	4	3	2	12
More than 20 years	8	0	4	2	14
Totals	19	24	17	9	69

Source: Self study

Analysing the survey results it was determined that the most significant respondent group was “Practitioner” having “More than 20 years” experience in land consolidation.

The final question for classification purposes was regarding respondents’ country of residence. Based on survey results a map was developed showing the number of international land consolidation experts from each country who had participated in the survey (Figure 34). From all the countries intended to be interviewed the author was only unable to get opinions from experts from the Republic of Kosovo and Montenegro. The best results, when comparing the number of invitations (4) against responses received (4) was reached in Lithuania as the author was able to motivate respondents face-to-face or by phone to share their opinions on the survey. For other countries it was necessary to follow up multiple times in order to get their opinion.

Figure 34: Map showing country experts invited who responded in the survey



Source: Self study

6.3.1. Criteria for selection of projects at municipal level

Twenty questions with possible “Criteria for selection of potential regions (municipalities) for comprehensive land consolidation” were provided to the respondents in the online questionnaire (Table 12); plus one question asking to write down possible important criteria, which, from the experts’ practical experience were very important, but were missing from the survey. Next to each criterion land consolidation experts were asked:

- if the provided criterion is important or not and, if it was important then

- what values (if higher/bigger/larger – function “Maximize”, if lower/smaller – function “Minimize”) would show the potential.

Table 12: Criteria of importance at municipal level according to expert’s opinion

#	Criteria	Importance	%	Function	%
1.	<p>Q: Is it important to have Local Action Groups when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Local Action Groups (LAG) - rural community-based organizations whose actions supported by LEADER axis of RDP. Number of LAG's could show that in certain regions there are active communities which could be interested in rural viability, could provide more desirable targets (objectives) and could take care of project implementation.</i></p>				
	Number of Local Action Groups	Yes	76.8	Max	58.5
2.	<p>Q: Is it important to have areas foreseen for rural urbanization (before LC) when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Regions can have areas foreseen for rural urbanization (prepared territory planning documents) and during land consolidation some aspects in parallel could be realized.</i></p>				
	Number of areas foreseen for rural urbanization	Yes	79.7	Min	56.4
3.	<p>Q: Is it important to have ongoing infrastructure development projects (before LC) when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Regions can have ongoing infrastructure development projects (road construction, sewage disposal, etc.) and during land consolidation some aspects of these could be realized in parallel.</i></p>				
	Number of ongoing infrastructure development projects	Yes	84.1	Max	69.0

#	Criteria	Importance	%	Function	%
4.	<p>Q: Is it important to have cultural heritage conservation objects when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>During comprehensive land consolidation cultural heritage conservation objects and areas around them can be maintained / developed.</i></p>				
	Number of cultural heritage conservation objects	Yes	63.8	Max	65.9
5.	<p>Q: Is it important to have “a number of prepared local development strategies” criteria when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Local Action Groups, rural communities and municipalities are developing local development strategies: planning specific activities; infrastructure development etc. LC projects could follow prepared local development strategies.</i></p>				
	Number of prepared local development strategies	Yes	79.7	Max	69.1
6.	<p>Q: Is it important to have “employable people (20-64 age)” criteria when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Employable people - people who have education and are ready to live and work in rural areas. Such people could have a broader attitude to the redevelopment, accept innovations and have fewer emotional bonds.</i></p>				
	Number of employable people (20-64 age)	Yes	69.6	Max	79.2
7.	<p>Q: Is it important to have “abandoned land” criteria when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Abandoned land - land which has a potential, but for some reasons for several years has not been used. Abandoned land could show potential that land could be returned to agricultural production.</i></p>				
	Average abandoned land area	Yes	76.8	Max	50.9

#	Criteria	Importance	%	Function	%
8.	Q: Is it important to have “parcel size” criteria when defining the potential regions (municipalities) for comprehensive land consolidation?				
	Average land parcel size	Yes	87.0	Min	53.3
9.	Q: Is it important to have “average agricultural holding size” criteria when defining the potential regions (municipalities) for comprehensive land consolidation?				
	Average agricultural holding size	Yes	81.2	Max	67.9
10.	Q: Is it important to have “average distance from farmstead to the fields” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? <i>Average distance (km) from farmstead to the fields. During land consolidation it is possible to concentrate land parcels near the farmstead.</i>				
	Average distance from farmstead to the fields	Yes	87.0	Min	56.7
11.	Q: Is it important to have “average land fragmentation index” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? <i>Land fragmentation index – an index which takes into account shape, size, ownership, etc. The smaller the value, the higher the degree of land fragmentation.</i>				
	Average land fragmentation index	Yes	89.9	Min	72.6
12.	Q: Is it important to have “land (soil) productivity score” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? <i>Land (soil) productivity score/index shows the agricultural production potential.</i>				
	Average land (soil) productivity score	Yes	72.5	Max	72.0

#	Criteria	Importance	%	Function	%
13.	Q: Is it important to have “average area owned by land fund/bank” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? <i>Land fund/bank may give land for public needs, for land reform corrections, in order to facilitate land mobility, to support young farmers’ establishment, etc.</i>				
	Average area owned by land fund/bank	Yes	81.2	Max	71.4
14.	Q: Is it important to have “average area for afforestation” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? <i>During land consolidation poor soil productivity land and land with inconvenient relief could be foreseen as being suitable for afforestation.</i>				
	Average area for afforestation	Yes	58.0	Min	52.5
15.	Q: Is it important to have “average area for soil erosion prevention” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? <i>Water and wind affect soil erosion. Prevention may be done during LC by introducing specific measures i.e. hedgerows.</i>				
	Average area for soil erosion prevention	Yes	72.5	Max	60.0
16.	Q: Is it important to have “average area for natural resource conservation” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? <i>Natural resource conservation - land to be excluded from intensive farming.</i>				
	Average area for natural resource conservation	Yes	69.6	Max	54.2
17.	Q: Is it important to have “average area with natural habitats” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? <i>Vulnerable areas which should potentially be protected.</i>				

#	Criteria	Importance	%	Function	%
	Average area with natural habitats	Yes	69.6	Min	56.2
18.	<p>Q: Is it important to have “number of ongoing alternative energy projects” criteria when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Solar, wind, water power projects. During land consolidation some aspects of these could be realized in parallel.</i></p>				
	Number of ongoing alternative energy projects	Yes	60.9	Min	52.4
19.	<p>Q: Is it important to have “average area for re-naturalization” criteria when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Re-naturalization - restoring swamps, streams which were regulated during melioration projects, etc. During land consolidation some aspects could be realized in parallel.</i></p>				
	Average area for re-naturalization	Yes	66.7	Max	52.2
20.	<p>Q: Is it important to have “average area for re-cultivation” criteria when defining the potential regions (municipalities) for comprehensive land consolidation?</p> <p><i>Re-cultivation of areas previously used as waste dump, quarry, etc. During land consolidation some aspects could be realized in parallel.</i></p>				
	Average area for re-cultivation	Yes	56.5	Max	74.4

Source: Self study

According to the majority of respondents' opinions all of the criteria provided were important and showed the potential of comprehensive land consolidation. From the questionnaire results it is possible to identify the five most important criteria which are:

- **Average land fragmentation index.** 89.9% of respondents chose this criterion as most important and 72.6% of these respondents indicated that a higher land fragmentation showed higher potential for land consolidation which means that the lowest index value is preferred.

- **Average distance from farmstead to the fields.** 87.0% of experts chose this criterion as the second most important. 56.7% of experts suggested that greater distance from farmstead to the fields shows higher potential.
- **Average land parcel size.** 87.0% of respondents identified this criterion as the third most important. 53.3% of these experts thought that smaller land parcels showed higher potential for land consolidation.
- **Number of ongoing infrastructure development projects.** 84.1% of respondents see this criterion as the fourth most important criterion. 69.0% of respondents said that municipalities having more ongoing infrastructure development projects have a higher potential for land consolidation than those who have fewer ongoing infrastructure development projects.
- **Average area owned by land fund/bank.** 81.2% of respondents think that this criterion is an indicator of potential and 71.4% of these think that a higher potential lies within those municipalities where a land fund/bank has more land.

It has to be highlighted here that criterion #9 “Average agricultural holding size” received 81.2% of respondent’s voices as well and would be at the position No. 5 in the above list, but for its lower rate of values preference (67.9% of respondents thought that there was a higher potential for comprehensive land consolidation in those municipalities where the average agricultural holding size was higher) which did not appear in the top five of the most important criteria.

The survey results have shown that the most questionable criterion showing the potential for comprehensive land consolidation at regional (municipal) level according to experts was concerned with environmental considerations: #20 “Average area for re-cultivation” (56.5% of all respondents said that this criterion is important).

The respondents were given the opportunity to suggest that the author consider the following nuances when identifying “criteria for selection of potential regions (municipalities) for comprehensive land consolidation”:

- Although the high land fragmentation (Table 12 criterion #11) was accorded the highest priority for land consolidation, a minority of respondents (10.1%) chose to dissociate themselves from this conclusion in the open comment section of the survey. These respondents argued in support of using a cost/benefit ratio in that it can provide more predictive information as to what the project can add in improvement (added value) in relation to the added costs (labour + investments) in those improvements.
- It is possible to add as many relevant objectives as are needed, however, project feasibility may only be assured by including those objectives which gives added value, as some non-priority objectives can be better and faster realised separately from land consolidation.
- A detailed investigation of farmers' income sources and types of agricultural production has to be performed as, for example, dairy farms need more attention than farms focusing on annual crop production, or production of fruits/berries, etc.
- Integrated land consolidation projects can be very useful, but on the other hand they can be risky as well, as they could become too complicated and take too long to complete. That is why balancing in a tailor-made approach to each project has to be considered.
- A balance has to be struck between agricultural and environmental objectives, as the more nature development or afforestation objectives are added in an LC project the less interested do farmers become. Also the enlargement of parcels decreases the perceived attractiveness of the landscape for tourism.
- Land abandonment criteria are not applicable in many Western European countries, but such criteria might be important in others (especially developing) countries.

One of the experts did suggest using a “whole area” indicator with many criteria instead of the “average area”, but such an indicator at municipal level does not assure equal rights for municipalities as some of them may be, for example twice as large as some others. The same situation could apply at the project level – one project could be dealing with 100 ha, others – 1,000 ha.

Another expert offered the thought that the average land fragmentation index differs between different countries. This is absolutely right in that there are the Januszewski index, the Simmons index and the Global Land Fragmentation index which take into account various parameters such as shape, size, ownership, etc. These three land fragmentation indices all are interpreted in the same manner; the smaller the index value, the higher the degree of land fragmentation. The author accepts all types of possible land fragmentation index however, and wishes to get the experts' opinions as to whether higher or lower fragmentation shows more or less potential for comprehensive land consolidation.

Respondents participating in the survey were able to offer supplementary criteria which according to their experience of practice were important and could be used for identifying potential territories (municipalities) for comprehensive land consolidation. In total there were sixteen additional criteria offered, five of which were offered by more than one respondent (Table 13).

Table 13: Five supplementary criteria offered by respondents

No.	No. of respondents	Offered criteria	Offered function
1.	5	Percentage of land owners/farmers/communities/local authorities who are in favour of land consolidation.	Max
2.	2	Average area under demand for drainage (re-)construction.	Max
3.	2	Average farmland intensity consumption (ha) for agricultural production.	Max
4.	2	Land mobility/market index (average rate of transactions in the area).	Max
5.	2	Index of agricultural road network density (less density - more need for LC).	Min

Only one notable criterion revealing acceptance for land consolidation was recommended by five (7%) respondents as an important factor to consider. A further four criteria, provided here above were offered by two experts, all the others being mentioned only once:

- The index for LC possibilities (average number of parcels that one parcel can be merged with) – Max;
- The average area of the land cultivated by the farmer (without ownership limitation) – Max;
- The frequency of flooding episodes per time interval (i.e. one year)– Max;
- The average number of land owners having emotional bonds with territory (i.e. several generations were living in a certain place and that is the reason why the land owner, particularly if senior, does not want to move even an inch to another place)– Min;
- The funds available for objective realisation (physical improvements or investment in landscape / nature conservation) – Max;
- The number of linkages with other EU support programmes – Max;
- The average number of land owners who do not have valid land ownership documentation – Min;
- The index of agricultural intensity – Max;
- The concentrations of nitrates and pesticides in water (surface and underground) – Max;
- The average area envisaged to create buffer strips (i.e.. hedgerows) – Max;
- The proportion of established young farmers – Max;

6.3.2. Criteria for project area level

Further in the questionnaire (Table 14) twenty six questions with possible “criteria to choose (rank) projects for implementation from all applications for comprehensive land consolidation” were provided to the experts. In addition to this, provision was made for the experts to write in the criteria which they had found to be valuable in practice but were missing from the survey. Once again they were asked if:

- a criterion is important or not, and if it was important, then

- what values (higher/bigger/larger – function “Maximize”, if lower/smaller – function “Minimize”) best shows the potential.

Table 14: Criteria of importance at project area level according to expert’s opinion

#	Criteria	Importance	%	Function	%
1.	Q: Do areas foreseen for rural urbanization show the potential for comprehensive land consolidation?				
	<i>Projects can have areas foreseen for rural urbanization (planning documents prepared) and during land consolidation some aspects of this could be realized in parallel.</i>				
	Area foreseen for rural urbanization	Yes	69.6	Min	54.2
2.	Q: Do areas in bad road infrastructure condition show the potential for comprehensive land consolidation?				
	<i>Areas with bad road infrastructure condition could show potential for comprehensive land consolidation, as it is possible to improve the situation.</i>				
	Area in bad road infrastructure condition	Yes	76.8	Max	73.6
3.	Q: Do areas in bad drainage/irrigation infrastructure condition show the potential for comprehensive land consolidation?				
	<i>Areas with bad drainage/irrigation infrastructure condition could show potential for comprehensive land consolidation, as it is possible to improve situation.</i>				
	Area in bad drainage/irrigation infrastructure condition	Yes	87.0	Max	80.0
4.	Q: Is it important to have an “average number of locals” criterion when selecting from several potential project territories for comprehensive land consolidation?				
	<i>Locals - people living in the project territory or near it. People living locally can be more attached to the land and are more motivated for improvements.</i>				
	Average number of locals	Yes	73.9	Max	94.1

#	Criteria	Importance	%	Function	%
5.	<p>Q: Is it important to have a “number of countryside tourism objects” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Countryside tourism objects shows that rural dwellers have alternative sources of income and have a broader attitude (not only focusing on agriculture).</i></p>				
	Number of countryside tourism objects	No	50.7		
6.	<p>Q: Is it important to have an “average number of prosperous farmers” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Prosperous farmers - (young) farmers who are working full time exclusively in agriculture and are able to subsist solely from such work.</i></p>				
	Average number of prosperous farmers	Yes	76.8	Max	86.8
7.	<p>Q: Is it important to have a “number of abandoned structures” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Abandoned structures - fallow collective or State farm buildings, infrastructure objects which could be demolished in parallel with land consolidation project.</i></p>				
	Number of abandoned structures	Yes	55.1	Max	71.1
8.	<p>Q: Is it important to have a “number of objects foreseen for public needs” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Objects foreseen for public needs - various public spaces: beach, marketplace, cemeteries, cultural houses, etc. which could be developed in parallel with a land consolidation project.</i></p>				
	Number of objects foreseen for public needs	Yes	73.9	Max	68.6

#	Criteria	Importance	%	Function	%
9.	<p>Q: Is it important to have an “employable persons (20-64 age range)” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Employable people - people, who have education and are ready to live and work in rural areas. Such people could have a broader attitude to the redevelopment, accept innovations and have fewer emotional bonds.</i></p>				
	Employable persons	Yes	66.7	Max	87.0
10.	<p>Q: Is it important to have an “abandoned land” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Abandoned land - land which has a potential, but for some reason for several years has not been used. Such land could have the potential to be returned to agricultural production.</i></p>				
	Abandoned land	Yes	68.1	Max	59.6
11.	<p>Q: Is it important to have an “average parcel size” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Average parcel size (ha) - agricultural or forest land. Small parcels can show that there is urgent need to increase parcel size.</i></p>				
	Average parcel size	Yes	89.9	Min	61.3
12.	<p>Q: Is it important to have an “average agricultural holding size” criterion when selecting from several potential project territories for comprehensive land consolidation?</p>				
	Average agricultural holding size	Yes	72.5	Max	60.0
13.	<p>Q: Is it important to have an “average distance from farmstead to the fields” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Average distance (km) from farmstead to the fields. During land consolidation it is possible to concentrate land parcels near the farmstead.</i></p>				

#	Criteria	Importance	%	Function	%
	Average distance from farmstead to the fields	Yes	82.6	Max	68.4
14.	<p>Q: Is it important to have an “average land fragmentation index” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Land fragmentation index – an index which takes into account shape, size, ownership, etc. The smaller the value, the higher the degree of land fragmentation.</i></p>				
	Average land fragmentation index	Yes	88.4	Min	67.2
15.	<p>Q: Is it important to have an “average soil productivity score” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Land (soil) productivity score/index shows the agricultural production potential.</i></p>				
	Average soil productivity score	Yes	65.2	Max	77.8
16.	<p>Q: Is it important to have a “number of land use constraints” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Land parcels may have land use constraints (i.e. mortgage, notary) that can influence land mobility.</i></p>				
	Number of land use constrains	Yes	60.9	Min	69.0
17.	<p>Q: Is it important to have a “number of land tenure constraints” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Land tenure after land reform may have land tenure constraints: no access, land conflicts with neighbours, etc.</i></p>				
	Number of land tenure constrains	Yes	76.8	Max	50.9

#	Criteria	Importance	%	Function	%
18.	<p>Q: Is it important to have an “average area owned by land fund/bank” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Land fund/bank may give land for public needs, for land reform corrections, in order to facilitate land mobility, to support young farmers’ establishment, etc.</i></p>				
	Average area owned by land fund/bank	Yes	76.8	Max	71.7
19.	<p>Q: Is it important to have an “average area for afforestation” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>During land consolidation poor soil productivity land and land with inconvenient relief could be earmarked for afforestation.</i></p>				
	Average area for afforestation	Yes	52.2	Max	52.8
20.	<p>Q: Is it important to have a “number of eco-farms” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Eco-farms - farms which are dedicated to ecological farming.</i></p>				
	Number of eco-farms	No	65.2		
21.	<p>Q: Is it important to have an “average area for soil erosion prevention” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Water and wind affect soil erosion. Prevention may be done by introducing specific measures i.e. hedgerows.</i></p>				
	Average area for soil erosion prevention	Yes	68.1	Max	66.0
22.	<p>Q: Is it important to have an “average area for natural resource conservation” criterion when selecting from several potential project territories for comprehensive land consolidation?</p> <p><i>Natural resource conservation - land to be taken out of intensive farming.</i></p>				
	Average area for natural resource conservation	Yes	65.2	Max	62.2

#	Criteria	Importance	%	Function	%
23.	Q: Is it important to have an “average area with natural habitats” criterion when selecting from several potential project territories for comprehensive land consolidation?				
	<i>Vulnerable areas which are in need of protection.</i>				
	Average area with natural habitats	Yes	60.9	Max	61.9
24.	Q: Is it important to have a “number of ongoing/planned alternative energy projects” criterion when selecting from several potential project territories for comprehensive land consolidation?				
	<i>Solar, wind, water power projects.</i>				
	Number of ongoing/planned alternative energy projects	No	50.7		
25	Q: Is it important to have an “average area for re-naturalization” criterion when selecting from several potential project territories for comprehensive land consolidation?				
	<i>Re-naturalization - restoring swamps, streams which were regulated during melioration projects, etc. During land consolidation some aspects of this could be realized in parallel.</i>				
	Average area for re-naturalization	Yes	62.3	Max	62.8
26.	Q: Is it important to have an “average area for re-cultivation” criterion when selecting from several potential project territories for comprehensive land consolidation?				
	<i>Re-cultivation of areas previously used as waste dumps, quarries, etc. During land consolidation some aspects of this could be realized in parallel.</i>				
	Average area for re-cultivation	Yes	58.0	Max	67.5

Source: Self study

According to the questionnaire results, a majority of respondents identified 3 criteria as of no importance at all when defining potential at project area level:

- The number of countryside tourism objects.
- The number of eco-farms.

- The number of ongoing/planned alternative energy projects.

After the analysis of survey results it is possible to identify the five most important criteria at project area level:

- **Average land parcel size.** 89.9% of respondents identified this criterion as the most important. 61.3% of these experts think that smaller land parcels show higher potential for land consolidation.
- **Average land fragmentation index.** 88.4% of respondents chose this criterion as the second most important and 67.2% of these respondents said that higher land fragmentation shows higher potential for land consolidation which means that lowest index values are preferred.
- **Area in bad drainage/ irrigation infrastructure condition.** 87.0% of experts chose this criterion as the third most important and 80.0% of these experts thought that larger areas in bad drainage/ irrigation infrastructure condition showed higher potential.
- **Average distance from farmstead to the fields.** 82.6% of experts chose this criterion as the fourth most important. 68.4% of them suggested that the further the distance from farmstead to the fields the higher the potential.
- **Average number of prosperous farmers.** 76.8% of respondents defined this criterion as falling into the fifth position. Actually there were three other criteria with the same score, but this criterion had a significant score (86.8%) among other respondents who thought that a higher number of prosperous farmers showed higher potential for comprehensive land consolidation.

Three other criteria which received the same importance score (76.8%) after respondents' data analysis were:

- Area in bad road infrastructure condition (73.6% gave priority to larger areas).
- Average area owned by land fund/ bank (71.7% gave priority to more land).

- Number of land tenure constraints (50.9% gave priority to more constraints).

The criterion “Area in bad drainage/ irrigation infrastructure condition” appears in position #3 in the list of the top five most important criteria at project area level. This confirms the importance of the FAO (2012) statement – that the restructuring of farms during land consolidation projects should be integrated with support programmes for farmers, such as the rehabilitation of irrigation systems and local roads.

The analysis of the survey data showed that, according to the experts, the most questionable criterion indicating the potential for comprehensive land consolidation at project area level was related to environmental considerations: “Average area for afforestation” (only 52.2% of all respondents said that this criterion was important).

Also respondents used the opportunity to share their opinion with regard to things to consider at project area level:

- When taking into account “distance from farmstead to the fields” it is necessary to consider rural planning identity as CEE countries structure varies from WE countries (i.e. in many CEEC countries farmers live in villages which may be distant from the fields, whereas in many WEC countries the farms tend to be located within or adjacent to the fields that they work).
- It is important to consider the existing drainage network when planning and building infrastructure and housing in order to assure the normal functioning of existing systems.
- It is necessary to consider other EU funded projects in the subject territory in order to assure synergy between the realization of objectives.
- Some criteria may play a role during project implementation, but not at the decision-making stage.
- If farm sizes are very small, the LC project might be ineffective because it can be a sign that people are already quitting. If farm sizes are overly large

the LC project may also be ineffective because such farms can do their own LC without any help from the LC project.

The survey participants suggested that some of the criteria used at municipal level should be considered for use at project area level as well, namely those focused on “the percentage of land owners/farmers/communities/local authorities who are in favour of land consolidation”.

The identified criteria helping land consolidation authorities to rank the projects are of an advisory and recommendatory nature as, according to Haldrup & Hartvigsen (2005) the final selection of the project site(s) cannot be based on quantitative methods alone, but will have to be based on the “best feeling” among the decision makers.

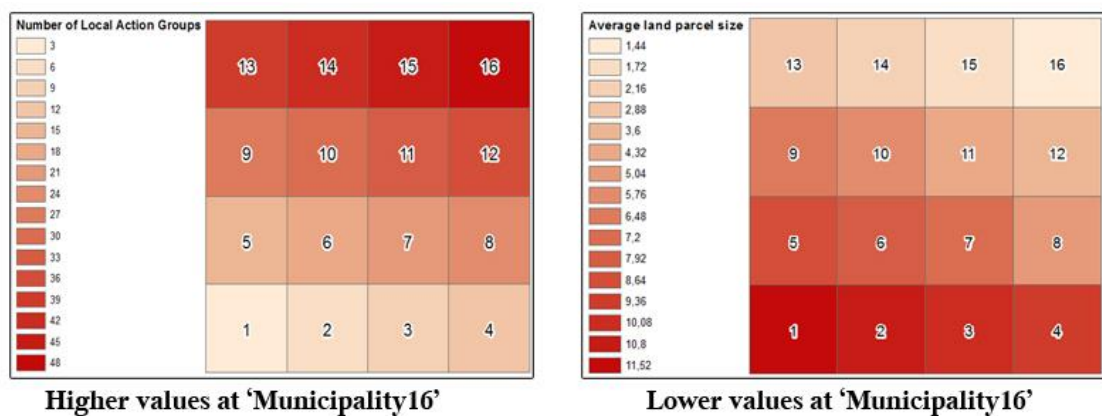
6.4. Developing a methodology to identify potential for land consolidation

Multi-criteria analysis can demonstrate the existence of an urgent need for agrarian structural improvement. However, if there is no, or even limited political will, or worse, an insufficient budget then no land consolidation projects will be started. The decision as to whether or not to start a land consolidation project is first and foremost a political one (the strategic level within the NLS decision and the operational level at municipal decision). However, as international practice shows, having maps (and associated data) of potential territories for land consolidation prepared according to the identified criteria, is an important prerequisite to empowering decision makers to identify target territories and plan further activities when the support programmes are available. Broader policy considerations may also influence the manner in which the methodologies and strategies for land consolidation may be developed from such information.

A set of criteria showing the potential for comprehensive land consolidation was established via a combination of literature review and feedback from international experts. The majority of experts were able to eliminate unimportant (according to their opinion) criteria and to offer additional criteria to be included in the

evaluation process. It will be demonstrated how the identification of potential territories works in practice using the identified criteria at different levels with MCDA methods: SAW and TOPSIS. The author using ArcGIS for Desktop software with the MC-SDSS module has developed a fishnet grid of 16 cells (4 x 4) and populated it with simulated data. In this study the author treats these 16 cells as municipalities and escalates further scenario. During data simulation, when filling the attribute table, experts' opinion whether higher or lower values are more desirable (function "Maximize" or "Minimize") was considered. In this case Municipality1 has "bad" values assigned making it the worst alternative; while Municipality16 is the best alternative. When higher values are more preferred ("Maximize" function) Municipality16 cell being as the "best" alternative is filled with higher values, when lower values are more desirable ("Minimize" function) Municipality16 cell being the "best" alternative is filled with lowest values. Further, (Figure 35) illustrates the actual situation where the darker the colour of the cell means the higher attribute value and vice versa.

Figure 35: Best alternative can have higher and lower values



Source: Self study

According to the scenario, after active marketing campaigns (explaining advantages of land consolidation) in TOP5 municipalities land consolidation authorities received 16 applications (prospect project areas) from Municipality16 for comprehensive land consolidation (shown on the map as points). Project1 is filled with "bad" values making it as a worst alternative, while Project16 as the best

alternative. The land consolidation authority has a challenging task to identify “best” projects at Municipality16, where further detailed investigation such as cost/benefit is necessary for EU support allocation.

The author seeks to demonstrate that selected MCDA mathematical methods work in practice despite the fact that it is possible to notice that Municipality16 and Project16 are the best preference according to the gathered data. The data are simulated for demonstration (methodology testing) purposes only and do not represent the real world.

6.4.1. Applying MCDA to identify potential municipalities

The author uses all criteria at municipal level provided in the survey as none of twenty offered criteria were eliminated as non-important by the majority of respondents (Table 15 and Table 16). All except six criteria according to the experts have to be “Maximized” (higher values shows higher potential). Criteria additionally recommended by respondents according to their practice are not included here, but can be added at any time. Antoine et al. (1998) notice that Multi-Criteria Decision Support (MCDS) scenarios have to be run a number of times and with varying inputs in order to identify a "best" or even an acceptable solution.

Table 15: Characteristics of 16 municipalities with simulated data (part I)

Criteria	Number of Local Action Groups	Number of areas foreseen for rural urbanization	Number of ongoing infrastructure development projects	Number of cultural heritage conservation objects	Number of prepared local development strategies	Number of employable people (20-64 age)	Average abandoned land area	Average land parcel size	Average agricultural holding size	Average distance from farmstead to the fields
Alternatives	1	2	3	4	5	6	7	8	9	10
Municipality1	3	86.4	1	1	2	48.71	2.22	11.52	1.08	1.65
Municipality2	6	81	3	1	3	49.74	4.44	10.8	2.16	3.3
Municipality3	9	75.6	5	2	4	50.88	6.66	10.08	3.24	4.95
Municipality4	12	70.2	7	3	5	51.71	8.88	9.36	4.32	6.6

Alternatives	1	2	3	4	5	6	7	8	9	10
Municipality5	15	64.8	9	4	6	52.71	11.1	8.64	5.4	8.25
Municipality6	18	59.4	11	5	7	53.75	13.32	7.92	6.48	9.9
Municipality7	21	54	13	6	8	54.77	15.54	7.2	7.56	11.55
Municipality8	24	48.6	15	7	9	55.76	17.76	5.04	8.64	13.2
Municipality9	27	43.2	17	8	10	56.74	19.98	6.48	9.72	14.85
Municipality10	30	37.8	19	9	11	57.76	22.2	5.76	10.8	16.5
Municipality11	33	32.4	21	10	12	58.71	24.42	4.32	11.88	18.15
Municipality12	36	27	23	11	13	59.75	26.64	3.6	12.96	19.8
Municipality13	39	21.6	25	12	14	60.74	28.86	2.88	14.04	21.45
Municipality14	42	16.2	27	13	15	61.71	31.08	2.16	15.12	23.1
Municipality15	45	10.8	29	14	16	62.75	33.3	1.72	16.2	24.75
Municipality16	48	5.4	31	15	17	63.71	35.52	1.44	17.28	26.4
Function	Max	Min	Max	Max	Max	Max	Max	Min	Max	Max

Source: Self study

Table 16: Characteristics of 16 municipalities with simulated data (part II)

Criteria	Average land fragmentation index	Average land (soil) productivity score	Average area owned by land fund/bank	Average area for afforestation	Average area for soil erosion prevention	Average area for natural resource conservation	Average area with natural habitats	Number of ongoing alternative energy projects	Average area for renaturalization	Average area for re-cultivation
Alternatives	11	12	13	14	15	16	17	18	19	20
Municipality1	0.99	2.345	2	64	3	3	96	12	4.5	4
Municipality2	0.975	4.69	4	60	6	6	90	11	9	8
Municipality3	0.91	7.035	6	56	9	9	84	10	13.5	12
Municipality4	0.845	9.38	8	52	12	12	78	9	18	16

Alternatives	11	12	13	14	15	16	17	18	19	20
Municipality5	0.78	11.725	10	48	15	15	72	8	22.5	20
Municipality6	0.715	14.07	12	44	18	18	66	7	27	24
Municipality7	0.65	16.415	14	40	21	21	60	6	31.5	28
Municipality8	0.585	18.76	16	36	24	24	54	5	36	32
Municipality9	0.52	21.105	18	32	27	27	48	4	40.5	36
Municipality10	0.455	23.45	20	28	30	30	42	3	45	40
Municipality11	0.39	25.795	22	24	33	33	36	2	49.5	44
Municipality12	0.325	28.14	24	20	36	36	30	1	54	48
Municipality13	0.26	30.485	26	16	39	39	24	1	58.5	52
Municipality14	0.195	32.83	28	12	42	42	18	1	63	56
Municipality15	0.13	35.175	30	8	45	45	12	1	67.5	60
Municipality16	0.065	37.52	32	4	48	48	6	1	72	64
Function	Min	Max	Max	Min	Max	Max	Min	Min	Max	Max

Source: Self study

Looking with the naked eye at the table filled with data it is obvious that Municipality16 is the best alternative, but selected MCDA methods SAW and TOPSIS have to confirm this. As data is tendentious, after including additional controversial criteria to the evaluation, the “best” alternative will move down from cell #16 to the cell #1 direction.

The author during the survey has not asked the respondents to rank the criteria according to their importance as this will be calculated from the data. The importance of each criterion is calculated using mathematical formulas from the values according to the function (Max or Min) provided by the majority of experts.

At first the decision matrix was normalized seeking to unify all criteria eliminating dimensions (hectares, kilometres, etc.). When applying “Maximize” function each value in the criteria column was divided by highest value. Applying “Minimize” function (only six criteria) lowest value in the column was divided from each value in the criteria column. In this case after normalization Municipality16 had all values equal to “1” as it was divided by itself.

The total sum for all criteria was calculated:

$$\sum t_{sum} = 151$$

The total average for all criteria was calculated:

$$\sum t_{avg} = 9$$

Calculation of rank sum:

$$t_{sum,i} = \sum_{j=1}^l t_{ij} \tag{4}$$

$$i=1,2..n, j=1,2..l, n= 20, l=16$$

Calculation of rank average:

$$t_{avg,i} = \frac{t_{sum,i}}{l} \tag{5}$$

Calculation of criterion importance:

$$g_i = \frac{t_{avg,i}}{\sum_{i=1}^n t_{avg,i}} \quad (6)$$

$$\underline{q}_i = 1 - g_i \quad (7)$$

$$\sum_{i=1}^n \underline{q}_i = 19$$

$$q_i = \frac{\underline{q}_i}{\sum_{i=1}^n \underline{q}_i} \quad (8)$$

Criteria importance shows higher q values. Results of calculations are presented in the Table 17 and Table 18. Sum of importance $\sum q_i = 1$

Calculation of criterion set of sum square:

$$S = \sum_{i=1}^n \left(\sum_{j=1}^l t_{ij} - \frac{1}{n} \times \sum_{i=1}^n \sum_{j=1}^l t_{ij} \right)^2 \quad (9)$$

$$S=128$$

Estimation of concordation coefficient:

$$W = \frac{12 \times S}{l^2(n^3 - n)} \quad (10)$$

$$W=0.00075$$

Validation passes the condition $W>0$, $W=0.00075>0$.

Table 17: Results of calculations at municipal level (part I)

Criteria	Number of Local Action Groups	Number of areas foreseen for rural urbanization	Number of ongoing infrastructure development projects	Number of cultural heritage conservation objects	Number of prepared local development strategies	Number of employable people (20-64 age)	Average abandoned land area	Average land parcel size	Average agricultural holding size	Average distance from farmstead to the fields
	1	2	3	4	5	6	7	8	9	10
$t_{sum,i}$	8.50	3.38	8.26	8.07	8.94	14.12	8.50	5.60	8.50	8.50
$t_{avg,i}$	0.531	0.211	0.516	0.504	0.559	0.883	0.531	0.350	0.531	0.531
g_i	0.056	0.022	0.055	0.054	0.059	0.094	0.056	0.037	0.056	0.056
q_i	0.944	0.978	0.945	0.946	0.941	0.906	0.944	0.963	0.944	0.944
q_i	0.050	0.051	0.050	0.050	0.050	0.048	0.050	0.051	0.050	0.050

Table 18: Results of calculations at municipal level (part II)

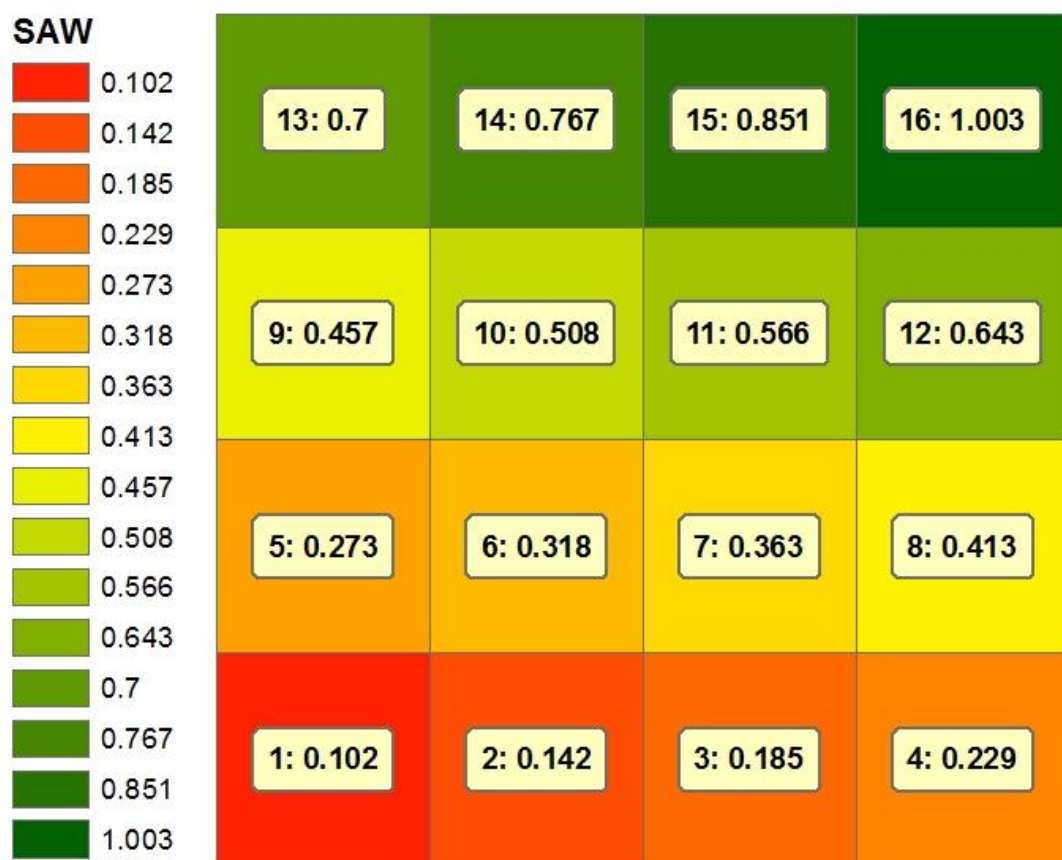
Criteria	Average land fragmentation index	Average land (soil) productivity score	Average area owned by land fund/bank	Average area for afforestation	Average area for soil erosion prevention	Average area for natural resource conservation	Average area with natural habitats	Number of ongoing alternative energy projects	Average area for renaturalization	Average area for re-cultivation
	11	12	13	14	15	16	17	18	19	20
$t_{sum,i}$	3.38	8.50	8.50	3.38	8.50	8.50	3.38	7.10	8.50	8.50
$t_{avg,i}$	0.211	0.531	0.531	0.211	0.531	0.531	0.211	0.444	0.531	0.531
g_i	0.022	0.056	0.056	0.022	0.056	0.056	0.022	0.047	0.056	0.056
q_i	0.978	0.944	0.944	0.978	0.944	0.944	0.978	0.953	0.944	0.944
q_i	0.051	0.050	0.050	0.051	0.050	0.050	0.051	0.050	0.050	0.050

As the data is tendentious and there are no significant value peaks, the importance among criteria are distributed almost equally.

After having identified criteria significances, SAW and TOPSIS methods were applied to test selected methods' reliability whether they point to the Municipality16 as the "best" alternative and Municipality1 as the "worst" alternative. The criteria and their values of importance (Table 15 - Table 18) were used as input data for further calculations.

Firstly, calculation was done by applying the SAW method. After matrix normalization according to the function "Maximize" or "Minimize" each value was multiplied with weights (q_i) and summed for each alternative. Ranking results points to the biggest value (1.003) as the "best" alternative (Figure 36) for the decision maker which is Municipality16 (top right cell).

Figure 36: Applying the SAW method for potential definition at municipal level



Source: Self study

Further more sensitive method TOPSIS was applied. Calculations start from matrix normalisation applying formula:

$$X_{ij} = \frac{\underline{X}_{ij}}{\sqrt{\sum_{j=1}^n \underline{X}_{ij}^2}} \quad (11)$$

$i=1, \dots, m; j=1, \dots, n$

where: X_{ij} – the normalised j -th criterion of the i -th alternative;
 \underline{X}_{ij} – the concrete value of the j -th criterion of the i -th alternative;
 m – the number of alternatives;
 n – the number of criteria.

In order to get weighted matrix, criteria matrix values are multiplied by the matrix of importance values. Applied formula:

$$P^* = [X] \times [q] \quad (12)$$

The normalised matrix is used for determination of the best alternative L_j^+ and the worst alternative L_j^- . Calculation of deviation of an alternative from the ideal positive (13) and negative (14) alternative is based on:

$$L_j^+ = \sqrt{\sum_{i=1}^n (f_{ij} - f_j^+)^2} \quad (13)$$

$$L_j^- = \sqrt{\sum_{i=1}^n (f_{ij} - f_j^-)^2} \quad (14)$$

where: L_j^+ – the best alternative of the j -th criterion;
 L_j^- – the worst alternative of the j -th criterion;
 f_{ij} – the normalised concrete value of the j -th criterion of the i -th alternative;
 f_j^+ – the highest value of the normalised j -th criterion (ideal positive alternative);

f_j^- – the lowest value of the normalised j -th criterion (ideal negative alternative);
 n – the number of criteria.

Intermediate calculations results are provided in the Table 19, Table 20 and Table 21.

Table 19: Significant criteria calculation results at municipal level applying TOPSIS (part I)

Criteria	Number of Local Action Groups	Number of areas foreseen for rural urbanization	Number of ongoing infrastructure development projects	Number of cultural heritage conservation objects	Number of prepared local development strategies	Number of employable people (20-64 age)	Average abandoned land area	Average land parcel size	Average agricultural holding size	Average distance from farmstead to the fields
	1	2	3	4	5	6	7	8	9	10
$\sqrt{\sum_{j=1}^n X_{ij}^2}$	116.03	208.86	73.86	35.23	42.24	225.73	85.87	27.89	41.77	63.82
f_j^+	0.021	0.001	0.021	0.021	0.020	0.014	0.021	0.003	0.021	0.021
f_j^-	0.001	0.021	0.001	0.001	0.002	0.010	0.001	0.021	0.001	0.001

Table 20: Significant criteria calculation results at municipal level applying TOPSIS (part II)

Criteria	Average land fragmentation index	Average land (soil) productivity score	Average area owned by land fund/bank	Average area for afforestation	Average area for soil erosion prevention	Average area for natural resource conservation	Average area with natural habitats	Number of ongoing alternative energy projects	Average area for renaturalization	Average area for re-cultivation
	11	12	13	14	15	16	17	18	19	20
$\sqrt{\sum_{j=1}^n X_{ij}^2}$	2.49	90.70	77.36	154.71	116.03	116.03	232.07	25.57	174.05	154.71
f_j^+	0.001	0.021	0.021	0.001	0.021	0.021	0.001	0.002	0.021	0.021
f_j^-	0.020	0.001	0.001	0.021	0.001	0.001	0.021	0.023	0.001	0.001

Table 21: Deviation results at municipal level from ideal positive and ideal negative variants

	L_j^+	L_j^-
Municipality1	0.085	0.000
Municipality2	0.080	0.006
Municipality3	0.074	0.011
Municipality4	0.068	0.017
Municipality5	0.062	0.023
Municipality6	0.056	0.029
Municipality7	0.051	0.035
Municipality8	0.044	0.041
Municipality9	0.039	0.046
Municipality10	0.033	0.052
Municipality11	0.028	0.058
Municipality12	0.022	0.064
Municipality13	0.016	0.069
Municipality14	0.011	0.075
Municipality15	0.005	0.080
Municipality16	0.000	0.085

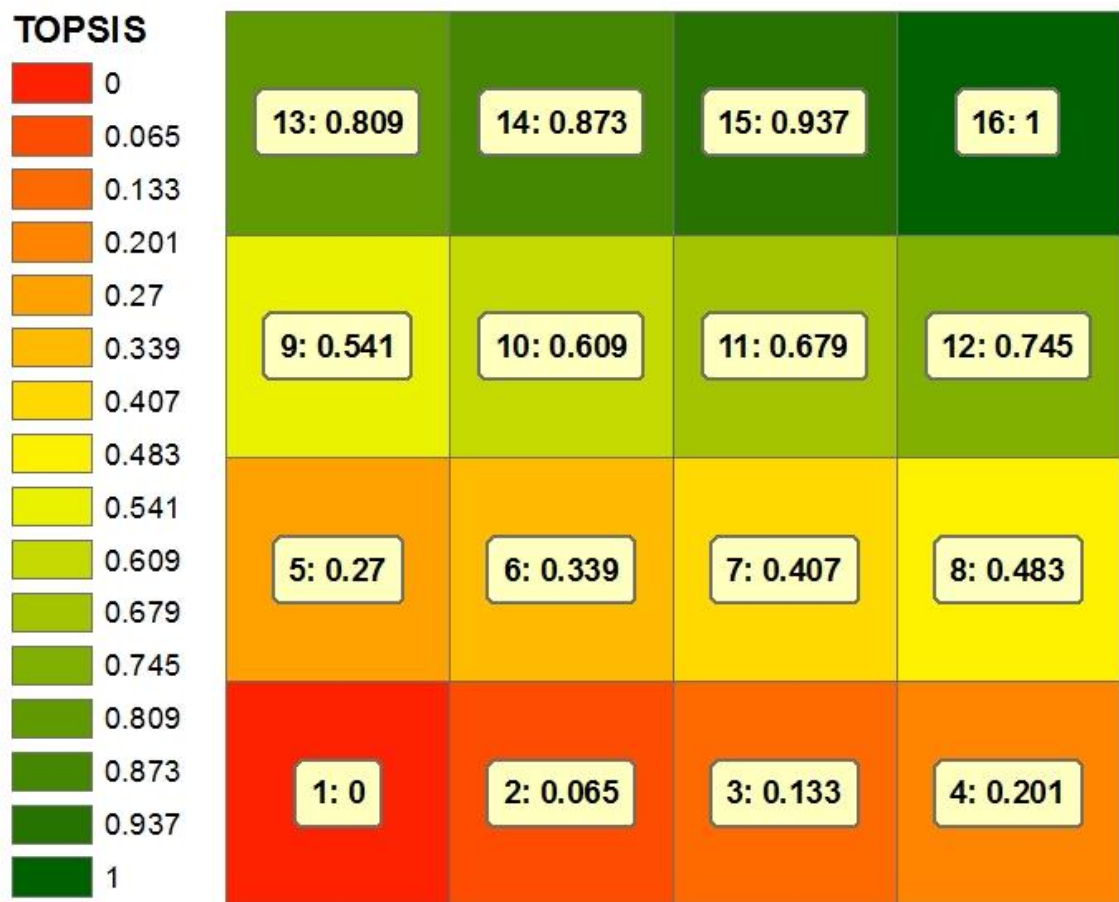
Source: Self study

Calculation of proportional variant's deviation from an ideal alternative is used applying formula (15).

$$K_{BIT} = \frac{L_j^-}{L_j^+ - L_j^-} \quad (15)$$

If criterion is minimised, it is necessary to take the minimal value from each column. If criterion is maximized – maximum value is taken from each column. The best alternative, is with the highest K_{BIT} value. The TOPSIS method points to the best alternative – Municipality16 as well as the SAW method did in the previous calculation (Figure 37).

Figure 37: Applying the TOPSIS method for potential definition at municipal level



Source: Self study

Both methods SAW and TOPSIS identified Municipality16 as the “best” alternative and tendentious decrease of preference to the “worst” alternative – Municipality1. Selected MCDA methods (SAW and TOPSIS) confirmed “state of the art”, obvious data regularity visible with naked eye.

6.4.2. Applying MCDA to identify potential project areas

At the “project area level”, unlike the “regional (municipal) level”, respondents have eliminated three criteria from twenty-six provided in the questionnaire. Only four criteria from twenty three identified as important criteria have to be “Minimized” (Table 22 and Table 23).

Table 22: Characteristics of 16 projects with simulated data (part I)

Criteria	Area foreseen for rural urbanization	Area in bad road infrastructure condition	Area in bad drainage/ irrigation infrastructure condition	Average number of locals	Average number of prosperous farmers	Number of abandoned structures	Number of objects foreseen for public needs	Employable persons	Abandoned land	Average parcel size	Average agricultural holding size	Average distance from farmstead to the fields
	1	2	3	4	5	6	7	8	9	10	11	12
Project 1	30	10.5	20.8	63.5	22.1	1	1	48.71	2.22	11.52	7.5	1.65
Project 2	28	12.2	24.4	65.8	23.8	1	1	49.74	4.44	10.8	9	3.3
Project 3	26	13.9	28	68.1	25.5	2	1	50.88	6.66	10.08	10.5	4.95

Alternatives	1	2	3	4	5	6	7	8	9	10	11	12
Project 4	24	15.6	31.6	70.4	27.2	3	1	51.71	8.88	9.36	12	6.6
Project 5	22	17.3	35.2	72.7	28.9	4	2	52.71	11.1	8.64	13.5	8.25
Project 6	20	19	38.8	75	30.6	5	2	53.75	13.32	7.92	15	9.9
Project 7	18	20.7	42.4	77.3	32.3	6	3	54.77	15.54	7.2	16.5	11.55
Project 8	16	22.4	46	79.6	34	7	3	55.76	17.76	5.04	18	13.2
Project 9	14	24.1	49.6	81.9	35.7	8	4	56.74	19.98	6.48	19.5	14.85
Project 10	12	25.8	53.2	84.2	37.4	9	4	57.76	22.2	5.76	21	16.5
Project 11	10	27.5	56.8	86.5	39.1	10	5	58.71	24.42	4.32	22.5	18.15
Project 12	8	29.2	60.4	88.8	40.8	11	5	59.75	26.64	3.6	24	19.8
Project 13	6	30.9	64	91.1	42.5	12	6	60.74	28.86	2.88	25.5	21.45
Project 14	4	32.6	67.6	93.4	44.2	13	6	61.71	31.08	2.16	27	23.1
Project 15	2	34.3	71.2	95.7	45.9	14	7	62.75	33.3	1.72	28.5	24.75
Project 16	1	36	74.8	98	47.6	15	8	63.71	35.52	1.44	30	26.4
Function	Min	Max	Max	Max	Max	Max	Max	Max	Max	Min	Max	Max

Source: Self study

Table 23: Characteristics of 16 projects with simulated data (part II)

Criteria	Average land fragmentation index	Average soil productivity score	Number of land use constraints	Number of land tenure constraints	Average area owned by land fund/bank	Average area for afforestation	Average area for soil erosion prevention	Average area for natural resource conservation	Average area with natural habitats	Average area for re-naturalization	Average area for re-cultivation
Alternatives	13	14	15	16	17	18	19	20	21	22	23
Project 1	0.99	35	24	1	2	4	3	3	6	4.5	4
Project 2	0.975	35.8	23	3	4	8	6	6	8	6	5.2
Project 3	0.91	36.6	22	5	6	12	9	9	10	7.5	6.4
Project 4	0.845	37.4	21	7	8	16	12	12	12	9	7.6

Alternatives	13	14	15	16	17	18	19	20	21	22	23
Project 5	0.78	38.2	20	9	10	20	15	15	14	10.5	8.8
Project 6	0.715	39	15	11	12	24	18	18	16	12	10
Project 7	0.65	39.8	14	13	14	28	21	21	18	13.5	11.2
Project 8	0.585	40.6	13	15	16	32	24	24	20	15	12.4
Project 9	0.52	41.4	12	17	18	36	27	27	22	16.5	13.6
Project 10	0.455	42.2	11	19	20	40	30	30	24	18	14.8
Project 11	0.39	43	10	21	22	44	33	33	26	19.5	16
Project 12	0.325	43.8	5	23	24	48	36	36	28	21	17.2
Project 13	0.26	44.6	4	25	26	52	39	39	30	22.5	18.4
Project 14	0.195	45.4	3	27	28	56	42	42	32	24	19.6
Project 15	0.13	46.2	2	29	30	60	45	45	34	25.5	20.8
Project 16	0.065	47	1	31	32	64	48	48	36	27	22
Function	Min	Max	Min	Max	Max	Max	Max	Max	Max	Max	Max

Source: Self study

After setting the decision matrix the first action to be carried out is input data normalization and further calculations in order to identify criteria significances. Results of calculations are presented in the Table 24 and Table 25.

Table 24: Results of calculations at project level (part I)

Criteria	Area foreseen for rural urbanization	Area in bad road infrastructure condition	Area in bad drainage/ irrigation infrastructure condition	Average number of locals	Average number of prosperous farmers	Number of abandoned structures	Number of objects foreseen for public needs	Employable persons	Abandoned land	Average parcel size	Average agricultural holding size	Average distance from farmstead to the fields
	1	2	3	4	5	6	7	8	9	10	11	12
$t_{sum,i}$	2.66	10.33	10.22	13.18	11.71	8.07	7.38	14.12	8.50	5.60	10.00	8.50
$t_{avg,i}$	0.166	0.646	0.639	0.824	0.732	0.504	0.461	0.883	0.531	0.350	0.625	0.531
g_i	0.013	0.051	0.051	0.066	0.058	0.040	0.037	0.070	0.042	0.028	0.050	0.042
q_i	0.987	0.949	0.949	0.934	0.942	0.960	0.963	0.930	0.958	0.972	0.950	0.958
q_i	0.045	0.043	0.043	0.042	0.043	0.044	0.044	0.042	0.044	0.044	0.043	0.044

Table 25: Results of calculations at project level (part II)

Criteria	Average land fragmentation index	Average soil productivity score	Number of land use constraints	Number of land tenure constraints	Average area owned by land fund/bank	Average area for afforestation	Average area for soil erosion prevention	Average area for natural resource conservation	Average area with natural habitats	Average area for re-naturalization	Average area for re-cultivation
	13	14	15	16	17	18	19	20	21	22	23
$t_{sum,i}$	3.38	13.96	3.00	8.26	8.50	8.50	8.50	8.50	9.33	9.33	9.45
$t_{avg,i}$	0.211	0.872	0.188	0.516	0.531	0.531	0.531	0.531	0.583	0.583	0.591
g_i	0.017	0.069	0.015	0.041	0.042	0.042	0.042	0.042	0.046	0.046	0.047
q_i	0.983	0.931	0.985	0.959	0.958	0.958	0.958	0.958	0.954	0.954	0.953
q_i	0.045	0.042	0.045	0.044	0.044	0.044	0.044	0.044	0.043	0.043	0.043

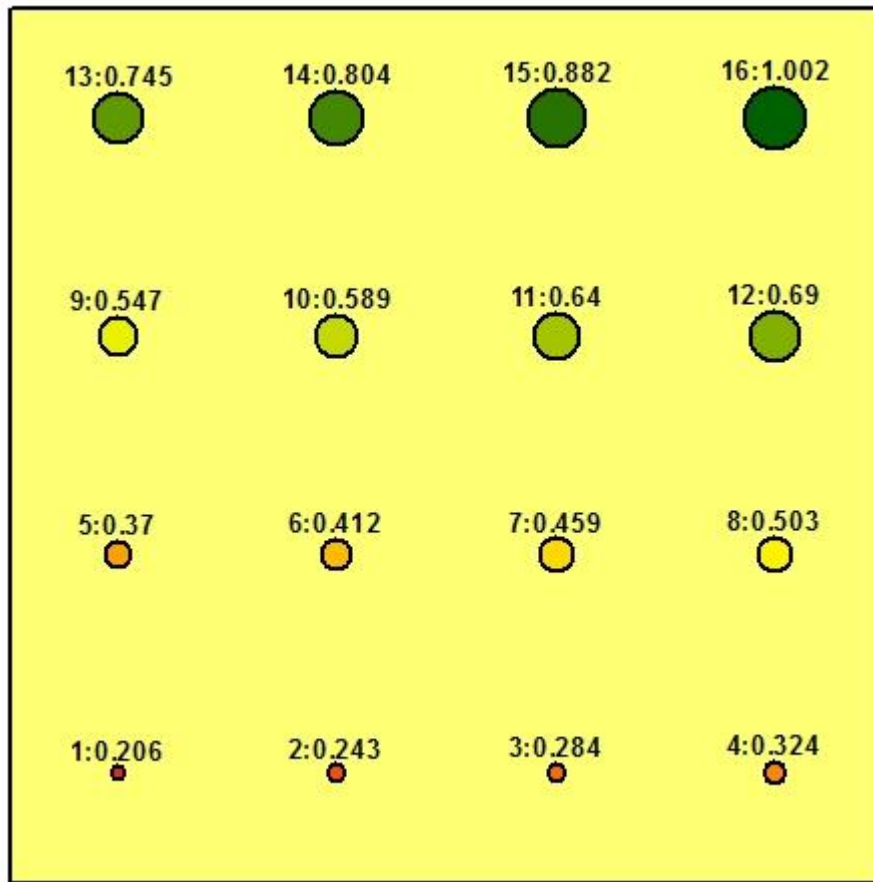
Sum of importance $\sum q_i = 1$. Calculation of criterion set of sum square: $S=204$.
Concordation coefficient: $W= 0.00079$; condition $W>0$ approved.

After the calculations of criteria significances, the SAW and TOPSIS methods were applied as at municipal level to test the reliability of selected methods: whether they point to the Project16 as the “best” alternative and Project1 as the “worst” alternative. The criteria and their values of importance (

Table 22 - Table 25) were used as input data for further calculations.

In applying the SAW method after matrix normalization according to the function “Maximize” or “Minimize”, each value was multiplied with weights (q_i) and summed for each alternative. Ranking results pointed to the biggest value (1.002) as the “best” alternative (Figure 38) for the decision maker, which is Project16 (top right biggest green point). Projects (points) were coloured and the point’s sizes were chosen respective to their importance.

Figure 38: Applying the SAW method for potential definition at project level



Source: Self study

The ranking of projects (points) through applying the TOPSIS method was performed in the same manner as at municipal level: matrix normalization, determination of the best alternative L_j^+ and the worst alternative L_j^- , estimation of K_{BIT} (deviation of the proportional variant's from an ideal alternative). Intermediate calculation results are provided in further tables (Table 26, Table 27 and Table 28).

Table 26: Significant criteria calculation results at project level applying TOPSIS (part I)

Criteria	Area foreseen for rural urbanization	Area in bad road infrastructure condition	Area in bad drainage/ irrigation infrastructure condition	Average number of locals	Average number of prosperous farmers	Number of abandoned structures	Number of objects foreseen for public needs	Employable persons	Abandoned land	Average parcel size	Average agricultural holding size	Average distance from farmstead to the fields
	1	2	3	4	5	6	7	8	9	10	11	12
$\sqrt{\sum_{j=1}^n X_{ij}^2}$	70.43	98.14	202.40	325.77	142.88	35.23	17.23	225.73	85.87	27.89	79.94	63.82
f_j^+	0.001	0.016	0.016	0.013	0.014	0.019	0.020	0.012	0.018	0.002	0.016	0.018
f_j^-	0.019	0.005	0.004	0.008	0.007	0.001	0.003	0.009	0.001	0.018	0.004	0.001

Table 27: Significant criteria calculation results at project level applying TOPSIS (part II)

Criteria	Average land fragmentation index	Average soil productivity score	Number of land use constraints	Number of land tenure constraints	Average area owned by land fund/bank	Average area for afforestation	Average area for soil erosion prevention	Average area for natural resource conservation	Average area with natural habitats	Average area for re-naturalization	Average area for re-cultivation
	13	14	15	16	17	18	19	20	21	22	23
$\sqrt{\sum_{j=1}^n X_{ij}^2}$	2.49	164.66	58.65	73.86	77.36	154.71	116.03	116.03	91.74	68.80	56.51
f_j^+	0.001	0.012	0.001	0.018	0.018	0.018	0.018	0.018	0.017	0.017	0.017
f_j^-	0.018	0.009	0.018	0.001	0.001	0.001	0.001	0.001	0.003	0.003	0.003

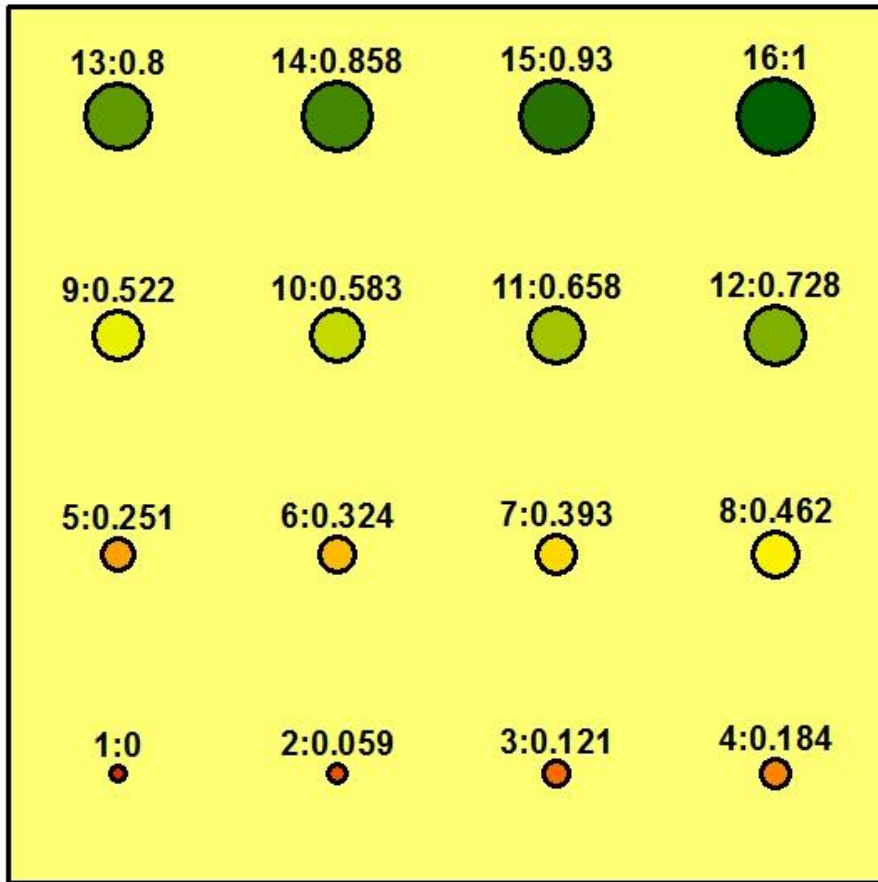
Table 28: Deviation results at project level from ideal positive and ideal negative variants

	L_j^+	L_j^-
Project 1	0.070	0.000
Project 2	0.067	0.004
Project 3	0.062	0.009
Project 4	0.058	0.013
Project 5	0.053	0.018
Project 6	0.048	0.023
Project 7	0.043	0.028
Project 8	0.038	0.033
Project 9	0.034	0.037
Project 10	0.029	0.041
Project 11	0.024	0.046
Project 12	0.019	0.052
Project 13	0.014	0.057
Project 14	0.010	0.061
Project 15	0.005	0.066
Project 16	0.000	0.070

Source: Self study

TOPSIS method (highest K_{BIT} value) points to the best alternative – Project16 (Figure 39).

Figure 39: Applying the TOPSIS method for potential definition at project level



Source: Self study

Both the SAW and TOPSIS methods identified Project16 as the “best” alternative and tendentious decrease of preference to the “worst” alternative – Project1. Project16 in both methods has value 1; this means that there are no conflicting criteria. If filled data were slightly conflicting the result for Project16 would be less than 1.

If the set criteria reflected real political and juridical preference, the lowest ranks would mean that there is doubt or that there is no potential for comprehensive land consolidation. Selection for the implementation of areas with the lowest rank may require more investments than in areas with higher ranks, but the results achieved would be hardly near to those results where the projects had received higher ranks.

6.5. Chapter summary

- This chapter has examined different practices in selected European countries, in particular how pre-study procedures are performed and potential areas for land consolidation are identified. The identification of potential areas (strategic level) is unique and a challenging task as it must assure a transparent dealing with multi criteria conflicts and alternatives. It was noticed that the FAO has paid attention to this issue and has prepared recommendations with criteria identifying potential areas for those countries launching pilot land consolidation projects. International practice shows that the identification of potential areas is highly appreciated by authorities and landowners, together with land users since it influences the bottom-up approach.
- Identified criteria defining the potential for comprehensive land consolidation at different scales is a significant advantage for the decision makers, especially for countries writing the first chapters of their land consolidation history.
- This chapter has outlined and illustrated multi-criteria decision making procedures identified by ranking and evaluating the alternatives (potential territories at different scales: municipality and project area) with selected SAW and TOPSIS methods and representing results with GIS.
- The findings demonstrate that identified criteria, multiple criteria decision analysis methods and GIS can be easily applied to assess alternatives from the worst to the best potential to support land consolidation authorities to analyse the potential for land consolidation and assure transparency.

Chapter 7

Drawing a framework of sustainable rural areas development through land consolidation in Lithuania

7.1. Introduction

In many CEECs agriculture is one of the important sectors of the economy, but it still suffers from land structure problems (mainly land use conflicts, land fragmentation, etc.) which influences land abandonment. Van Huylenbroeck et al. (1996) noted that the adjustment of rural structures is not only important for a prosperous and sustainable agriculture, but also for many other rural functions and sectors. Ossko & Sonnenberg (2002) argue that land consolidation will be the most important procedure in Central Europe in the near future, creating an economic agricultural property structure and properly functioning rural land markets.

Through an understanding of the power and importance of land consolidation, land management experts from WECs have for more than a decade trained and broadened the attitude of CEECs to sustainable rural areas development implementing land consolidation projects through various projects, workshops and seminars. Despite the efforts of those experts from WECs, land consolidation design unfortunately is not simply transferable from one country to another. As revealed in Chapter 4, there are differences in policy, traditions, history, etc. However, western experts have made the initial fundamental steps in helping national land managers to stake out a platform for the future of this process based upon WEC practice, and it will be the main instrument for at least another two generations. The main guidelines for sustainable rural development are set in the EU rural development policy and EU member countries and those seeking to become members of the EU, are framing policies in their own way, preparing legal frameworks, establishing institutional bodies and performing capacity building (FAO, 2012). The FAO further considers that strategies should identify the

principles and objectives of the readjustment approaches: the beneficiaries; the development of capacity and knowledge in the public sector; the private sector, organizations of farmers and small-scale producers; of anglers and fishermen; of forest users; and academia (ibid).

It is not easy to adopt (copy and paste) land consolidation “as is” from Western European countries as there are many peculiarities. There is a need to take into account historical evolution, the psychology of the citizens, emotional bonds and traditions related with the land and to combine it with national, social, economic, environmental and political conditions. Only national authorities know which factors will be most effective in their respective countries and how the introduced instruments will be accepted by the society. Thomas (2006b) confirms this statement by arguing that some common preconditions have to be taken into account, but each country must find its own approach.

In this Chapter the author seeks to develop a framework for sustainable rural areas development in Lithuania through land consolidation by summarizing the elements that are missing in the legislation and procedures and incorporating WEC best practices.

7.2. Considering recent Western European countries’ practice

Land consolidation as a land management instrument has changed and adjusted through time to meet the specific demands of a society. Thomas (2012) considered recent European trends identifying the purposes and objectives to be pursued by LC:

- More “integrated land consolidation”;
- Resolving “land use conflicts”;
- Land consolidation in case of big public infrastructure projects;
- Village development and renewal;
- Urban land consolidation;
- Implementation of EU-Water Framework Directive;
- “Strengthening the traditional rural road network”;

- Agricultural land consolidation (traditional farm oriented);
- Forest land consolidation;
- “Repairing the land reform results”.

All of these objectives may be realised by applying voluntary or legally well-developed comprehensive (compulsory) or specific land consolidation processes, or even a mixture of them working together in parallel. Hartvigsen (2014) reports that the discussion on land consolidation in CEE has often been limited to either simple/voluntary or a compulsory/comprehensive approach. As voluntary land consolidation has very limited results and a comprehensive land consolidation approach is not implementable without some compulsory elements, Hartvigsen (2014) noted that the FAO and other experts have recognized that there could be a third model for land consolidation in CEE – Integrated Voluntary Land Consolidation, where the realisation of rural infrastructure (road network, drainage, etc.) is outside the land consolidation project, but in accordance with the local community development plan which was prepared during land consolidation. Thomas (2012) points out that effective LC approaches need further three core elements:

- solid legislation;
- with obligatory participation of the land owners; and
- legally established institutions.

Hence, everything from the initiation until the implementation depends on a legal base which describes the possible approaches to reach clear objectives, involves participants, objects concerned, regulates the valuation process which affects land mobility (sell, buy and exchange) – core part of the land rearrangement, financial issues, institutions’ involvement, etc. The next very important aspect in WEC is the presence of strong rural communities and land owners acting in a bottom-up approach, seeking clear objectives – private benefits. It must be highlighted here that project participants have many powers and duties (i.e. role of the Board of Participants in decision making) during the process despite the fact that legal compulsion exists in order to benefit public and private needs. The fulfilment of comprehensive objectives is achieved through synergy between governmental

authorities and this is what is really missing in CEE countries during the land consolidation process. The situation in WEC can be summarised by this insight by Van Dijk (2002), "*the faith in a government that acts in the best interest of the civilians and assurance of ownership is high*". The intensive involvement of governmental institutions assures not only realisation of objectives, but also the monitoring of the workflow of the process at all stages, which allows quick reactions and framework upgrades.

7.3. Drawing land consolidation framework for Lithuania

Western experts agreed that land consolidation in CEECs should be implemented in a democratic way. This contrasts to the socialist period during which "land consolidation" was a tool for nationalisation and a way of forming co-operatives (Ossko & Sonnenberg, 2002). However, the situation after two decades has changed and it is time to reconsider the compulsory model, which allows comprehensive results. A comprehensive land consolidation programme, including village renewal, is a first step towards sustainable rural development and can become one of its cornerstones (Thomas, 2006b).

In the Lithuanian context, the viability of a strong and vibrant rural economy depends, in a large part, upon the existence within it of strong and vibrant family farms. Land consolidation, in combination with other rural development programs, should be the instrument whereby such family farms are able to put down deep roots in the rural areas. There is a danger that the consolidated holdings will become the means whereby agribusinesses may extend their dominance over rural employment with resultant rural depopulation. The presence of an intimate and long term connection between a successful family farm and the land itself is seen as a necessary prerequisite to the ultimate goal of long term sustainable rural development. Considering the expressions from land consolidation project participants reflected in Chapter 5, which realised only narrow objectives, introduction of comprehensive (compulsory) land consolidation is very important. Lithuanian land management authorities (NLS) observing the overall process situation, are educating citizens, pointing out that in Western Europe the process

increasingly becomes blurred between voluntary and compulsory land consolidation, and there is the trend for the formation of the process model combining the characteristics of both models (Ministry of Agriculture of the Republic of Lithuania, 2009). Today in Lithuania there exists only one land consolidation model which is defined in the Law on Land as *“a complex readjustment of land parcels when their boundaries and location are changed according to a land consolidation plan prepared for a certain territory, with an aim to enlarge land parcels, to form rational land holdings of farms and to improve their structure, to establish necessary infrastructure and to implement other goals and tasks of the agricultural and rural development as well as environment protection policy”* (The Parliament of the Republic of Lithuania, 2004). This definition gives the impression of comprehensive land consolidation with sustainable objectives (infrastructure development, rural development and environmental protection) mentioned, but there are missing measures. These include compulsion and the components of “project implementation” in the process workflow (rules of preparation and implementation of land consolidation projects) recommended in the FAO (2003) guidelines on comprehensive land consolidation.

The actual definition of land consolidation sounds solid, but factual implementation within the legal environment confuses land owners and provides a negative attitude to land consolidation as the first wave of LC projects (14 of them) disappointed many of the participating landowners. Whereas they had seen plans being drawn up to develop local road networks, repair drainage systems, improve electricity supplies, etc., the available budget only covered the administrative costs of the project such as land valuation, preparation of the plan, cadastral measurements and the legal costs of revising the cadastre (Pašakarnis & Maliene, 2010).

Changes and new provisions in the legislation are necessary at all project stages:

- the analysis of potential territories;
- the investigation of the project goals and objectives;
- the analysis of how the project meets the sources of finance with an estimation of cost sharing;

- an introduction to several valuation methods;
- the inclusion of a cost-benefit and impact oriented analysis when presenting alternative project versions;
- the assurance for project solutions implementation (i.e. the construction of planned infrastructure), etc.

The author further illustrates how the actual land consolidation process in Lithuania should be improved to meet sustainable rural development requirements.

Despite the fact that the demand for comprehensive land consolidation by land owners exists, establishment of several land consolidation models with clearly defined objectives would be much appreciated. The actual situation shows that today there is demand for the introduction of two models: compulsory (especially those who want infrastructure and village renewal), and accelerated voluntary land consolidation (for those who require quick spatial adjustment (some amalgamation) where some minimal environmental issues are considered). Each introduced model, after the application's appearance, has a different complexity that influences project realisation time (Table 29).

Table 29: Land consolidation process workflow depending on the applied model

No.	Compulsory LC	Accelerated voluntary LC
1.	Decision to start the project (National Land Service) <ul style="list-style-type: none"> • In-depth project applicants' applications analysis (feasibility study). • Awareness campaign informing neighbours, all public authorities, local NGO's, etc. • Identification of possible obstructions. • Calculation of project financial 	Decision to start the project (National Land Service) <ul style="list-style-type: none"> • Applicants' motives and desirable re-allotments investigation. • Investigation of project cost sharing scheme between applicants. • Awareness campaign informing neighbours, all public authorities, local

No.	Compulsory LC	Accelerated voluntary LC
	<p>issues shares.</p> <ul style="list-style-type: none"> • Evaluation of project integration with other EU and national support programmes. • Calculation of project cost/benefit and impact oriented analysis. • Decision to start the project for investigated project territory and clearly defined objectives. • Selection of project development contractors (land surveyor, land valuer, constructor, environment issues consultant, etc.). 	<p>NGO's, etc.</p> <ul style="list-style-type: none"> • Decision to start the project for investigated project territory. • Selection of project development contractor (land surveyor).
2.	<p>Preparatory work (contractor and *National Land Service)</p> <ul style="list-style-type: none"> • Updated land information system data acquisition. • First project meeting, election of project representatives (Board of Participants). • Surveying actual project situation. • Working with project participants, authorities, NGO's, etc. • Designing draft plan. • *Acquiring land for objectives realisation (i.e. for public infrastructure (re-)development). 	<p>Preparatory work (contractor)</p> <ul style="list-style-type: none"> • Updated land information system data acquisition. • First project meeting, election of project authorized representatives. • Surveying actual project situation. • Working with project (participants, authorities, NGO's, etc.). • Designing draft plan.
3.	<p>Development of land valuation plan (contractor)</p> <ul style="list-style-type: none"> • Decision on valuation method (market/soil/comparative). 	<p>Development of land valuation plan (contractor)</p> <ul style="list-style-type: none"> • Decision on valuation method (soil/comparative).

No.	Compulsory LC	Accelerated voluntary LC
	<ul style="list-style-type: none"> • Valuation and preparation of valuation plan with support of the Board of Participants. • Approval of valuation plan. 	<ul style="list-style-type: none"> • Valuation and preparation of valuation plan with support of the authorized project representatives. • Approval of valuation plan.
4.	Designing the project (contractor) <ul style="list-style-type: none"> • Drafting project plan by interviews and discussions with project participants, municipality, NGO's, etc. • Involvement of infrastructure, environmental agencies, etc. in order to reach common project objectives. • Identification of territory potential for alternative activities. • Preparing final project plan with cost sharing calculations, EIA report. 	Designing the project (contractor) <ul style="list-style-type: none"> • Drafting desirable project plan. • Preparing final project plan with cost sharing calculations.
5.	Public hearing and approval of project (contractor) <ul style="list-style-type: none"> • Presenting project plan with cost sharing calculations, cost-benefit and impact oriented analysis, EIA report. • Presenting identified territory potential for alternative activities. • Objections, negotiations and suggestions regarding presented project plan. • Project plan verification according 	Public hearing and approval of project (contractor) <ul style="list-style-type: none"> • Presenting project plan with cost sharing calculations. • Objections, negotiations and suggestions regarding presented project plan. • Project plan verification according reasonable objections. • Approval of LC project plan (project participants, NLS,

No.	Compulsory LC	Accelerated voluntary LC
	reasonable objections. <ul style="list-style-type: none"> • Approval of LC project plan (project participants, NLS, infrastructure companies and governmental authorities). 	infrastructure companies and governmental authorities).
6.	Project implementation (contractor, authorities, participants) <ul style="list-style-type: none"> • Formed land borders stakeout. • Approved project measures realisation (i.e. construction of planned infrastructure). • Compensations for participants who lose. • Preparation of new title documents. • Notary approval. • Updates in the cadastre. • Apportion of project expenses. • Disbandment of Board of Participants and transferring ownership (i.e. common facilities to the municipality). 	Project implementation (contractor, authorities, participants) <ul style="list-style-type: none"> • Formed land borders stakeout. • Preparation of new title documents. • Notary approval. • Updates in the cadastre. • Apportion of project expenses.

Source: Self study

The need for the compulsory approach is determined by the concern to create an efficient administrative procedure and the efficacy in achieving the stated comprehensive land consolidation objectives. Offering a compulsory land consolidation model would assist the development of sustainable rural areas, while the accelerated voluntary land consolidation model will focus mainly on agricultural (re-)development. Because of this global objective, accelerated voluntary LC will be cost effective and quicker to implement as:

- a less comprehensive analysis (motives investigation) is necessary, which actually means a faster project launch;
- smaller territories with fewer participants – rapid results on working conditions;
- very slight changes on road and drainage networks;
- simpler land valuation process;
- less involvement of governmental institutions as there is no infrastructure (re-)development.

Introducing the accelerated voluntary land consolidation model will minimize bureaucratic procedures (i.e. less time on re-planning, fewer public hearings) as the participants have a clear objective – the merging and reshaping of land parcels. Despite the chosen LC approach, the land management authority (National Land Service) acts as a decision-maker who methodically leads during the process and as a supervising body.

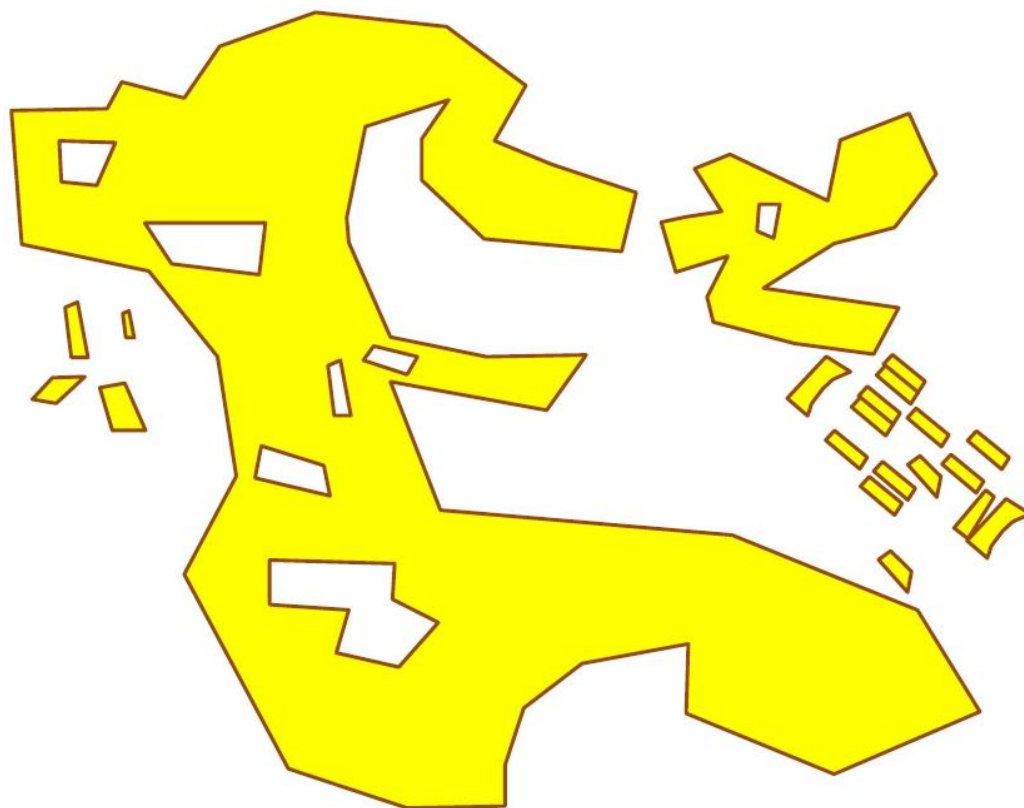
Furthermore, the author will provide missing aspects that hamper sustainable development to rural areas through existing legal acts regulating the land consolidation process in Lithuania.

7.3.1. General improvements in legislation

The size and scale of the area included in the LC project exerts a considerable influence upon what can be achieved. The actual legislation defines the lowest level – 100 ha minimal project area. There is no clear description about the project area configuration as well. The author during a WEC LC process analysis saw many project plans and noticed that project areas are clear, fully covering the territory under analysis whilst in comparison project areas in Lithuania contain “cheese holes” (non-participating land parcels), land parcels as “satellites” of project areas (which are outside project area, but involved in the project with the aim to perform cadastral measurements for free) (Figure 40). Unfortunately in such an area only the simplest reforms can be made such as geodetic measurement and voluntary mergers of holdings to produce more sensible ownership configurations. Such a situation is due to the chosen voluntary approach. To achieve the objective of long-

term sustainable and economic development at the first stage, a compulsory LC approach has to be introduced. Secondly, the project planners with authority (NLS) approval would need to have the flexibility in resource allocation and access to investment funds that can only be offered in much larger areas. It would be rational to define minimal areas depending on what land consolidation model is applied. In the case of compulsory land consolidation, the areas should be cadastral area size (can be more than 1,000 ha) as it is logical that such readjustment projects at larger areas affects local infrastructure. Accelerated voluntary land consolidation should be with the minimal number (controllable) of landowners. Concerning the compulsory land consolidation approach, project territory requirements should be including together with other parameters (number of co-owners, number of parcels, etc.), but they should be flexible, adjusted according to the potential of the region as defined by the National Land Service recommendations. Land management authorities (NLS) should identify the potential of each region (municipality) following the methodology described in Chapter 6 and set minimal requirements for applications. Notwithstanding what LC model is applied, the possibility to allow others wishing to join the ongoing project (after the approval of the authority) is urgent. Currently these possibilities are very limited as the project area is fixed in the project support application (the amount of EU support depends upon the project area as well). If additional project participants are subsequently included in the project, the project contractor would have to accept the new volume of the project for the same remuneration. Such aspects point once again to the need for flexibility.

Figure 40: Legislation permits such a configuration to the LC project area



Source: Self study

Project realization time depends mainly on the project approach, objectives (complexity), and the number of participants and the size of project area. At the initial phase, before launching the LC project, the land management authority (NLS) should consider the project time aspect: accelerated voluntary land consolidation should last up to 1 year, compulsory LC up to 5 years. Long lasting projects become uncertain and may be threatened largely due to the age of the majority of those participating. The land management authority should estimate at the decision to start the project phase how long it will take to realise the project according to the motives of the project participants and the stated objectives. If some realisations take more time, such improvements should not be linked to the completion date of the land consolidation project; they may run in parallel where land consolidation has made a base for further improvements.

Another aspect, which is related particularly to comprehensive land consolidation, but not always in the actual legislation, is the loss of project expedience. Due to the long project implementation period, changes can appear in the legal acts, regional policy, and financing programs. If the majority of stated objectives and expectations lose their relevance, the land consolidation project may, in turn, lose its expedience and it is irrational to continue the project implementation. The land management authority (NLS), after a comprehensive investigation, must be empowered with opportunity to suspend such a project and, if it is still rational, reclassify it within another type of redevelopment. Such an amendment in legislation could protect national and EU support from aimless expenditures.

In Lithuania, during the decision stage, the feasibility study procedure is missing, which is very important in many WECs. As comprehensive land consolidation projects are expensive it is very important to perform a project feasibility study before launching the official procedure to be sure that the positive effects are greater than the project costs. Such a study can answer the question of whether the correct land consolidation model will be applied and to measure what result all the involved parties can expect in the prospect territory after project implementation. If the results after the study are negative, the land management authorities have to look for other alternative land management instruments or accept high project implementation costs (if it is a strategic object).

Drafting the project plan, the project contractor has to consider the village, and the cadastral area boundaries that actually create further fragmentation. As villages are disappearing and many land parcels become abandoned, there is an urgent need to correct legislation from hampering viable development and stimulating subdivision of land parcels, while it is necessary to allow them to merge. During the project, the role of the land surveyor is to make radical updates to the cadastral map, and to redesign land parcels, their area amount shape, develop a rational road network, correct the geo-referenced background, etc. It is necessary to place restrictions in other places of the legislation which should be anticipated upon the completion of a project. It is logical that measures (restrictions) should be put in place to prevent landowners from subdividing or fragmenting their holdings in a

way that may jeopardise this development process. At present, there is no such limitation.

Following WEC practice, it is necessary to anticipate the possibility for an elected Board of Participants to freely decide on the type of valuation, but the land management authority has to allow it. The current provision states: if State land exists in the project area, the estimation of market value method has to be applied. As State land exists in practically all land consolidation projects, there is no possibility to apply any other valuation method. The widely applied valuation methods used in WEC such as comparative valuation and estimation of land (soil) productivity could be effectively used in Lithuania as well. The introduction of such valuation methods could save time and money (especially in the accelerated voluntary LC model), and can be performed by the Board of Participants with the support of consultants and the supervision of land management authorities. Landowners have to have opportunity to avoid land valuation at all if there are only a few project participants and the exchange of parcels could be based on negotiations.

The compulsory (comprehensive) land consolidation method, according to the study performed by Pašakarnienė (2013), could be welcome and widely applied by the road administration to avoid procedures for land acquisition for public needs when the land is necessary for road widening, establishing roundabouts at junctions, etc., thereby avoiding the further merging of private land parcels. Improvements in such projects often involve the (re-)development of drainage, the construction of roads, and other infrastructure improvements; these facilities do not end at the border of the land consolidation project. Therefore, land management authorities should have a power to force the requisite landowners to join the project or pay compensation for the benefits accrued from the project.

When implementing compulsory land consolidation, the State land (vacant stock land) could be effectively used for elimination of land reform mistakes, rural infrastructure (re-)development, vulnerable areas protection, and for other public needs. After an estimation of the necessary reserve for the project objectives, the

realisation of a State land fund should use its own reserves or acquire additional land within the project area. If there is none or a very limited area of State land and the improvements to the public infrastructure is urgent, a legal act regulating the land consolidation process should anticipate the possibility that the project participants will have to use a share of their land for common needs.

Compulsory land consolidation is unavoidable in order to protect the EU, national, municipal and participant's investments especially when the project is related with (re-)development of public objects. In the past decades politicians were against compulsory LC as the older generation has many negative emotions from the Soviet era. Today, it is not possible to say that Lithuanians are not ready for the introduction of compulsory mechanisms since many citizens already have faced this situation since it is related to shared property in common (co-ownership) – i.e., the renovation of condominiums, where the rule of 50 percent plus one is all that is necessary to start the process. Such assurance of democracy is provided through the Civil Code of the Republic of Lithuania (co-ownership right). During a land consolidation, project participants should be treated as co-owners for an area of land, with their shares (amount of money) in the land as well.

Following WEC practice, the participants of the project have to contribute with an adequate share of land where necessary for public interest and the financial contribution for at least the project's technical procedures (i.e. cadastral works). At present, the implementation of a project in Lithuania is totally free of charge for landowners. Rules for the project preparation and its implementation have to be supplemented with the requirement of both LC models that the project participants have to cover land valuation and all procedures relating to the preparation of new title documents (geodetic measurements and update of cadastre). Taking an old German practice (not used anymore) into consideration, public works and support with materials (i.e. woods) should be considered during the compulsory land consolidation approach when developing rural infrastructure i.e. the establishment of recreational areas, public spaces, etc. The introduction of such an option could alleviate the financial burden for the older generation. Regardless of the EU support, it is necessary to create favourable conditions for

project participants to obtain long-term credits which could be allotted for the necessary infrastructure development, i.e. helping to reorient from agriculture to tourism. Similar support schemes for enduring value improvements from the government exist – for the renovation of condominiums, where government covers a part of investments. Currently land consolidation projects are financed from the EU (75%) and the national (25%) budget, and there is no financial involvement of local government. In considering identified potential territories for comprehensive land consolidation, municipalities have to link all possible support programmes and investments in order to realise project objectives.

The author wishes to highlight the importance of a comprehensive situation investigation (surveying of existing border marks, buildings and other territory elements) in the project area at the preparatory stage, which is missing in the actual legislation. The success of the project is directly related to the detailed examination of the project area and, at the preparatory stage; it is very important to have as much GIS data and documentation as possible. The project planner should use all possible means to create a comprehensive database of any features that may have a bearing on the success of the project. Field visits and engagement with landowners are also pre-conditions for success. Just making contact with the affected owners also has its difficulties; contact details (at least phone numbers) are not routinely held by the local authorities, the land owners may no longer live in the area (or may have emigrated), and individual sites may have changed ownership using informal arrangements which have not been notified to the authorities (Fernandez & Eberlin, 2010). Situations such as these leave gaps in the area covered by the project, which may severely hamper the scope for efficient reallocation. The appearance of the land surveyor in the project area (fields) at the early stage can influence the land market and involvement of new participants wishing to join the project. Surveying of the actual project situation at the project preparatory work stage will give an *ex-ante* project situation picture, which could be used for the evaluation of the results. In addition, the fixed situation works as a disciplinary measure for all project participants. In the land consolidation project implemented between 2005-2008 in the Mažeikiai district, there was an incident in parts of the Židikai and Ukrinai cadastral areas when a landowner, before

swapping land parcels, cut down all woods, which threatened all re-allotments and the project. Following the German practice, it is necessary to introduce strict legal restrictions on any changes in the use of the land when landowners join the project. During the surveying process, in applying modern surveying technologies such as unmanned aerial vehicles (UAVs), 3D lasers scanners at early stage it is possible to create comprehensive initial project documentation for project development and monitoring.

Natura 2000 areas (sensitive areas) are not excluded from land consolidation projects in WEC as they are in Lithuania. It is necessary to understand that in such areas measures for the intensification of land cultivation are not applied; the main changes appear in land titles and their borders. Moreover, the instrument allows environmental protection measures (i.e. establishing hedge strips, etc. saving vulnerable areas) to be applied, redirects landowners to other activities, or even compensates some departures from agricultural activities. Legislation regulating LC in Lithuania has to allow land consolidation projects to be performed in *Natura 2000* areas, if such projects do not change land use and do not have a negative affect on landscape or environment issues. Supervisors of such territories (i.e. national park administration) could be LC initiators as well and work together with active farmers in the neighbourhood in order to access benefits. Financial mechanisms for environmental protection and agriculture could benefit both players.

7.3.2. Institutional setup and strengthening existing bodies

In WEC, a very significant player in land consolidation projects is the Board of Participants, which has many powers. The Board of Participants in Lithuanian legislation doesn't exist; there are authorized representatives elected from the project participants who are mainly responsible for minimal project organizational issues – such as assistance for the land surveyor. Such a body experiences only the initial rudiments compared with WEC and it is natural that they have very limited power. This is the very reason why a powerful Board of Participants should be established especially in the compulsory land consolidation model; for accelerated

voluntary land consolidation it would be sufficient to have authorized representatives (a few land owners). The missing body establishment and empowerment would help to develop a viable, acting bottom-up community, which is faster and more productive. Established and successful Local Action Groups (LAGs) demonstrate that communities in rural areas are capable of representing common interests such as seeking better living conditions in rural areas. At the beginning, the establishment of a Board of Participants (at the first technical part of the project – Preparatory work) should be assisted by the local land management authorities to assure the fluent coordination between many institutions for all measures' realisation. Once established the Board of Participants should act from its formation at the beginning of the project and until it is discharged at the end of the project. The Board of Participants, during the planning process, should represent the needs of all participants (i.e. valuation process, planning common facilities, etc.), mediate in solving disputes and distribute project implementation contribution among project participants. Following the analysed WEC practice, the Board should have a juridical status (like a Non-Governmental Organization). Such status could allow donations to be obtained from private and juridical bodies and these donations could be used for project realisation.

The application and draft project plan for accelerated voluntary LC could be prepared by a private land surveyor or land management consultant. He could do initial investigations of the area, interview all applicants and prepare all necessary documents for the submission to NLS. Private consultant's (surveyors') involvement at the initial (decision to start the project) stage could include the:

- establishment of new surveyors and assure the future of the profession;
- minimisation of administrative preparation work for land management authorities;
- improvement of the quality and time of preparation of services;
- influence of the awareness of instrument at early stage.

Such a private land surveyor or land management consultant furthermore could be a member of the project authorized representatives.

Where the central National Land Service office has to be responsible for the strategic decisions, projects supervision at the highest level, legal acts improvements, methodological guidance and projects approval it is necessary to establish a local land consolidation consultant position in each municipality (within the local NLS offices), which could be close to landowners and interested people who should:

- provide advisory services for land owners;
- assist (by guiding) the Board of Participants;
- perform marketing campaigns and investigations;
- supervise and assure the measures' implementation and coordination with governmental institutions.

Before starting the land consolidation process, at an early stage of initiation, after receiving all applications from applicants, the local land consolidation consultant (NLS) should either investigate the project area in detail himself or examine all material prepared by the private consultant (surveyor) hired by land owners initiating accelerated LC. All possible obstructions must be identified and eliminated before starting the project. All findings from the territory analysis should be the subject of public tender in order to assure transparency for the project contractor. After selecting the project contractor all material used for territory investigation has to be shared between NLS and contractor. The prediction of results is a very important component of the LC process: *ex-ante* – before starting the project and *ex-post* when the LC procedure has been completed in order to evaluate results achieved. A comprehensive prediction of the intended sustainability objectives is very dependent on the initial data used during the evaluation and for further project monitoring. After five years following the completion of the LC project the evaluation should be performed by NLS in order to evaluate the long-term effects. Such evaluations using raw data and reflections from project participants could reveal the limitations of legal acts and could be used to improve knowledge.

As land reform is almost complete, the central NLS office should pay more attention to the formulation and update of the national land consolidation policy,

coordinate communication between the involved institutions, and monitor and react to the situation from each project area. The monitoring system has to be developed in order to receive feedback from the implemented projects and on how the legal base should be improved. Monitoring should be accomplished by the board responsible for the overall national LC picture supervision moderated by central NLS office and consisting of politicians, local and international land consolidation experts, authorities from different ministries, local government, academia, landowners associations, NGO's, farmers associations, etc.

The central NLS office should follow Finnish and Dutch practice and the suggested evaluation methodology (Chapter 6) to perform studies in order to identify the potential of regions and other areas. As mentioned previously in this chapter, flexibility is necessary when setting the criteria showing the potential of the region.

Governmental institutions and other third parties should be involved at the early stage of the project in order to state their objectives and realize all anticipated improvements. NLS should be the coordinator for fluent communication between all governmental institutions during the LC project to assure the realisation of all anticipated objectives. In reality, the State Land Fund now applies to all institutions at the initial stages of the project, but only in order to obtain planning conditions for the project contractor, but there is no further coordination.

Objections to the accelerated voluntary land consolidation model (during public hearing) are left as an option as such objections may occur from neighbours not participating in the project, NGO's and other parties whose interests are affected within the project. Today there is no clear established process for appeals with responsible bodies for disputes resolution (i.e. legal withdrawal from the project). If the compulsory land consolidation project planner (surveyor) can't find consensus between all needs and interests provided by all participants and if any project participant is not satisfied with the solution, he should be able to appeal to the local arbiter (responsible for mediations related with land issues) from the local land management authority (NLS lawyers (arbitrage) or local land

consolidation consultant) before going to the court. Such an arbiter would save time and assure “near justice” through their ability to thoroughly investigate historical situations related to an appealing landowner, related territory, and will know the project from the early stage, etc.

The benefit of the Land Fund involvement in a land management scheme is described by the FAO (2004a) as institutions established under a state authority in Western European countries are successfully used to play a catalytic role in the land market, assembling and providing better shaped plots and parcels to farmers in land consolidation projects, implementing and facilitating early retirement schemes, and enabling other types of “land demanding” projects providing nature and environmental protection, forestation and infrastructure. The State Land Fund is the established body in Lithuania since 2010, but is mainly responsible for the administration of the process (initiation, selecting contractor by public procurement, project process supervision). The State Land Fund has to change its course in LC projects from initiation and supervision. There have been no land purchases or sales in land consolidation projects since this body’s establishment. Now it has to take a proactive part in the early stage (preparatory stage) of acquiring land for the realisation of objectives, especially for the correction of land reform mistakes and for the compensations.

7.3.3. Capacity building

The implementation of land consolidation and improvements involves both technical and psychological factors; the latter are sometimes more important than the first (Schirmer, 1958). Following this statement, the land consolidation project manager (in Lithuania, a land surveyor) has to be impartial, able to communicate, be transparent, able to negotiate and solve problems, and equipped with modern measuring hardware and GIS software. As land reform is coming to the end and land consolidation has a high potential according to WEC history, there is a need to tighten up the provision of LC specialists within Lithuania. The professional bodies could play their part by setting standards for those seeking to enter the profession and by acting as the agents of knowledge/good practice transfer between

practitioners in Lithuania itself, and between Lithuanian practitioners and the wider international community. The country's universities and colleges might also be induced to make LC planning more central to their core curricula in conjunction with the professional bodies.

The Universities and Colleges have a contribution to make in that it is they who will provide the next generation of project planners. Not only can their networks, both at home and internationally, be used to enhance the understanding of land consolidation, but also their curricula should reflect the centrality of LC planning to all rural planning and the critical contribution that it has to make to ensure a sustainable future for the countryside. The involvement of academia in the monitoring and investigations of long-term results would assist NLS authorities in this time consuming process. Students who selected to write a thesis about land consolidation could join projects for the interviewing of the landowners (raw data harvesting) and for other assistance to land management authorities.

During land consolidation many private and public interests have to be harmonised. All project participants should expect fluent involvement and synergy between them and they have to understand that this is a land management instrument. As the study performed by Pašakarnienė (2013) showed, road administration specialists have a very narrow understanding about land consolidation and about the possibilities of their active involvement, but all specialists stated that they would like to know more through seminars, workshops, etc. Organising specific trainings workshops should be a priority for road administration specialists, foresters, environmental protection and cultural heritage specialists, infrastructure and utilities owners and managers.

There are two main professional organisations in Lithuania: the Lithuanian Association of Surveyors (member of International Federation of Surveyors (FIG)) and the Lithuanian Association of Land & Water Management Engineers. From the experts of these associations a board should be established that would be responsible for the formation of a network for disseminating the local expert's professional best practices and knowledge. The same practice could be applied in

other professional associations: land owners, farmers, property valuers, foresters, etc.

7.3.4. Awareness rising

To expect a bottom-up land consolidation approach, active landowners are essential. The level of their activity depends directly upon their understanding of the objectives that could be achieved through the application of this new land management instrument. The mass media in Lithuania is quite passive regarding LC. In public articles, only the basic matters-of-fact about LC are provided, accentuating the possibility that during the land consolidation process farmers can enlarge their holdings. It is a commonly held public opinion that LC will create large collective style farms again, as during the Soviet years, thereby making the main message even less appealing (Pašakarnis & Malienė, 2011). Many think that LC is simply the merging of land parcels. They do not know that they can participate in such projects and solve important issues from their point of view.

Project plans with “cheese holes”, “satellite” land parcels described earlier in this chapter shows that land owners (private and public) lack comprehensive information and knowledge about this land management process. The low involvement of authorities from various ministries (which provide only the planning conditions for the contractor and approval of the project) also demonstrates a lack of awareness. As land consolidation projects are managed by land surveyors, many institutions treat these projects as land reform plans where institutions participate in a passive manner – only providing checks as to whether their interests have been infringed. A normal situation is when the project planner meets specialists from the utilities and infrastructure companies only when the project plan has been developed and it must be approved. Poorly stated objectives by project participants confirm a lack of understanding as well. Such a situation shows the urgent need for changes. Geodesign, smart cities and smart communities concepts involve modern Information and Communication Technologies (ICT) for active interaction between all concerned parties and should be applied to the redevelopment of the countryside in applying land consolidation as well.

After the successful implementation of an LC project it can be expected that the value of the affected land will rise and it will attract investment, which will in turn, lead to further rises in value, all of which are good for the viability of the surrounding local environment. Successful projects work like beacons, attracting neighbours to start similar projects. Publicising individual success stories therefore becomes an important part of the process as a whole. One possible channel for public awareness could be a WebGIS portal enriched with interactive webmaps with land consolidation projects, best practice and success stories from implemented projects, which could be disseminated within Lithuania and beyond.

As public awareness is very important, it is very important that land management authorities from NLS and SLF should popularise such land development through local societies showing good examples from implemented projects. Such projects “speak” for themselves and are contagious. Promotional information about land consolidation projects have to be circulated to the public much more using mass media resources to involve the maximum number of participants from the top (i.e. authorities, municipalities) downwards (i.e. farmers, communities). The best example to present to the public is a comprehensive land consolidation project with all the stated measures implemented by the participants. When the land consolidation topic is sufficiently publicised than it is possible, that the initiation of new projects will be reversed to a bottom-up approach with comprehensive objectives.

7.3.5. Integration with other EU rural development support programmes

In order to assure sustainable rural redevelopment a comprehensive land consolidation model has to have close links to other EU RDP measures (i.e. afforestation, greening, eco farming, tourism, etc.). The author recommends that during the investigation of the project area at the “decision to start the project” stage, a zoning map of the potential area (i.e. cadastral area) be prepared, together with guidelines for activities having potential in the particular area which could

serve as a “development concept” for the rural occupants affected. Following such a “development concept” would ensure the timely distribution of various EU and national support measures. These concepts would also be of use to landowners, the LC project implementation team and support administrators. Such concepts should be prepared by the private consultants and approved by the NLS. The Ministry of Agriculture has to prepare EU financial support guidance in order to explain how to join land consolidation with other projects supported by other programmes for objectives realisation. Such guidance would assure the realisation of objectives for ongoing projects and which would be impossible to reach through land consolidation alone.

Landowners hoping for changes in their area could apply for the support for advisory services where private consultants could perform investigations of the actual situation, possible improvements, and could help to submit the application for project initiation. Such private consultants could represent, especially, the wishes of older farmers at all stages of the project.

A sensitive issue for the planners to consider (if not resolve), is that of the age structure of the existing landowners. The presence within a scheme of farmers who are nearing retirement age may inhibit the full realisation of the schemes dynamics. Not only is the time frame of their commitment going to be shorter than for younger farmers but the newly enlarged holdings may be more than they can physically manage. This would suggest that a scheme of assisted early retirement programmes should form a part of the LC development plan as well. Such an action could naturally fall within the duties of the State Land Fund, which could support the purchase of land from older landowners wishing to leave agricultural production and support prosperous family farms wishing to live and work in the countryside.

There are various ongoing projects affecting agriculture and rural redevelopment which are related with territorial (re-)development: melioration, local road network maintenance and traffic safety programs, development of alternative energy resources, environmental protection programs, etc. Through the

application of comprehensive (compulsory) land consolidation, it is possible to prepare background for complex area improvements, which could be realised by local government, community, LAG, etc., even when land consolidation is finished.

7.4. Chapter summary

- In this chapter, the variety of the most recent land consolidation models is reviewed together with their applicability, recent trends and the three core elements of LC, which is very important to consider when developing a framework for land consolidation.
- Furthermore, the author highlights elements, which are missing in the Lithuanian legal act regulating land consolidation in order to have comprehensive (compulsory) land consolidation.
- The author also considers the demand for the applicability of an instrument that offers the introduction of two models: compulsory and accelerated voluntary land consolidation. The complexity of procedures for each offered model is specified and the criteria (i.e. objectives, area size, etc.) to commence the project and which model to apply is described.
- All the most crucial improvements missing in allowing the achievement of sustainable redevelopment at the actual legislation stages are identified and described covering the institutional setup, capacity building, awareness raising and integration with other EU support programmes redeveloping rural areas.
- A flowing framework of a comprehensive (compulsory) land consolidation model has been developed which makes it possible to create sustainable rural areas in Lithuania and other CEE countries.

Chapter 8

Discussions and conclusions

8.1. Introduction

This chapter presents some overall conclusions from the conducted research study, indicating the research limitations that were encountered and highlighting the significance and originality of the research. This research provides a significant contribution to knowledge in the field of applied land consolidation, a proven land management instrument in WEC, in order to revitalise rural areas in Lithuania and other CEE countries facing land reform mistakes, land fragmentation, land abandonment, lack of infrastructure, solving land conflicts, improving the production and working conditions in agriculture and forestry, and the (re-) development of rural areas in general by developing a framework to achieve sustainable rural areas (re-)development through land consolidation.

An extensive literature review was undertaken in order to critically justify the chosen research area, and the subsequent research problem, which was that rural areas in CEEC are suffering from various problems mainly related to the structure of land ownership that hampers sustainable development. WEC having a powerful land management instrument (land consolidation) have shared their best practices, know-how and helped CEEC to adopt this effective instrument to achieve rural sustainability. Unfortunately the “*copy-paste*” approach is generally not possible as there are many factors (culture, history, legislation, political will, etc.) to consider. In view of this problem, the following research question was proposed:

How can LAND CONSOLIDATION, a popular land management instrument for many years applied in many Western European countries, be properly applied in rural areas of Lithuania and other Central and Eastern European countries

to ensure viable rural development, which aims to redevelop the countryside to be an attractive place for people to live and work in, now and in the future?

The research is aimed at the *investigation of land consolidation in Lithuania as an essential tool to achieve prosperous rural areas focused on the principles of sustainability. Through the evaluation and comparison of land consolidation examples within Europe, the study seeks to incorporate the best practice and to develop a framework for sustainable rural areas in Lithuania.*

The following objectives must be elaborated to achieve the proposed aim:

- 1. To identify the core problems that rural areas in Central and Eastern European countries face today (with the focus on sustainability).*
- 2. To analyse the prevalent land consolidation methodology used in Western European countries, to distinguish their advantages and disadvantages; to analyse the application of methods on the principles of sustainability for the development of prosperous rural areas.*
- 3. To analyse the Lithuanian existing land consolidation legislation model, national land consolidation strategy, and to measure how it fits into the land consolidation policy at local, national and European levels.*
- 4. To measure the effectiveness of the land consolidation projects through case studies of the recently implemented projects in Lithuania and to evaluate the land consolidation process in protecting and enhancing rural areas in Lithuania.*
- 5. According to the principles, methodology and experiences of the land consolidation process in European countries to develop a framework applicable and important for sustainable rural areas development in Lithuania and potentially in Central and Eastern European countries.*

8.2. Summary of conclusions

The stated aim and objectives were achieved in this thesis, thus answering the posed research question. The main conclusions of the research are presented below.

8.2.1. Conclusions from literature review

The literature review in this thesis focused on examining the actual situation in rural areas following the collapse of the Soviet regime in Central and Eastern European countries. It was noticed that the parcels that farmers received during land reform (the restitution process) are often too small and often badly shaped, for instance in their length to width ratio to survive in an increasingly competitive sector (Riddell & Rembold, 2000). Csaki (2000) observed that in the leading CEE countries, the reform process is close to completion. The literature review has demonstrated that following land reform in many CEE countries a real threat to the rural areas was experienced, including:

- the decline in the rural population;
- a high degree of land fragmentation and land abandonment;
- environmental degradation;
- an outward migration of the young to urban areas;
- a lack of infrastructure.

As was noticed from the literature review many rural areas of CEE countries are alarmed at the urgent need for a “second wave” of land reform – aimed at rationalizing rural space through land management tools such as the consolidation of fragmented parcels (FAO, 2004a). The greatest impetus for starting this process of solving problems in the countryside was the support of the EU for pre-accession countries (provided as a “buffer” for countries joining the EU in the expectation that they are obliged to follow the same directives as other member countries). Today all member states follow the EU Rural Development Policy, which is focused on the creation of sustainable rural areas in a multi-aspect manner. In most Western Europe countries (EU member states), land consolidation is an integrated

part of a broader rural development context and is often implemented with EU co-financing under the national rural development programme.

There are two main definitions of land consolidation in the literature, but land consolidation simply can be described as an instrument improving the production and working conditions in agriculture and forestry, and the (re-) development of rural areas in general, where the fundamental action of the land consolidation process is land readjustment, which could be implemented on a voluntary or compulsory basis (depending on country policy).

Many Western European experts have discussed the significance of land consolidation. Van Dijk (2007), in particular, highlights the expectations of land consolidation by the Food and Agriculture Organisation of the United Nations (FAO) who are preparing prototype legislation on land consolidation as a “blueprint” for Central European countries, drawn up in accordance with experts from the relevant countries from the West (Giovarelli & Bledsoe, 2001). As the demand for rural revitalization in CEEC still remains high, the introduction of successful and comprehensive land consolidation is very welcome with some caveats. Unfortunately, this powerful instrument sometimes still used in many CEECs in a very narrow sense, is mainly focused on economic concerns such as farms’ enlargement without taking into account the mitigation of climate change, environment protection measures, the creation of alternative employment, village renewal. It is important to consider the land as a nation’s most valuable resource and, in this respect, agriculture and rural areas will remain crucial today and will be in the future.

These findings have motivated the author to analyse the land consolidation methodologies of Western European countries to evaluate the land consolidation process in Lithuania (one of the CEE countries) and by incorporating the best WEC practices, develop a framework of comprehensive (compulsory) land consolidation for the sustainable rural development in Lithuania.

8.2.2. Conclusions from WEC land consolidation model analysis

An analysis of the literature has identified that land consolidation differs in various aspects from country-to-country. For example, it could be implemented using a “bottom-up” or “top down” approach, on a voluntary or compulsory basis (Thomas, 2006a; Thomas, 2006b), involving two land owners, a single village or even several cadastral regions, focusing only on the rearrangement of land parcels or the reworking of the entire rural infrastructure including environmental protection measures, etc. The recent trends across Western European countries have shown a clear indication that land consolidation has increasingly become an instrument of rural development in the wider context (FIG, 2004). The reason for such an FAO statement is that land consolidation in WEC is empowered by a well-established legal framework with clear goals, objectives, process workflow and responsibilities allowing the development of prosperous rural areas. In seeking to identify the best practices from the prevalent land consolidation methodology used in Western European countries the author has analysed the land consolidation process in six countries: Germany, France, Switzerland, Belgium, Finland and Cyprus. A comparative analysis of the selected countries was performed according to five criteria:

- Legal acts regulating the process, possible models, goals and objectives.
- Requirements in order to start the procedure.
- Main participating bodies in land consolidation.
- Land valuation methods.
- Financial issues of LC projects.

These selected criteria for comparative analysis following the literature review were found to be most important element of the entire process: from the beginning – until the implementation. The author accorded the comparative criteria at the first stage, which was the review of the legal acts of the respective countries. The task of translating the legal acts to English (where possible) was shared by local land consolidation experts and after the revision, the author sought advice from experts in order to clarify uncertainties in the peculiarities of the respective processes. It was identified that in all countries analysed there is a single land

consolidation methodology – the methodology of Western European countries, but with slight differences in the process existing through the influence of national (regional), traditional differences. Nevertheless in Germany, Belgium, and Switzerland there are generalized acts regulating the land consolidation process, although regions have the power to act in their own particular way. The countries analysed in this research, demonstrated well-formulated legislation (i.e. statutory measures) with clear objectives allowing sustainable targets to be reached (i.e. attitude to environmental measures), providing power to the rural community, a degree of synergy between the parties involved, and balanced financial mechanisms.

Finally, in analysing the situation in the WEC the author has made a short overview of the situation in England and why there is no land consolidation. It was observed that in England a very strong cultural element has evolved related to land ownership protected by laws that stretch back beyond the Anglo-Saxon period. However, in the literature review it was noted, for example, by Home (2007a; 2007b), that land readjustment (a core part of land consolidation) and land pooling could be an attractive alternative to existing approaches in Britain, especially for land assembly; in the cases where public funds for compulsory purchase and infrastructure provision are limited.

8.2.3. Conclusions from Lithuanian land consolidation analysis

The analysis of land consolidation in Lithuania described in Chapter 5 provides answers to the stated objectives 3 and 4.

The history of Lithuanian land consolidation has evolved since 2000 when the first pilot land consolidation projects started with the support of Danish experts who were training land managers. They explained the benefits of land consolidation to politicians and helped to prepare the legal base. Land consolidation regulations, as an amendment, appeared in the Law on Land in 2004. It is established in the law that land consolidation is totally voluntary and free of charge for landowners (they

are currently provided with EU support and also from the national budget). In order to start land consolidation there is a main requirement: there should be a minimum of 5 applicants, having a minimum 5 land parcels and the project area should be at least 100 ha. If this requirement is accepted, the land management authorities may start the analysis if an LC is feasible and useful. LC projects in Lithuania should be developed from the initiation until the implementation according to the resolution on “the Rules for Preparation and Implementation of Land Consolidation Projects” approved by the Government in 2005. Considering the FAO recommendations at the beginning of 2008, a National Land Consolidation Strategy was developed by the National Land Service under the Ministry of Agriculture and approved by the Government. Financial support will be provided and the land consolidation project will start only if the project area is expected to solve as many issues as possible (more than just agricultural) in that area. Lithuania has had little practice in dealing with land consolidation since only 4 pilot projects were the main basis for the development of the legal acts and capacity building, whilst 14 projects were implemented already having the first revision of legislation and 39 new projects are not yet complete. Despite the fact that Lithuania has sustainable development embedded within the LC definition, the process regulating the legal acts largely reflects the main components of voluntary land consolidation strategy copied from many WEC, although improvements are actually crucial at all stages in order to develop sustainable rural areas in Lithuania. The missing elements in the Lithuanian land consolidation framework are identified and improvements according to WEC analysis are offered at Chapter 7.

Lithuanian land consolidation weaknesses were identified by performing case studies with the landowners from within the implemented land consolidation project and also the municipal authorities. An analysis revealed that the majority of landowners, especially those having only a single land parcel in the project area, participated in the land consolidation project with a view to obtaining a free geodetic survey of their property. Project catalysts, mainly viable farmers, had higher expectations including the following: restructuring of the rural infrastructure; creation of a better road network; repairing drainage networks;

establishing new farmsteads; and developing energy infrastructures. An analysis of land consolidation projects that had been implemented showed that the participants assessed the implemented project as being better than 50% (more than half expectations were fulfilled). When analysing the municipal authorities' attitude to land consolidation, it was discovered that despite their lack of comprehensive information concerning LC, they have expectations that through land consolidation it is possible to improve the rural infrastructure (mainly local road and drainage networks). The findings of this analysis show that there is still quite a wide gap between aspiration and actuality as the public and majority of the private sector (both are beneficiaries in the projects) do not formulate common objectives in seeking to avoid the future degradation of rural areas.

8.2.4. Conclusions from the developed sustainable LC framework

Chapter 7 (with Chapter 6) presented a framework following the evaluation and comparison of land consolidation examples within selected WECs., This develops sustainable rural areas through land consolidation in Lithuania satisfying the aim of this thesis which was seeking to incorporate best practice and develop a framework for sustainable rural areas in Lithuania.

The development of the framework starts at Chapter 6, which described and identified the criteria presenting the potential areas for comprehensive land consolidation at different scales (municipal and project area) and developing a methodology based on applying MCDA methods to identify potential areas. The identification of potential areas is still significant especially when selecting pilot projects (widely applied by FAO experts) in CEE countries and influencing the bottom-up approach in WE countries (the author analysed the situation in the Netherlands and Finland).

In developing a sustainable LC framework, it is necessary to take into account the historical evolution, the psychology of the people, emotional bonds, and traditions related to the land whilst combining it with national social, economic,

environmental and political conditions. The author in drawing a sample land consolidation framework for the sustainable development of rural areas through land consolidation in Lithuania has developed two land consolidation models: Compulsory LC (for higher objectives) and Accelerated voluntary LC (for lower objectives). The sustainable development of rural areas development is achieved through the Compulsory (comprehensive) LC model, while through applying the Accelerated voluntary LC model landowners are able to perform quick structural changes without including sustainable rural development measures (i.e. infrastructure (re-)development, environmental conservation measures, etc.).

Chapters 5, 6 and 7 fulfil Objective 5 i.e.: the principles, methodology and experiences of the land consolidation process in European countries to develop a framework applicable and important for sustainable rural areas development in Lithuania and potentially in Central and Eastern European countries. In addition, this will be a significant contribution to the general theory and practice of land consolidation.

8.3. Beneficiaries of the developed framework

The Lithuanian land consolidation framework developed together with the research findings (principles, methodology and experiences) will be directly beneficial to a number of interested parties, nationally and internationally, which is mainly orientated towards the policy makers of CEE countries framing land policy, international consultants, land management authorities, and academia.

The experience revealed from the land consolidation projects implemented in Lithuania (Chapter 5) could work as *know-how* material where summarized success factors are provided, which is very important in implementing land consolidation projects. Such material has to be considered by local governments, land management authorities, consultants, land surveyors (project planners), land owners, all involved public authorities, etc. dealing with land consolidation projects; as well as international land consolidation experts (i.e. FAO experts)

starting pilot land consolidation projects and helping to develop the legal base for countries who have not yet introduced land consolidation.

The flexible methodology developed, based on identified criteria at different scales, indicates the potential for comprehensive land consolidation and through applying MCDA methods for the identification of potential areas, it could assist local governments and land management authorities arrive at fair allocation of EU support for the realisation of projects. Materials developed (webmaps showing the potential areas for comprehensive land consolidation) will assure transparency and influence bottom-up initiatives as consultants, landowners and all the involved public authorities will have access to the informative data.

The expectations of landowners and municipal specialists reveal expectations that highlight that at present in Lithuania, there is high demand for the introduction of two models in order to reach the stated objectives: comprehensive with measures of compulsion (especially those who want infrastructure and village renewal) and accelerated voluntary land consolidation (those who want quick cadastral measurements with some amalgamation and considered environmental issues). Finally, the process workflow describing the two land consolidation models and the missing policy elements should be considered by Lithuanian and international policy makers and land management authorities.

8.4. Research limitations and future work

During the study some research limitations were encountered that should be taken into account.

The author's analysis of legal acts regulating land consolidation in WE countries (Chapter 4) was unable to obtain all the actual revisions of the related legal acts translated into English. In particular, the author met difficulties in analysing the situation in France and Switzerland as there are no legal acts translated into English, apart from a few scientific publications (mainly from the proceedings of FIG conferences). In order to fill this gap, the author has contacted land

consolidation experts from all the countries analysed in order to verify unclear elements.

In performing the case study investigating the land consolidation situation in Lithuania (Chapter 5) the author was analysing the second stage of the land consolidation projects implemented as until the end of 2014 there were now new land consolidation projects implemented from the third stage. (Note: the author considers the first stage as the 4 pilot land consolidation projects implemented during 2000-2004, the second stage as the first 14 projects implemented during 2005-2008 directly after the legislation approval, and the third stage as new where 39 ongoing land consolidation projects were started 2012 and estimated to finish in the spring of 2015). Owing to time and financial constraints, the interviews of the participants (landowners) of the land consolidation project were conducted in a single land consolidation project area (Mažeikiai district, parts of the Židikai and Ukrinai cadastral areas). The research author was the land consolidation project manager in this project area and was already well known by the interviewed persons, which permitted honest and comprehensive answers during face-to-face interviews.

In identifying criteria that indicate the potential for comprehensive land consolidation at different scales (Chapter 6), the author used the Bristol Online Survey platform (provided by LJMU), which has a limited ranking function. Having such a function the author would be able to obtain experts' ranks for certain criteria (importance), but the author used other methods and calculated criteria importance according to spatial data. The time of the survey (summer) has been an influence since the author was unable to obtain answers equally from practitioners and scientists of each country. Other problems encountered includes the data for MC-SDSS analysis according to the identified criteria and for this reason the MCDA analysis was empirical – with simulated data on a fishnet grid of 16 cells and 16 points.

A further study could investigate in WEC the reasons for the revision of legal acts relating to land consolidation, the appearance of new process regulations which

were influenced by practical observations (best practice reflections from the projects). Interviewing lawyers together with land management authorities who know best the evolution of national land consolidation should be the basis of such a study. The findings could reveal very interesting parameters for international experts, which could influence adopting of best practices into their countries.

In future research, a measure of the land consolidation project participants' satisfaction should be taken into account through face-to-face interviews with land owners and all involved public authorities such as: foresters, road administration authorities, environmental and cultural heritage protection specialists, etc.

It is possible to make calculations of the potential for comprehensive land consolidation with other MCDA methods such as COPRAS, PROMETHEE, DEA and other methods. The final results and their sensitivity could be compared with each other.

8.5. Summary

The findings of this research are anticipated to have a positive effect on many interested parties from CEE countries that seek to ensure viable rural development. The findings of the research could encourage them to consider two land consolidation models: accelerated voluntary and compulsory (comprehensive) land consolidation. Compulsory land consolidation is able to redevelop the countryside in a sustainable manner to provide an attractive place for people to live and work, now and in the future. Accelerated voluntary land consolidation model is mainly focused on quick structural changes.

8.5.1. A significant contribution to knowledge

In particular, this thesis has created a significant contribution to new knowledge by:

- Providing a comparative analysis of land consolidation peculiarities in six selected Western European countries.

- Performing a detailed analysis and summarization of the evolution of Lithuanian land consolidation and of the legal acts regulating the land consolidation process.
- Comprehensively analysing one land consolidation project implemented in Lithuania where the weakest aspects of the legislation have been identified within the whole process.
- A qualitative analysis, comparing and summarizing the three groups involved in the land consolidation process in Lithuania for the first time: landowners, municipal authorities and land surveyors.
- Revealing significant criteria and developing a methodology, which supports land management authorities requiring identifying potential areas for comprehensive land consolidation.
- Developing a framework for compulsory land consolidation and providing proposals on how to improve the existing legislation and optimizing the process in order to reach sustainable rural areas development in Lithuania. Additionally, developing a framework of accelerated voluntary land consolidation, which is focused on rapid structural changes.

It is hoped that this thesis will be a subject worthy of discussion and provide innovations for international politicians and experts focusing on sustainable rural development theme, together with land management authorities and academia to adapt. Recent publications confirms that in CEE and other European countries (Latvia (Sproģe, 2014), Serbia (Pavlović, 2014), Macedonia (Georgievski, 2014), Ukraine (Kadomskiy & Zhovtonog, 2011), etc.) sustainable rural development through land consolidation is still a very important topic and there are many things to learn from WEC in which many innovations are constantly applied and this is the reason why future studies should keep the course to this subject.

Published scientific papers related to the PhD thesis

Scientific papers at peer reviewed academic journals

Pašakarnis, G., Morley, D. and Malienė, V. (2013) Factors Influencing Land Consolidation Success: Lessons Learned in Lithuania. In: Hepperle, E., Dixon-Gough, R., Maliene, V., Mansberger, R., Paulsson, J. and Pödör, A. (eds.) *Land Management: Potential, Problems and Stumbling Blocks*, Zürich, Switzerland: Vdf Hochschulverlag, pp. 121-131.

Pašakarnis, G., Morley, D. and Malienė, V. (2013) Rural development and challenges establishing sustainable land use in Eastern European countries. *Land Use Policy*, Vol. 30 (1), p.p. 703-710.

Pašakarnis, G. and Malienė, V. (2010) Towards sustainable rural development in Central and Eastern Europe: Applying land consolidation. *Land Use Policy*, Vol. 27, (2), p.p. 545-549.

Scientific papers at peer reviewed conference proceedings

Pašakarnis, G. and Maliene, V. (2011) Land consolidation in Lithuania: Aspiration and actuality. In *Proceedings: 8th International Conference on Environmental Engineering*, 19–20 May, Lithuania: VGTU Press Technika, pp. 1424-1431.

Pašakarnis, G. and Maliene, V. (2009) Land Readjustment for Sustainable Rural Development. In *Proceedings: EURO Mini Conference 5th International Vilnius Conference on Sustainable Development "Knowledge-Based Technologies and OR methodologies for Strategic Decisions of Sustainable Development"*, September 30 - October 3, Lithuania: VGTU Press Technika, pp. 169-174

References

- Ayten, T., Akkus, S., Cagla, H., Basciftci, F. & Yilmaz, S.A. (2008) Problems occurred from block planning and the lack of coordination between the institutions in land consolidation projects. In: *FIG Working Week 2008 Integrating Generations*. Stockholm.
- Anon (2009) Appendix 4 assessment of instruments. , p.81. Available from: <<http://www.belspo.be/belspo/ssd/science/Reports/Appendix 4.pdf>> [Accessed 2 March 2013].
- Anon (1992) *Constitution of the Republic of Lithuania*. Lithuania. Available from: <<http://www3.lrs.lt/home/Konstitucija/Constitution.htm>>.
- Anon (1999) *Federal Constitution of the Swiss Confederation*. Switzerland.
- Anon (1978) *Law of 22 July 1970 on the comprehensive land consolidation of rural properties pursuant to the law as supplemented by the Law of 1 August 1978 (English translation)*. Belgium.
- Anon (2008) Sharing the experience from first implemented land consolidation projects.
- Anon (2013) *Swiss Civil Code*. Switzerland. Available from: <<http://www.admin.ch/ch/e/rs/2/210.en.pdf>>.
- Antoine, J., J. Dent, F., Sims, D. & Brinkman, R. (1998) Agro-ecological zones and Resource Management Domains (RMDs) in relation to land use planning. In: E. Beinat & P. Nijkamp eds. *Multicriteria analysis for land-use management*. Springer Science & Business Media, pp.311–331.
- Antucheviciene, J. & Zavadskas, E.K. (2008) Modelling multidimensional redevelopment of derelict buildings. *International Journal of Environment and Pollution*, 35, pp.331–344.

- Arborino, T. (2008) 3rd River Rhone Training Project: Objectives, Solutions and Spatial Development. In: *INTERPRAEVENT 2008*. Dornbirn, International Research Society INTERPRAEVENT, pp.41–50. Available from: <http://www.interpraevent.at/palm-cms/upload_files/Publikationen/Tagungsbeitraege/2008_1_41.pdf>.
- ArgeFlurb (1995) *Flurbereinigungsgesetz. Land consolidation act (Federal Republic of Germany)*.
- Ascough, J.C.I., Rector, H.D., Hoag, D.L., McMaster, G.S., Vandenberg, B.C., Shaffer, M.J., Weltz, M.A. & Ahjua, L.R. (2002) Multicriteria Spatial Decision Support Systems: Overview, Applications, and Future Research Directions. In: *Integrated Assessment and Decision Support Proceedings of the 1st Biennial Meeting of the IEMs*. Lugano, Switzerland, pp.175–180.
- Backman, M. (2010) Cost-benefit analysis of Land Consolidation in Sweden from the viewpoint of society and a land owner. In: *FIG Congress 2010. Facing the Challenges – Building the Capacity*. Sydney, Australia, pp.1–15.
- Backman, M. (2002) Rural Development by Land Consolidation in Sweden. In: *FIG XXII International Congress*. Washington, D.C.
- Backman, M. & Österberg, T. (2004) Land Consolidation in Sweden. In: *FIG Commission VII-Symposium*. Volvic (Clermont-Ferrand), France, pp.1–13.
- Beckmann, A. & Dissing, H. (2004) EU Enlargement and Sustainable Rural Development in Central and Eastern Europe. *Environmental Politics*, 13, pp.135–152.
- Beinat, E. (1997) *Value Functions for Environmental Management*. Environmen. Springer-Science+Business Media, B.V.
- Beinat, E. & Nijkamp, P. (1998) *Multicriteria analysis for land-use management*. E. Beinat & P. Nijkamp eds. Springer Science & Business Media.

- Bideleux, R. & Jeffries, I. (1998) *A History of Eastern Europe: Crisis and Change*. 1 edition. London, Routledge.
- Binns, B. (1950) *Consolidation of Fragmented Agricultural Holdings*. Rome, FAO.
- Bollinger, A. (2010) From Land-Consolidation to Rural Development Projects in Switzerland. In: *FIG Congress 2010. Facing the Challenges – Building the Capacity*. Sydney, Australia, pp.1–5.
- Van Den Brink, A. (2009) From land consolidation to area development in the Netherlands. In: E. Hepperle & H. Lenk eds. *Land Development Strategies: Patterns, Risks, and Responsibilities*. European Faculty of Land Use and Development, pp.47–60.
- Bryman, A. (2008) *Social Research Methods*. Third Edit. Oxford. Available from: <<http://books.google.co.uk/books?id=Pf4dPwAACA AJ>>.
- Bullard, R.K. (2007) *Land Consolidation and Rural Development*. Ashgate Publishing Company. Available from: <<http://www.anglia.ac.uk/ruskin/en/home/faculties/alss/deps/law/staff0/home.Maincontent.0017.file.tmp/No.10-LandConsolidation.pdf>>.
- Burel, F. & Baudry, J. (1995) Social, aesthetic and ecological aspects of hedgerows in rural landscapes as a framework for greenways. *Landscape and Urban Planning*, 33 (1-3), pp.327–340. Available from: <<http://www.sciencedirect.com/science/article/pii/016920469402026C>>.
- Busch, G. (2006) Future European agricultural landscapes - What can we learn from existing quantitative land use scenario studies? *Agriculture, Ecosystems and Environment*, 114, pp.121–140.
- Celen, G. (2007) Challenges for Land Development in Flanders. In: *UNECE WPLA Workshop*. Munich, Germany, pp.1–7.
- Charmaz, K. (2006) *Constructing grounded theory: a practical guide through qualitative analysis*. SAGE Publications.

- Cohen, L., Manion, L. & Morrison, K. (2007) *Research Methods in Education*. Sixth edit. Routledge. Taylor & Francis Group. Available from: <http://www.tandfonline.com/doi/abs/10.1111/j.1467-8527.2007.00388_4.x>.
- Commission of the European Communities (2002) *Enlargement and agriculture: Successfully integrating the new Member States into the CAP*. Brussels. Available from: <http://ec.europa.eu/agriculture/cap-history/2003-reform/sec2002-95_en.pdf>.
- Commission of the European Communities (2007) *Rural Development in the European Union: Statistical and Economic Information Report 2007*.
- Connellan, O. (2002) Land Assembly for Development – The Role of Land Pooling, Land Re-adjustment and Land Consolidation. In: *FIG XXII International Congress*. Washington, D.C., pp.1–13. Available from: <http://www.fig.net/pub/fig_2002/ts9-1/ts9_1_connellan.pdf>.
- Council of Europe (1996) *RECOMMENDATION 1296 on a European Charter for Rural Areas*. Available from: <<http://assembly.coe.int/Main.asp?link=/Documents/AdoptedText/ta96/EREC1296.htm>>.
- Csaki, Csaba (2000) Agricultural reforms in Central and Eastern Europe and the former Soviet Union Status and perspectives. *Agricultural Economics*, 22, pp.37–54.
- Daniliauskas, R. (2013) Development of agriculture in Sintautai area in the 20th century. Lietuvos Valsčiai. Sintautai. *Lithuanian Local Researches*, pp.1–118.
- Danish Ministry of Food Agriculture and Fisheries (2002) *Land Consolidation Pilot Project, Dotnuva Area, Lithuania. FINAL REPORT*.
- Danish Ministry of Food Agriculture and Fisheries (2004) *Land consolidation: a tool for sustainable rural development. Final report*.

- Daugalienė, V. (2004) Preparation for Land Consolidation in Lithuania. In: *Symposium on Modern Land Consolidation*. Volvic (Clermont-Ferrand), France, pp.1–12. Available from: <http://www.fig.net/commission7/france_2004/papers_symp/ts_04_daugalienė.pdf>.
- Davis, J. (2006) Rural non-farm livelihoods in transition economies: emerging issues and policies. *electronic Journal of Agricultural and Development Economics (eJADE)*, 3 (2), pp.180–224.
- Deininger, K., Sarris, A. & Savastano, S. (2004) Rural land markets in transition: evidence from six Eastern European Countries. *Quarterly Journal of International Agriculture*, 43, pp.361–390.
- Demetriou, D. (2012) The Development of an Integrated Planning and Decision Support System (IPDSS) for Land Consolidation. University of Leeds.
- Derlich, F. (2002) Land Consolidation: A Key for Sustainable Development – French Experience. In: *FIG XXII International Congress*. Washington, D.C., pp.1–8.
- Van Dijk, T. (2007) Complications for traditional land consolidation in Central Europe. *Geoforum*, 38, pp.505–511.
- Van Dijk, T. (2003a) *Dealing with Central European Land Fragmentation: A Critical Assessment on the Use of Western instruments*. Eburon, Delft.
- Van Dijk, T. (2002) Export of planning knowledge needs comparative analysis: the case of applying Western land consolidation knowledge in Central Europe. *European Planning Studies*, 7, pp.913–924.
- Van Dijk, T. (2003b) Scenarios of Central European land fragmentation. *Land Use Policy*, 20 (2), pp.149–158.
- Van Dijk, T. (2005) The dangers of transplanting planning instruments: the case of land fragmentation in Central Europe. *European Journal of Spatial Development*, 16, pp.1–39. Available from: <<http://www.nordregio.se/EJSD/>>.

- Van Dijk, T. (2004) Wanted: alternatives for program-driven land consolidation. In: *Symposium on Modern Land Consolidation*. Volvic (Clermont-Ferrand).
- Dixon-Gough, R. & Hunt, G. (2007) *The Real Property and General Boundary System of England and Wales*. J. Zevenbergen, A. Frank, & E. Stubkjaer eds. Delft, IOS Press. Available from: <http://repository.tudelft.nl/assets/uuid:ce45bcf6-2cc8-46a3-9305-8526df914887/OTB2007_ZEV_web.pdf>.
- Doebele, W.A. (1982) *Land Readjustment: A Different Approach to Financing Urbanization*. Lexington Books.
- Dwyer, J., Baldock, D., Beaufoy, G., Bennett, H., Lowe, P. & Ward, N. (2002) *Europe's Rural Futures: The Nature of Rural Development II, Rural Development in an Enlarging European Union*. Available from: <<http://www.ieep.eu/assets/135/ERFRevised.pdf>>.
- Epinat, M. (2007) Land Consolidation Projects in France – are property rights preserved and guaranteed? In: *The workshop on Effective and Sustainable Land Management. UNECE-WPLA*. Munich, Germany, pp.1–18.
- EU Cork Conference on Rural Development (1996) *The Cork Declaration - A living countryside*. Cork, Ireland. Available from: <http://ec.europa.eu/agriculture/rur/cork_en.htm>.
- European Commission (2010a) *Commission staff working document. Lisbon Strategy evaluation document*. Brussels. Available from: <http://ec.europa.eu/archives/growthandjobs_2009/pdf/lisbon_strategy_evaluation_en.pdf>.
- European Commission (2007) *Development plan for rural areas of Brandenburg/Berlin, 2007-13*. Germany. Available from: <http://www.eler.brandenburg.de/sixcms/media.php/4055/eplr_eng.pdf>.
- European Commission (2013a) EU Framework [Internet]. Available from: <<http://enrd.ec.europa.eu/policy-in-action/rural-development-policy>>.

overview/eu-framework/en/eu-framework_en.cfm> [Accessed 10 March 2013].

European Commission (2010b) *EUROPE 2020*. Available from: <<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>>.

European Commission (2013b) History of the CAP [Internet]. Available from: <http://ec.europa.eu/agriculture/cap-history/index_en.htm> [Accessed 10 February 2013].

European Commission (2005) *Lisbon Strategy - putting rural development to work for jobs and growth*. Brussels. Available from: <http://europa.eu.int/comm/agriculture/publi/newsletter/lisbon/special_en.pdf>.

European Commission (2013c) Policy Overview 2014-2020 [Internet]. Available from: <http://enrd.ec.europa.eu/policy-in-action/cap-towards-2020/rdp-programming-2014-2020/policy-overview/en/policy-overview_en.cfm> [Accessed 10 March 2013].

European Commission (2006) *The EU Rural Development Policy 2007-2013*. Luxemburg.

European Ministers responsible for Regional Planning (1983) *European regional / spatial planning Charter (Torremolinos Charter)*. Torremolinos. Available from: <http://www.coe.int/t/dg4/cultureheritage/heritage/cemat/versioncharte/Charte_bil.pdf>.

European Union (2011) *A short guide to the European Commission's proposals for EU rural development after 2013*.

Eurostat (2005) *Farm Structure Survey*.

Fairlie, S. (2009) *A Short History of Enclosure in Britain* [Internet]. Available from: <<http://www.thelandmagazine.org.uk/articles/short-history-enclosure-britain>> [Accessed 10 August 2013].

FAO (2009) *1st FARLAND International Workshop 'How To Revitalise Farming And Agricultural Land Use? European Options For The Future' (DRAFT)*. Oeiras, Portugal. Available from: <http://www.fao.org/fileadmin/user_upload/Europe/documents/Events_2011/LCLB_2011/DraftReport.pdf>.

FAO (2003) *FAO LAND TENURE STUDIES 6. The Design of Land Consolidation Pilot Projects in Central and Eastern Europe*. Rome. Available from: <<ftp://ftp.fao.org/docrep/fao/006/Y4954E/Y4954E00.pdf>>.

FAO FAOLEX [Internet]. Available from: <<http://faolex.fao.org/faolex/index.htm>>.

FAO (1997) *Integrated approach to the planning and management of land resources* [Internet]. Available from: <<http://www.fao.org/sd/epdirect/Epre0029.htm>>.

FAO (2004a) *International workshop. Land banking/Land Funds as an instrument for improved land management for CEEC and CIS*. Tonder, FAO.

FAO (2004b) *International workshop. Land banking/Land Funds: Elements for Land Consolidation, Land Management and Rural Development*. Tonder.

FAO (2004c) *Operations manual for land consolidation pilot projects in Central and Eastern Europe. FAO Land tenure manuals 1*. Rome.

FAO (2012) *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security*. Rome. Available from: <<http://www.fao.org/docrep/016/i2801e/i2801e.pdf>>.

Farland (2006) *Study tour report Flanders*.

Fernandez, C.Z. & Eberlin, R. (2010) Galicia (Spain): BanTeGal: Main successes and difficulties after 3 years of working. In: *Regional workshop on land tenure and land consolidation, land banking and public land management*. Prague.

Available from:

<http://www.fao.org/fileadmin/user_upload/Europe/documents/Events_2010/>.

FIG (2004) Proceedings of the Symposium. In: *Modern Land Consolidation (Amenagement Foncier Moderne)*. Volvic (Clermont-Ferrand), France.

Available from:

<http://www.fig.net/commission7/france_2004/program_symposium.htm>.

Finnish Ministry of Agriculture and Forestry (1995) *Real Estate Formation Act*. Finland.

Fishburn, P.C. (1967) *Additive Utilities with Incomplete Product Set: Applications to Priorities and Assignments*. Baltimore, U.S.A.

Gatzweiler, F.W., Judis, R. & Hagedorn, K. (2002) *Sustainable Agriculture in Central and Eastern European Countries: The Environmental Effects of Transition and Needs for Change*. Aachen, Shaker Verlag.

Georgievski, K. (2014) On-going preparation of a land consolidation program in Macedonia. , p.8. Available from:

<http://www.fao.org/fileadmin/user_upload/Europe/documents/Events_2014/4LandNet/1_2_2_Land_Consolidation_Macedonia_Kiril_Georgievski.pdf> [Accessed 20 December 2014].

GERAR (Syndicat National Des Geometres Experts Amenageurs Ruraux) (2013) 70 years of land development in France: Principles, methods and development, compared to other experiences in Europe and worldwide. In: *International Symposium. '70 years of land development in France: Principles, methods and development, compared to other experiences in Europe and worldwide'*. Lyon, p.116.

German Foundation for International Development (1998) *Land Tenure and Policy Issues in Land Use Planning with special reference to Southern and Eastern Africa*. In: M. Kirk, U. Löffler, & T. Petermann eds. *Proceedings of the International Seminar on Land Tenure and Policy Issues in Land Use Planning*. Berlin, Food and Agriculture Development Centre (ZEL), p.143. Available from: <<https://www.mpl.ird.fr/crea/taller-colombia/FAO/AGLL/pdfdocs/dse-ten.pdf>>.

Giannerini, G., Laniado, E. & Stagni, G. (1998) Assessment, evaluation and allocation of funds to infrastructure projects: the case of the road network in Lombardy (Italy). In: E. Beinart & P. Nijkamp eds. *Multicriteria analysis for land-use management*. Springer Science & Business Media, pp.95–113.

Giovarelli, R. & Bledsoe, D. (2001) *Land Reform in Eastern Europe*. Seattle.

Goodchild, M.F. & Kemp, K.K. (1990) *NCGIA Core Curriculum in GIS*. M. F. Goodchild & K. K. Kemp eds. Santa Barbara CA, National Center for Geographic Information and Analysis, University of California. Available from: <<http://www.geog.ubc.ca/courses/klink/gis.notes/ncgia/toc.html#UNIT57>>.

Government of the Republic of Lithuania (2008) *Resolution on National Land Consolidation Strategy approval*. Lithuania. Available from: <http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=380525&p_query=&p_tr2=2>.

Government of the Republic of Lithuania (2013) *Resolution on the approval of the rules of preparation and implementation of land consolidation projects*. Lithuania. Available from: <http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=448760>.

Government of the Republic of Lithuania (2001) *The resolution for negotiating position of the Republic of Lithuania in negotiations for membership in the European Union approval*. Lithuania. Available from: <<http://tar.tic.lt/Default.aspx?id=2&item=results&aktoid=C3DA1DCF-4AC8-4283-8445-5165A3987F8C>>.

- Graefen, C. (2002) Land reform and land fragmentation and consequences for rural development in CEE/CIS countries. In: *Land registration and spatial planning in transition countries*. Wageningen.
- Guitouni, A. & Martel, J.-M. (1998) Tentative guidelines to help choosing an appropriate MCDA method. *European Journal of Operational Research*, 109, pp.501–521.
- Gulinck, H. & Wagendorp, T. (2002) References for fragmentation analysis of the rural matrix in cultural landscapes. *Landscape and Urban Planning*, 58, pp.137–146.
- Hayashi, K. (2000) Land readjustment in international perspectives: applicability and constraints of technology transfer in urban restructure. In: EAROPH, pp.1–21. Available from: <<http://www.earoph.info/pdf/2000papers/31.pdf>>.
- Haldrup, N.O. & Hartvigsen, M. (2005) Getting Land Consolidation Pilot Projects going. In: *Territorial organization and land consolidation in the EU: The way ahead*. Prague, p.11. Available from: <http://www.fao.org/fileadmin/user_upload/Europe/documents/Events_2005/Land2005/Denmark.pdf>.
- Hartman, G. (1997) Dollars, diplomacy, and dignity: United States economic involvement in Lithuania, 1914–1940. *Journal of Baltic Studies*, 28 (2), pp.153–170.
- Hartvigsen, M. (2014) Integrated Voluntary Land Consolidation – A third land consolidation model for Central and Eastern Europe? , p.6. Available from: <http://www.fao.org/fileadmin/user_upload/Europe/documents/Events_2014/4LandNet/2_7_1_Integrated_voluntary_land_consolidation_Morten_Hartvigsen.pdf>.
- Hartvigsen, M. (2006) Land Consolidation in Central and Eastern European Countries. In: *XXIII FIG Congress*. Munich, Germany.

- Hartvigsen, M. (2005) Land Consolidation Pilot Projects in Eastern Europe. In: *International land consolidation conference*. Budapest.
- Hiironen, J. & Konttinen, K. (2013) Land Consolidations for Environmental Development in Finland. In: *70 ans d'aménagement foncier en France: Principes, méthodes et évolution, comparaison avec d'autres expériences en Europe et dans le monde*. Lyon, France, pp.101–103.
- Hiironen, J., Mattila, P., Lähti, M., Oja, H., Katajamäki, M., Tanskanen, H., Konttinen, K. & Penttilä, L. (2010) Renewing the evaluation of land consolidation effects. In: *FIG Congress 2010. Facing the Challenges – Building the Capacity*. Sydney, Australia, pp.1–13.
- Home, R.K. (2009) Land ownership in the United Kingdom: Trends, preferences and future challenges. *Land Use Policy*, 26, pp.103–108.
- Home, R.K. (2007a) *Land readjustment as a global land tool: Focus on the Middle East*. London.
- Home, R.K. (2007b) Land readjustment as a method of development land assembly: A comparative overview. *Town Planning Review*, 78 (4), pp.459–483.
- Hoogeveen, A. & van Lier, H. (1999) *CIGR Handbook of Agricultural Engineering. Volume I Land and Water Engineering*. the American Society of Agricultural Engineers.
- Van Huylenbroeck, G., Coelho, J.C. & Pinto, P.A. (1996) Evaluation Of Land Consolidation Projects (LCPs): A Multidisciplinary Approach. *Journal of Rural Studies*, 12, pp.297–310.
- Ishizaka, A. & Nemery, P. (2013) *Multi-criteria Decision Analysis: Methods and Software*. John Wiley & Sons, Ltd.
- Jacoby, H.E. (1959) *Land consolidation in Europe*. 3rd editio. Wageningen, The Netherlands, H. Veenman & Zones N.V.

- Jagt, P.D. van der, Holst, F. van, Thomas, J., Brink, A. van den, Reyniers, J., Jongeneelen, O., Dijk, T. van, Timmermans, W., Daugaliene, V., Crecente, R., Ambar, M. & Flachner, Z. (2007) *Far land near future*. Budapest, 4C.
- Kadaster (2011) Verkavelingsbarometer. , p.1.
- Kadomskiy, A. & Zhovtonog, O. (2011) Land reform process in Ukraine. , p.8.
Available from:
<http://www.fao.org/fileadmin/user_upload/Europe/documents/Events_2011/LCLB_2011/Agenda_en.pdf> [Accessed 20 December 2014].
- Der Kantonsrat des Kantons Schwyz (1989) *Verordnung über die Landumlegung und die Grenzbereinigung*. Switzerland. Available from:
<http://www.sz.ch/documents/400_210.pdf>.
- Karaczun, Z.M. (2003) The future of CAP in enlarged Europe – from Polish perspective. In: *Future of CAP in Enlarged Europe. International Conference*. Krakow.
- Keeney, R.L. & Raiffa, H. (1976) *Decisions with multiple objectives: Preferences and value tradeoffs*. New York, Wiley.
- King, R. & Burton, S. (1983) Structural changes in agriculture: the geography of land consolidation. *Progress in Human Geography*, 7 (5), pp.471–501.
- Konttinen, K. (2007) Land Consolidation in Finland - a farmer driven project with many goals. In: *UNECE WPLA Workshop*. Munich, Germany, p.9.
- Kučas, A. (2010) Location prioritization by means of multicriteria spatial decision support systems: A case study of forest fragmentation based ranking of forest administrative areas. *Journal of Environmental Engineering and Landscape Management*, 18 (4), pp.312–320.
- Land Consolidation Department (1993) *Land Consolidation in Cyprus*. Nicosia, Cyprus, Press and Information Office, Republic of Cyprus.

- Larsson, G. (1993) *Land readjustment: A modern approach to urbanization*. Avery, Aldershot.
- Lerman, Z. (2004) Policies and Institutions for Commercialization of Subsistence Farms in Transition Countries. *Journal of Asian Economics*, 15, pp.461–479.
- Lerman, Z. & Cimpoieş, D. (2006) Land consolidation as a factor for rural development in Moldova. *Europe-Asia Studies*, 58 (3), pp.439–455.
- Lerman, Z. & Shagaida, N. (2007) Land policies and agricultural land markets in Russia. *Land Use Policy*, 24 (1), pp.14–23.
- Liepienė, N. (2006) *Bendroji žemės ūkio politika (The Common Agricultural Policy)*. Vilnius.
- Lisec, A., Cerjak, M. & Pintar, M. (2005) The influence of the land consolidation on the ecological elements in the rural landscape. In: *The 6th International conference 'Environmental Engineering'*. Vilnius.
- Lithuanian Institute of Agrarian Economics (LIAE) (2011a) *Abandoned Land: Problems and Solutions. Scientific Study*. Vilnius. Available from: <http://www.laei.lt/x_file_download.php?pid=1046>.
- Lithuanian Institute of Agrarian Economics (LIAE) (2011b) *The Tendencies of Rural Development in Lithuania. Scientific Study*. Vilnius. Available from: <http://www.laei.lt/x_file_download.php?pid=1102>.
- Louwsma, M., van Beek, M. & Hoes, B. (2014) A New Approach: Participatory Land Consolidation. In: *FIG Congress 2014. Engaging the Challenges - Enhancing the Relevance*. Kuala Lumpur, pp.1–10.
- Maanmittauslaitos (National Land Survey of Finland) (2013) *Peltoalueiden tilusrakenne ja sen parantamismahdollisuudet*.
- Magel, H. (2008) New priorities in rural development for achieving food security and poverty reduction.

- Magocsi, P.R. (1996) *A History of the Ukraine*. University of Washington Press.
- Malczewski, J. (1999) *GIS and Multicriteria Decision Analysis*. John Wiley & Sons.
- Malienė, V., Cibulskiene, D. & Gurskiene, V. (2005) The Lithuanian real estate taxation system in the context of alien countries. *International Journal of Strategic Property Management*, 9, pp.17–32.
- Maliene, V., Howe, J. & Malys, N. (2008) Sustainable communities: affordable housing and socio-economic relations. *Local economy*, (23), pp.267–276.
- Malienė, V. & Malys, N. (2008) Sustainable housing – part of a healthy and attractive community. In: *The CIB W070 Conference in Facilities Management*. Edinburgh, Heriot Watt University, pp.343–350.
- Maliene, V. & Weis, E. (2004) *Flurbereinigung in der Bundesrepublik Deutschland*. Vilnius, Technika.
- Marczyk, G., DeMatteo, D. & Festinger, D. (2005) *Essentials of Research Design and Methodology*. John Wiley & Sons, Inc.
- Markuszczyńska, I. (2013) Land consolidation as an instrument of shaping the agrarian structure in Poland: a case study of the Wielkopolskie and Dolnośląskie voivodeships. *Quaestiones geographicae*, 32 (3), pp.53–67. Available from: <http://geoinfo.amu.edu.pl/qg/current/QG323_053-067.pdf>.
- Meuser, F.-J. (1992) No Title. In: *Europäische Fachtagung Flurbereinigung im Jahre 1988 – Analyse der Ergebnisse*. München, Technische Universität München, p.195.
- Ministry of Agriculture of the Republic of Lithuania (2009) Žemės konsolidacija: vartai į rytdienos kaimą (Land consolidation: the gateway to the village of tomorrow). , p.20. Available from: <<http://www.zum.lt/documents/leidiniai/5.pdf>>.

- Morel, B. (2003) A French Experience in Land Consolidation. In: *FIG Working Week*. Paris, pp.1–17.
- Mulliner, E. (2013) A Complex Model for the Assessment of Sustainable Housing Affordability. Liverpool John Moores University.
- Munda, G., Parruccini, M. & Rossi, G. (1998) Multicriteria evaluation methods in renewable resource management: integrated water management under drought conditions. In: E. Beinart & P. Nijkamp eds. *Multicriteria analysis for land-use management*. Springer Science & Business Media, pp.79–93.
- National Land Service under the Ministry of Agriculture of the Republic of Lithuania (NLS) (2013) Land restitution in rural areas is about 99 per cents [Internet]. Available from: <<http://www.nzt.lt/go.php/lit/Zemes-grazinimas-kaimo-vietovese-siekia-apie-99-proc/79>>.
- National Land Service under the Ministry of Agriculture of the Republic of Lithuania (NLS) (2004) *National Land Service under the Ministry of Agriculture*. Vilnius.
- Office for National Statistics (2011) *Population Trends. No. 145 Autumn 2011*. Available from: <<http://www.ons.gov.uk/ons/rel/population-trends-rd/population-trends/no--145--autumn-2011/jrd-population-trends-145.pdf>>.
- Office of the Law Commissioner (2010) *The Consolidation and Reallocation of Agricultural Land Laws 1969 to 2003 (English translation and consolidation)*. Cyprus.
- Ossko, A. & Sonnenberg, J.K.. (2002) Rural Land Markets in Central and Western Europe. In: *FIG XXII International Congress*. Washington, D.C.
- Pahl-Weber, E. & Henckel, D. eds. (2008) *The Planning System and Planning Terms in Germany. A Glossary*. Hanover, Academy for Spatial Research and Planning. Available from: <http://shop.arl-net.de/media/direct/pdf/ssd_7.pdf>.

- Palma, J., Graves, A.R., Burgess, P.J., Van Der Werf, W. & Herzog, F. (2007) Integrating environmental and economic performance to assess modern silvoarable agroforestry in Europe. *Ecological Economics*, 63 (4), pp.759–767.
- Palmer, D. (2008) FAO's Experiences with Land Consolidation in Central and Eastern Europe. In: *the 43rd Croatian and 3rd International Symposium on Agriculture*.
- Palmer, D., Munro-Faure, P. & Rembold, F. (2003) Land consolidation and rural development in Central and Eastern Europe. Available from: <[http://www.eurocadastre.org/pdf/Palmer abstract.pdf](http://www.eurocadastre.org/pdf/Palmer_abstract.pdf)>.
- Parliament of the United Kingdom (2013) Managing and owning the landscape. Overview [Internet]. Available from: <<http://www.parliament.uk/about/living-heritage/transformingsociety/towncountry/landscape/overview/>> [Accessed 10 August 2013].
- Parliament of the United Kingdom (2004) *Planning and Compulsory Purchase Act 2004*. UK. Available from: <http://www.legislation.gov.uk/ukpga/2004/5/pdfs/ukpga_20040005_en.pdf>.
- Pašakarnienė, I. (2013) Road infrastructure facilities development and rearrangement implementing land consolidation projects. Vilnius Gediminas Technical University. Available from: <http://vddb.library.lt/fedora/get/LT-eLABa-0001:E.02~2013~D_20130618_144613-67043/DS.005.0.01.ETD>.
- Pašakarnis, G. & Maliene, V. (2010) Towards sustainable rural development in Central and Eastern Europe: Applying land consolidation. *Land Use Policy*, 27 (2), pp.545–549.
- Pašakarnis, G. & Maliene, V. (2011) Land consolidation in Lithuania: Aspiration and actuality. In: D. Čygas & K. D. Froehner eds. *The 8th International Conference*

Environmental Engineering, 8th ICEE, selected papers. Vilnius, Technika, pp.1424–1431.

Pašakarnis, G. & Malienė, V. (2009) Land readjustment for sustainable rural development. In: M. Grasserbauer, L. Sakalauskas, & E. K. Zavadskas eds. *Knowledge-based technologies and OR methodologies for strategic decisions of sustainable development. 5th International Vilnius Conference – EURO Mini Conference.* Vilnius, Technika, pp.169–174.

Pašakarnis, G., Morley, D. & Malienė, V. (2013a) Factors Influencing Land Consolidation Success: Lessons Learned in Lithuania. In: E. Hepperle, R. Dixon-Gough, V. Malienė, R. Mansberger, J. Paulsson, & A. Pödör eds. *1st International and Interdisciplinary Symposium 'Sustainability: Focus on Urban and Peri-Urban Development'.* Liverpool, vdf Hochschulverlag, pp.121–131. Available from: <www.vdf.ethz.ch>.

Pašakarnis, G., Morley, D. & Malienė, V. (2013b) Rural development and challenges establishing sustainable land use in Eastern European countries. *Land Use Policy*, 30 (1), pp.703–710. Available from: <<http://www.sciencedirect.com/science/article/pii/S026483771200097X>>.

Pavlović, T. (2014) The importance of Land Consolidation in Serbia. , p.3. Available from: <http://www.fao.org/fileadmin/user_upload/Europe/documents/Events_2014/4LandNet/2_5_3_The_importance_of_land_consolidation_in_Serbia_Tomislav_Pavlovic.pdf> [Accessed 20 December 2014].

Pereira, S., Thomson, K. & Dwyer, J. (2008) *Assessing the Impact of Rural Development Policies (RuDI). Priorities in rural development policies. Country profiles on rural characteristics. France.*

Podvezko, V. (2011) The Comparative Analysis of MCDA Methods SAW and COPRAS. *Engineering Economics*, 22 (2), pp.134–146.

- Property Valuation Oversight Agency (2013) *Confirmation of 29th of November, 2013 on actual number of accredited real estate appraisers in Lithuania*. Vilnius.
- Provincial Directorate of Agriculture and Forestry (2007) Du remembrement agricole à l'aménagement de l'espace rural. , p.1. Available from: <http://ddsv70.agriculture.gouv.fr/IMG/pdf/53_TEC_070830_historiqueAFoncier_cle01c1d1.pdf>.
- Rees, P., Boden, P., Dennett, A., Stillwell, J., Jasinska, M., de Jong, A., ter Veer, M., Kupiszewski, M. & Kupiszewska, D. (2010) *Regional population dynamics: a report assessing the effects of demographic developments on regional competitiveness and cohesion*. Luxembourg. Available from: <http://www.espon.eu/export/sites/default/Documents/Projects/AppliedResearch/DEMIFER/DEMIFER_Deliverable_7.pdf>.
- Riddell, J. & Rembold, F. (2000) Social and economic impact of land fragmentation on rural society in selected EU accession countries. In: *Land Markets and Land Consolidation in Central Europe*. TU Delft - UDMS, pp.13–20.
- Robson, C. (2002) *Real World Research: a Resource for Social Scientists and Practitioner-Researchers*. John Wiley & Sons, Inc. Available from: <<http://books.google.com/books?id=DkplMcAysFQC>\n<http://media.matthewsbooks.com.s3.amazonaws.com/documents/tocwork/063/9780631213055.pdf>>.
- Rooth, T. (1993) *British Protectionism and the International Economy. Overseas Commercial Policy in the 1930s*. Cambridge, Cambridge University Press.
- Sabates-Wheeler, R. (2002) Consolidation initiatives after land reform: responses to multiple dimensions of land fragmentation in Eastern European agriculture. *Journal of International Development*, 14, pp.1005–1018.
- Saxon State Office of Environment and Agriculture Geologie (2013) Reorganisation of Land Holdings. Land Development Toolbox. , p.92. Available from:

<<https://publikationen.sachsen.de/bdb/artikel/20437/documents/27439>>
[Accessed 2 February 2014].

Schirmer (1958) Aerial survey photography : an aid in land consolidation. In: *Land consolidation: cheaper and more simplified methods*. Paris, OEEC, pp.65–73.
Available from: <<http://www.oicrf.org/document.asp?ID=12992>>.

Sikor, T., Müller, D. & Stahl, J. (2009) Land Fragmentation and Cropland Abandonment in Albania: Implications for the Roles of State and Community in Post-Socialist Land Consolidation. *World Development*, 37 (8), pp.1411–1423. Available from:
<<http://www.sciencedirect.com/science/article/pii/S0305750X09000564>>.

Simanaviciene, R. & Ustinovichius, L. (2010) Sensitivity analysis for quantitative decision making methods: TOPSIS and SAW. In: *16th International Conference on Information and Software Technologies IT2010*. Kaunas, Lithuania, Technologija, pp.33–38. Available from:
<http://isd.ktu.lt/it2010/material/Proceedings/1_AI_3.pdf>.

Sproģe, K. (2014) Vision of Land Consolidation process in Latvia. , p.11. Available from:
<http://www.vzd.gov.lv/files/vision_of_land_consolidation_process_in_latvia.pdf> [Accessed 12 September 2014].

Stanfield, D. (1995) *Study of the Romanian Land Market*.

Statistics Lithuania (2011) *Statistical yearbook of Lithuania 2011*. Vilnius. Available from:
<http://web.stat.gov.lt/uploads/metrastis/1_LSM_2011_en.pdf?PHPSESSID=0018c76801d4cb651699284aae1ca139>.

Sturmeijer, S.G. (1955) Owner-farming in England and Wales, 1900 to 1950. *The Manchester School*, 23 (3), pp.245–268. Available from:
<<http://onlinelibrary.wiley.com/doi/10.1111/j.1467-9957.1955.tb00968.x/abstract>>.

Sweet, R., Pittock, M. & Overton, M. (2008) *The Enclosures of the 18th Century*.

Interview by Bragg Melvyn. Available from:

<<http://www.bbc.co.uk/radio/player/b00b1m9b>>.

Swinnen, J.F.M.M. (1996) An explanation of land reform choices in Central and Eastern Europe. In: *Working paper No. 5, Policy Research Group*. Leuven, p.32.

Available from: <<http://ageconsearch.umn.edu/bitstream/31883/1/prg-wp05.pdf>>.

Swiss Federal Office for Agriculture (2001) *Agricultural Report 2001*. Berne.

Šiaulių hidroprojektas (2015) Land consolidation project solutions drawing in Skuodas municipality. *Land consolidation project solutions drawing*, p.1.

The Federal Assembly of the Swiss Confederation (2010) *Bundesgesetz über die Landwirtschaft (Federal Law on Agriculture)*. Switzerland. Available from:

<<http://www.wipo.int/edocs/lexdocs/laws/de/ch/ch185de.pdf>>.

The Ministry of Agriculture (2005) *Guidelines for applicants' providing projects, for support in 2005 in accordance with the SPD of Lithuania for 2004 – 2006 priority Rural Development and Fishery Priority measure 'Promotion of Adaptation and Development of Rural Areas' activity 'Reparcell*. Lithuania.

Available from:

<http://www.zum.lt/min/failai/Gaires_0728_zem_sklypu_perskirstymas_.pdf>.

The Ministry of Agriculture (2012) *Rural Development Programme for Lithuania 2007 – 2013*. Available from: <<http://www.nma.lt/index.php/support/rural-development-programme-2007-2013/685>>.

The Ministry of Agriculture (2011) *The rules for Lithuanian Rural Development Programme for 2007-2013 measure 'Infrastructure related to the development and adaptation of agriculture and forestry', activity 'Land consolidation' implementation*. Lithuania. Available from:

<<http://www.zum.lt/documents/isakymu-priedai/110427-3D-370.pdf>>.

- The Parliament of the Republic of Lithuania (2004) *Republic of Lithuania Law on Land*. Lithuania.
- The Parliament of the Republic of Lithuania (2013) *The Law of the Republic of Lithuania on the restoration of the rights of ownership of citizens to the existing real property (Actual Revision)*. Lithuania. Available from: <http://www3.lrs.lt/pls/inter3/dokpaieska.showdoc_l?p_id=456784>.
- The Parliament of the Republic of Lithuania (1994) *The Law on Territorial-Administrative Units*. Lithuania.
- The Supreme Council of the Republic of Lithuania (1990) *The resolution on farmers' farm land plots expansion*. Lithuania, Valstybės žinios. Available from: <<http://tar.tic.lt/Default.aspx?id=2&item=results&aktoid=D3E4D7B5-F3D6-43B5-9F47-CB1DCDDB40A8>>.
- The University of Bristol About BOS [Internet]. Available from: <<http://www.survey.bris.ac.uk/support/about>> [Accessed 26 August 2014].
- The University of Nottingham (2013) Laxton: Living in an open field village [Internet]. Available from: <<http://www.nottingham.ac.uk/manuscriptsandspecialcollections/learning/laxton/theme1/introduction.aspx>> [Accessed 10 March 2013].
- Thomas, J. (2006a) Attempt on Systematization of Land Consolidation Approaches in Europe. *Zeitschrift für Geodäsie, Geoinformation und Landmanagement (ZfV)*, 131, pp.156–161.
- Thomas, J. (2007) Future Approaches to Land Development across Europe – preliminary results of the EU-INTERREG III C project FARLAND. In: *UNECE WPLA Workshop*. Munich.
- Thomas, J. (2015) Is there any alternative to compulsory land acquisition by big public infrastructure projects? *Journal of FAO Land Tenure*, p.21.

- Thomas, J. (2004) Modern Land Consolidation - recent trends on land consolidation in Germany. In: *FIG Commission VII-Symposium*. Volvic, France.
- Thomas, J. (1998) Non-polluting Land Use and Sustainable Development in Rural Regions - Support through Land Consolidation and Village Renewal. In: *FIG XXI. Congress Brighton*.
- Thomas, J. (2006b) Property rights, land fragmentation and the emerging structure of agriculture in Central and Eastern European countries. *Journal of Agricultural and Development Economics*, 3, pp.225–275.
- Thomas, J. (2012) The Status of Land Development and Land Consolidation in Europe - 2011. A cross section analysis. , p.15. Available from: <http://www.fao.org/fileadmin/user_upload/Europe/documents/Events_2012/3LANDNET/14_en.pdf> [Accessed 29 October 2014].
- Thomas, J. (2006c) What's on Regarding Land Consolidation in Europe? In: *XXIII FIG Congress*. Munich, Germany.
- Triantaphyllou, E. (2000) *Multi-Criteria Decision Making Methods: A Comparative Study*. Volume 44. P. M. Pardalos & D. Hearn eds. Springer Science + Business Media B.V.
- UNECE (2001) *Land administration review – Armenia*. Geneva.
- United Nations (2008) *FRANCE. National Information / National Reports. Rural Development*. Available from: <http://www.un.org/esa/agenda21/natinfo/countr/france/ruraldevelopment_en.pdf>.
- United Nations (1987) *Report of the World Commission on Environment and Development. General Assembly Resolution 42/187*. Available from: <<http://www.un.org/documents/ga/res/42/ares42-187.htm>>.

- United Nations (2011) The History of Sustainable Development in the United Nations [Internet]. Available from: <<http://www.uncsd2012.org/history.html>> [Accessed 10 February 2013].
- Vitikainen, A. (2004a) An overview of land consolidation in Europe. In: *Symposium on modern land consolidation*. p.12.
- Vitikainen, A. (2004b) An Overview of Land Consolidation in Europe. *Nordic Journal of Surveying and Real Estate Research*, 1, pp.25–44.
- Vranken, L., Noev, N. & Swinnen, J. (2004) Fragmentation, abandonment and co-ownership: transition problems of the Bulgarian Land Market. *Quarterly Journal of International Agriculture*, 43, pp.391–408.
- Weiken (1958) Survey of area in need of consolidation. In: *Land consolidation : cheaper and more simplified methods*. Paris, OEEC, pp.13–22. Available from: <<http://www.oicrf.org/document.asp?ID=12986>>.
- Wilden, R. (2007) Integrative Land Consolidation - an approach for fulfilling the objectives of the rural development policy. In: *Effective and Sustainable Land Management – a permanent challenge for each society*. Munich, Germany, pp.1–12.
- Zavadskas, E.K. & Antucheviciene, J. (2007) Multiple criteria evaluation of rural building's regeneration alternatives. *Building and Environment*, 42, pp.436–451.

Appendix 1



ŽEMĖS KONSOLIDACIJOS PROJEKTO DALYVIŲ APKLAUSA

Dėkojame JUMS, kad sutikote dalyvauti šioje anonimiškoje apklausoje, kurią vykdo Liverpulio Džono Mūro Universiteto doktorantas. Jūsų atsakymai padės geriau įvertinti žemės konsolidacijos poreikį ir perspektyvas Lietuvoje.

Tinkamą (-us) atsakymo variantą (-us) įrašyti arba pažymėti

[Translation]

Survey of the land consolidation project participants

Thank you for taking the time to respond to this anonymous survey which is performed by a Liverpool John Moores University PhD researcher. Your answers will help to improve the evaluation of demand for land consolidation (LC) and perspectives in Lithuania.

Select or type in the most appropriate answer variant.

ŠEIMA

1. Kiek šeimos narių sudaro Jūsų šeimą? (Jūs + sutuoktinis (-ė) + vaikai).

_____ šeimos nariai.

[Translation]

FAMILY

1. How many family members are in your family? (you + spouse + children).

_____ family members.

2. Koks Jūsų šeimos narių amžius ir lytis?

	Jūs	Sutuoktinis (-ė)	1 vaikas	2 vaikas	3 vaikas	4 vaikas	5 vaikas
Amžius, m							
Lytis, Vyras/Moteris (rašyti V arba M)							

[Translation]

2. What is your family members age and sex?

	You	Spouse	1 child	... child
Age				
Sex, (type F for female, M - male)				

3. Jūsų šeimos narių dabartinė gyvenamoji vieta ir kiek laiko ten gyvenama?

I lentelės langelius prie šeimos narių rašyti metų skaičių, kiek ten gyvenama. (PVZ po lentele.)

	Jūs	Sutuoktinis (-ė)	1 vaikas	2 vaikas	3 vaikas	4 vaikas	5 vaikas
Mieste							
Gyvenv./miestelis							
Kaime							
Vienkiemyje							

PVZ

(Dabar, Jūs ir sutuoktinis(-ė) gyvenate kaime jau 15 metų, „1 vaikas“ mokosi ir gyvena mieste jau 2 metus, „2 vaikas“ gyvena kitame kaime jau 5 metus).

	Jūs	Sutuoktinis (-ė)	1 vaikas	2 vaikas	3 vaikas	4 vaikas	5 vaikas
Mieste			2				
Kaime	15	15		5			

[Translation]

3. What is your family members current place of living and for how long?

Near each family member write how many years he/she lives there. (Example under the table)

	You	Spouse	1 child	... child
City				
Township				
Village				
Farmstead				

Example

(Currently, you and your spouse live in village for 15 years, "1 child" lives and studies in the city for 2 years, "2 child" lives in other village for 5 years.)

	You	Spouse	1 child	2 child
City			2	
Village	15	15		5

4. Koks Jūsu statusas?

Dirbantis *Pensininks* *Bedarbis*

Kiek laiko jūsu toks statusas, metais: _____.

[Translation]

4. What is your current status?

Employed *Pensioner* *Unemployed*

How many years you have such status: _____.

5. Ar Jūs dirbate žemės ūkio sektoriuje?

Taip *Ne*

Jeigu atsakėte NE, tai kiek metų jau nebedirbate, jeigu dirbote anksčiau : _____.

Jeigu atsakėte TAIP, tai kiek metų jau dirbate: _____.

Kiek vidutiniškai valandų praleidžiate ūkyje per dieną _____ val.

[Translation]

5. Do you work in agricultural sector?

Yes *No*

If you have answered NO, how many years before you have been working in agricultural sector, if you ever worked: _____.

If you answered YES, how long you are working there: _____.

How many hours per day in average you spend in agriculture _____ hours.

6. Kiek šeimos narių dirba žemės ūkio sektoriuje?

Irašyti skaičių _____.

[Translation]

6. How many family members is employed in agricultural sector?

Type number _____.

7. Ar žemės ūkis yra pagrindinis (daugiau kaip 50%) Jūsų šeimos pajamų šaltinis?

Taip *Ne*

[Translation]

7. Does agriculture is the primary source (more than 50%) of income for your family?

Yes No

8. Ar Jūsų vaikai norėtų ūkininkauti?

Taip *Ne*

Kodėl? _____

[Translation]

8. Would your children like to farm?

Yes No

Why? _____

9. Koks Jūsų išsilavinimas?

- | | |
|---|---|
| <input type="checkbox"/> <i>Aukštasis (universitetinis);</i> | <input type="checkbox"/> <i>Vidurinis;</i> |
| <input type="checkbox"/> <i>Aukštasis neuniversitetinis (pvz. technikumas);</i> | <input type="checkbox"/> <i>Pradinis;</i> |
| <input type="checkbox"/> <i>Aukštesnysis (profesinės mokyklos);</i> | <input type="checkbox"/> <i>Neturiu išsilavinimo.</i> |

[Translation]

9. What is your education background?

- | | |
|---|-------------------------------------|
| <input type="checkbox"/> Higher education (University); | <input type="checkbox"/> Secondary; |
| <input type="checkbox"/> Higher non university (College); | <input type="checkbox"/> Primary; |

Higher technical school;

Without education.

ŽEMĖ

10. Kiek Jūsų šeimai priklauso žemės sklypų (Jums + sutuoktiniui(-ei) + vaikams)? Koks plotas ha?

Priklauso _____ žemės sklypai. Plotas _____ ha.

[Translation]

LAND

10. How many land parcels owns your family (you + spouse + children)? What area in ha?

We own _____ land parcels. Total area _____ ha.

11. Kiek žemės sklypų naudojama žemės ūkio produkcijos gamybai? Koks plotas ha?

_____ žemės sklypai. Plotas _____ ha.

[Translation]

11. How many land parcels are used for agricultural production? What area in ha?

_____ land parcels. Total area _____ ha.

12. Kaip naudojate Jūsų šeimai priklausančią dirbamą žemę?

Visą dirbame Visą nuomojame Dalį dirbame, dalį nuomojame.

[Translation]

12. What do you do with land owned by your family?

All is cultivated All is rented Part is cultivated, other is rented

13. Ar Jūsų šeima papildomai nuomojasi žemės?

Taip Ne

Jeigu atsakėte TAIP, užpildykite šią lentelę:

	Žemės sklypų skaičius	Kokį plotą, ha.	Kiek vidutiniškai laiko, metais
Nuomojamės iš privačių žemės savininkų			
Nuomojamės iš valstybės			

[Translation]

13. Does your family additionally rents land?

- Yes No

If you answered YES, please fill this table:

	Number of land parcels	Area in ha	How many years in average?
Renting from private owners			
Renting state land			

14. Kokia forma Jūs atsiskaitote su žemės nuomininku?

- Pinigais;
- Gaminama produkcija;
- Dalis pinigais, dalis gaminama produkcija;
- Suteikia naudotis be atlygio;
- Kita (rašyti): _____
- _____

[Translation]

14. In what form you pay for person who rents you land?

- Money;
- Harvested production;
- Share in money, share in harvested production;
- Land owner rent for free of charge;
- Other (write): _____

15. Kokiu būdu Jūs įsigijote žemės sklypą (-us)?

Atstatyta nuosavybė _____ žemės sklypai, plotas _____ ha.

Pirkti _____ žemės sklypai, plotas _____ ha.

[Translation]

15. How you have acquired your land parcels?

Restored ownership _____ land parcels, area _____ ha.

Purchased _____ land parcels, area _____ ha.

16. Kokias pasėlių rūšis Jūs deklaruote šiais metais? Kokį plotą?

- | | | | |
|--------------------------|--|---------------------------|-------------------|
| <input type="checkbox"/> | <i>Pašariniai augalai ir pasėliai sėkloms.</i> | <i>Deklaruotas plotas</i> | <i>..... ha.;</i> |
| <input type="checkbox"/> | <i>Grūdiniai augalai.</i> | <i>Deklaruotas plotas</i> | <i>..... ha.;</i> |
| <input type="checkbox"/> | <i>Bulvės.</i> | <i>Deklaruotas plotas</i> | <i>..... ha.;</i> |
| <input type="checkbox"/> | <i>Lauko daržovės.</i> | <i>Deklaruotas plotas</i> | <i>..... ha.;</i> |
| <input type="checkbox"/> | <i>Techniniai augalai.</i> | <i>Deklaruotas plotas</i> | <i>..... ha.;</i> |
| <input type="checkbox"/> | <i>Kita. (rašyti) -</i> | <i>Deklaruotas plotas</i> | <i>..... ha.</i> |

[Translation]

16. What crop cultures you have declared this year? What area?

- | | | | |
|--------------------------|------------------------------------|---------------|------------|
| <input type="checkbox"/> | Forage plants and crops for seeds. | Declared area | _____ ha.; |
| <input type="checkbox"/> | Grain crops. | Declared area | _____ ha.; |
| <input type="checkbox"/> | Potatoes. | Declared area | _____ ha.; |
| <input type="checkbox"/> | Field vegetables. | Declared area | _____ ha.; |
| <input type="checkbox"/> | Industrial crops. | Declared area | _____ ha.; |
| <input type="checkbox"/> | Other (write) - | Declared area | _____ ha.; |

17. Ar vykdomėte ekologinį ūkininkavimą?

- Taip* *Ne*

Jeigu TAIP, tai kiek metų: _____ m. Koks ekologinio ūkio dydis: _____ ha.?

[Translation]

17. Are you carrying ecological farming?

- Yes No

If YES, how many years _____. What is the size of eco farm _____ ha.?

18. Kokią ekologinę žemės ūkio produkciją Jūs gaminatė?

Išvardinti: _____

[Translation]

18. What ecological agricultural production you produce?

Please specify: _____

19. Ar Jūsų ūkyje yra samdomų darbininkų?

- Taip Ne

Jeigu atsakymas Taip, tai:

kiek vyrų _____; jų amžiaus vidurkis _____ m.

kiek moterų _____; jų amžiaus vidurkis _____ m.

[Translation]

19. Does your farm have employed workers?

- Yes No

If YES:

how many men _____; their average age _____

how many women _____; their average age _____

20. Ar Jūs turite nuosavos žemės ūkio technikos savo žemės sklypų apdirbimui?

- Turiu nuosavą;
 Dalį turiu, dalį nuomoju;
 Nieko neturiu, viską nuomoju;
 Kita (rašyti): _____

[Translation]

20. Do you have your own agricultural machinery for your parcels harvesting?

- Own machinery;
 Part is own, part is rented;
 All is rented;
 Other (specify): _____

21. Ar esate per pastaruosius 5 metus įsigijęs žemės ūkio technikos?

- Taip, įsigijau naujos;
 Taip, įsigijau naudotos;
 Ne, nieko neįsigijau;
 Kita (rašyti): _____

[Translation]

21. Have purchased agricultural machinery in recent 5 years?

- Yes, purchased new;
 Yes, purchased used;

- No
 Other (specify)

22. Ar esate gavęs Europos Sąjungos paramą žemės ūkiui?

- Taip Ne

Jeigu atsakymas Taip, tai pagal kokią programą: _____

[Translation]

22. Have you ever received EU support for agriculture?

- Yes No

If YES, according what programme support was received.

ŽEMĖS KONSOLIDACIJA

23. Kiek Jūsų šeimos žemės sklypų įtrauka į žemės konsolidacijos projektą?

Įtraukti _____ žemės sklypai(-ų). Jų bendras plotas _____ ha.

[Translation]

LAND CONSOLIDATION

23. How many land parcels of your family are included in land consolidation project?

Included _____ land parcels. Total area _____ ha.

24. Iš kur sužinojote, kad ketinama rengti žemės konsolidaciją šioje teritorijoje?

- | | |
|--|--|
| <input type="checkbox"/> Iš žiniasklaidos (TV, radijas, laikraštis); | <input type="checkbox"/> Sužinojau iš giminių/kaimynų; |
| <input type="checkbox"/> Informavo žemėtvarkos skyrius; | <input type="checkbox"/> Kita (įrašyti): _____ |

[Translation]

24. Who has informed you that land consolidation project will start in this territory?

- saw on public media (TV, radio, newspaper); informed relatives/neighbours;
 informed land management authority; Other (please specify): _____

25. Kas paskatino jus dalyvauti žemės konsolidacijoje? (Pažymėti visus tinkančius)

- | | |
|--|--|
| <input type="checkbox"/> Žemės sklypų
apjungimas/konfigūracijos
pagerinimas; | <input type="checkbox"/> Valstybinės žemės pirkimas; |
| <input type="checkbox"/> Žemės konfliktų išsprendimas; | <input type="checkbox"/> Kelių tinklo gerinimas; |
| <input type="checkbox"/> Nemokami kadastriniai matavimai; | <input type="checkbox"/> Žemės reformos klaidų ištaisymas; |
| <input type="checkbox"/> Melioracijos sistemų renovacija; | <input type="checkbox"/> Kita (įrašyti): _____

_____ |

[Translation]

25. What was the main motive for participation in land consolidation? (Select all that apply)

- | | |
|--|--|
| <input type="checkbox"/> Consolidate land parcels; | <input type="checkbox"/> Purchase of “Free land” and over-plots; |
| <input type="checkbox"/> Solve conflicts with neighbours; | <input type="checkbox"/> Improvement of road network; |
| <input type="checkbox"/> Free geodetic (cadastral) measurements; | <input type="checkbox"/> Fixing mistakes of land reform; |
| <input type="checkbox"/> Renovation of drainage systems; | <input type="checkbox"/> Other (please specify): _____ |

26. Kokias išlaidas žemės konsolidacijos projekto metu sutiktumėte padengti savo lėšomis?

- | |
|---|
| <input type="checkbox"/> Žemės sklypų kadastrinius matavimus; |
| <input type="checkbox"/> Žemės sklypų vertinimą; |
| <input type="checkbox"/> Notarinių sandorių ir nuosavybės dokumentų tvarkymą; |
| <input type="checkbox"/> Nenoriu nieko dengti savo lėšomis; |
| <input type="checkbox"/> Kita (įrašyti): _____
_____ |

[Translation]

26. What land consolidation project expenditures you could cover on your own?

- | |
|--|
| <input type="checkbox"/> Geodetic (cadastral) measurements; |
| <input type="checkbox"/> Land valuation; |
| <input type="checkbox"/> Notary agreements and preparation of new title deeds; |
| <input type="checkbox"/> I don't want to cover anything; |
| <input type="checkbox"/> Other (please specify): _____ |

27. Kaip vertinate žemės konsolidacijos projekto sprendinius? Ar vertėjo dalyvauti?

(Pažymėti vertinimo skalėje vieną langelį, kaip vertinate naudą, kur 1 reiškia – „Visai nenaudinga“, o 10 – „Labai naudinga“).

1	2	3	4	5	6	7	8	9	10
Visai nenaudinga					Labai naudinga				

[Translation]

27. How do you rate land consolidation project's solutions? Was it worth to participate?

(Mark one cell in the rating scale, how you rate the project's efficiency. Rating mark 1 means – “Very bad”, 10 means – “Very successful”).

28. Kas galėtų būti patobulinta vykdant kitus žemės konsolidacijos projektus? (Pažymėti visus tinkančius)

- Įstatyminės bazės sutvarkymas (žemės konsolidacijos įstatymas: kuriame apspręstas žemės konsolidacijos proceso supaprastinimas ir pagreitinimas, sumažintas susirinkimų skaičius, supaprastintas žemės vertinimo metodas ir t.t.);
- Iš anksto numatyti finansavo šaltiniai ir projekto sprendinių įgyvendinimo galimybės;
- Numatyta kaimo infrastruktūros plėtra;
- Numatytas rekreacinių (poilsio) zonų sukūrimas;
- Nusipirkti valstybinės žemės;
- Projektavimo pradžioje turėtų būti vietovės išanalizavimas (apmatuoti sklypai, užfiksuoti riboženkliai);
- Kita (įrašyti): _____

[Translation]

28. What improvement should appear in future land consolidation projects? (Select all that apply)

- Improvements in legislation (land consolidation law: anticipated land consolidation process simplification and acceleration, minimized amount of public hearings, simplified valuation methods, etc.);
- Planned in advance sources of funding and possibilities to realise project solutions;
- Planned rural infrastructure development;
- Planned recreational zones development;
- Possibility to acquire state land;

Comprehensive territory analysis before designing the project (measured land parcels, coordinated all border marks in the field);

Other (please specify): _____

29. Kokie Jūsų ateities planai po žemės konsolidacijos projekto įgyvendinimo per ateinančius 5 metus?

Plėsiu ūkį (pirksiu/nuomosiu žemę);

Nieko nekeisiu, toliau dirbsiu turimą/nuomojamą žemę;

Pasitrauksiu iš žemės ūkio (visą žemę parduosiu);

Visą žemę išnuomosiu;

Nežinau, dar nenusprendžiau;

Kita (įrašyti): _____

[Translation]

29. What are your future plans after land consolidation project implementation for 5 coming years?

I am going to expand farm (will buy/rent more land);

I am not going to change anything, will work own/rented land further;

I am going to sell all land that I have (will leave agriculture);

I am going to rent all land that I have;

I don't know, I haven't decided yet;

Other (please specify): _____

30. Kaip manote ar keisis Jūsų žemės sklypų vertė po žemės konsolidacijos ir kiek procentų?

Manau, kad žemės sklypų vertė pakils _____ %.

Kodėl? _____

Manau, kad žemės sklypų vertė nukris _____ %.

Kodėl? _____

Manau, kad žemės sklypų vertė išliks tokia pati.

Kodėl? _____

[Translation]

30. What do you think; will the value of your land parcels change after the land consolidation and how many percent?

I think the value of land parcels will increase _____%

Why? _____

I think the value of land parcels will decrease _____%

Why? _____

I think the value of land parcels will leave the same _____%

Why? _____

KAIMAS

31. Jūsų nuomone šiandiena su kokiom problemom susiduria Lietuvos kaimas?

- Daugėja asocialių šeimų;*
- Jaunimas masiškai bėga iš kaimo;*
- Didelis kontrastas tarp kaimo ir miesto;*
- Didelis nedarbo lygis;*
- Alkoholizmas;*
- Ūkininkai pasitraukia iš ūkininkavimo, nes valdžia nemato jų problemų;*
- Kita (rašyti): _____*

[Translation]

COUNTRYSIDE

31. What problems Lithuanian countryside today meets according to your opinion?

(Select all that apply)

- Increases number of asocial families;
- Many youths are leaving countryside;
- Big contrast between town and countryside;
- High level of unemployment;
- Alcoholism;
- Farmers are leaving farming, because government doesn't see their problems;
- Other (please specify): _____

32. Kas Jūsų nuomone paskatintų jaunimą likti gyventi ir dirbti kaime? (Pažymėti visus tinkančius)

- Užimtumo kaime didinimas;
- Skirtumų tarp gyvenimo mieste ir kaime mažinimas;
- Didelė valstybės ir ES parama jauniems ūkininkams;
- Ūkių modernizavimas;
- Ekologinės gyvulininkystės ir augalininkystės paklausa;
- Alternatyvių verslų ir paslaugų įmonių sukūrimas;
- Kita (įrašyti): _____

[Translation]

32. What according your opinion could encourage youth to stay, live and work in countryside? (Select all that apply)

- Introducing more activities in countryside;
- Reduction of living inequalities between town and countryside;
- Bigger national and EU support for young farmer;
- Modernisation of farms;
- Higher demand of ecological livestock and crop production;
- Creation of alternative businesses and service providers;
- Other (please specify): _____

33. Kokios yra pagrindinės priežastys, kodėl gyvenate kaime?

- Tradicija ir sentimentai (tėvai, protėviai čia gyveno);
- Dirbu žemės ūkyje;
- Pigesnis pragyvenimas, nei mieste;
- Švari-ekologiška aplinka;
- Kita (įrašyti): _____

[Translation]

33. What are the main reasons why you live in the countryside?

- Traditions and emotional bonds (parents and grandparents lived here);
- I work in agriculture;
- Cheaper cost of living comparing with town;
- Clean and ecological environment;
- Other (please specify): _____

34. Kokią alternatyvią žemės ūkiui šaką Jūs galėtumėte vystyti kaime?

Kaimo turizmą;

Kaimo amatus;

Kita (įrašyti): _____

[Translation]

34. What alternative business you could start in the countryside, if you would leave agriculture?

Countryside tourism;

Rural handicrafts;

Other (please specify): _____

DĖKOJU UŽ BENDRADARBIAVIMĄ!

[Translation]

THANK YOU FOR COOPERATION!

Appendix 2

Municipal specialists' survey

Zemes konsolidacija jusu rajone



Page 1 of 3

Specialistu dirbanciu savivaldybese apklausa zemes konsolidacijos tema

Dekoju Jums, kad sutikote dalyvauti sioje anonimiskoje apklausoje, kuria vykdo Liverpulio Džono Muro universiteto doktorantas. Jusu atsakymai pades man geriau ivertinti zemes konsolidacijos (ZK) raida ir jos perspektyvas Lietuvoje.

Apklausoje yra 17 klausimu. Tinkama (-us) atsakymo varianta (-us) pazymekite arba irasykite. Anketos uzpildymui Jus uztruksite ~7 min. Kad pradeti atsakinėti i klausimus spauskite **Continue>**.

[Continue >](#)

[Translation]

Land consolidation in your district

Specialists' working in municipalities' survey on land consolidation theme

Thank you, for taking the time to respond to this anonymous survey which is performed by a Liverpool John Moores University PhD researcher. Your answers will help to improve the evaluation for the evolution of land consolidation (LC) and perspectives in Lithuania.

This survey consists of 17 questions. Select or type in the most appropriate answer variant. The survey takes approximately 7 minutes to complete. In order to start answering to the questions, please click the "Continue >" button.

Apklausa

Zemes konsolidacija jusu rajone

1. Ar Jusu rajone 2000 - 2008 m. buvo vykdomas(-i) zemes konsolidacijos projektas(-ai)?

- Taip
 Ne
 Nezinau

Jeigu atsakete TAIP, tai kiek is viso projektu per nurodytus metus Jusu rajone buvo vykdoma? Irasykite skaiciu.

[Translation]

Land consolidation in your district

1. Were any land consolidation projects implemented in your district during 2000 – 2008?

- Yes
 No
 Don't know

If you have answered **YES**, then how many projects during this period were implemented? Type the number.

2. Jeigu pries, tai buvusiam klausime Nr.1 atsakete **TAIP**, tada atsakykite i si klausima. Jei atsakete **NE** arba **NEZINAU**, pereikite prie klausimo Nr.3.

Ar tose vietovese kur vyko zemes konsolidacijos projektai, vyko kiti projektai (is ES arba savivald) (Optional)

- Taip
 Ne
 Nezinau

Jeigu atsakete TAIP, ta kas buvo atlikta ir uz kokias lesas (programas)? Irasyti

[Translation]

2. If in previous question No. 1 you have answered **YES**, then please answer to this question. If you have answered **NO** or **DON'T KNOW**, please proceed to the question No. 3.

Thinking about those areas where land consolidation projects were implemented, were there any other projects (financed by the EU structural funds or from the municipal budget) realised i.e. road construction (reconstruction), the development of electricity supplies, the repair of drainage systems and so on?

(Optional)

3. Ar Jus zinote kas yra zemes konsolidacija, kokie jos tikslai ir ar galetumete apie tai papasakoti/pristatyti rajono gyventojui?

- Taip, zinau ir galeciau issamiai papasakoti
- Pakankamai zinau
- Ne, nezinau

[Translation]

3. Do you know enough about land consolidation and its aims and objectives to be able to present it to a typical farmer of your district?

- Yes, I know enough and I would be able to explain comprehensively.
- I know enough.
- No, I don't know.

4. Ar kada nors i Jus kreipesi rajono gyventojas norintis dalyvauti zemes konsolidacijos projekte?

- Taip
- Ne

Jei TAIP, tai kiek gyventuju i jus kreipesi? Irasyti skaiciu

[Translation]

4. Have you ever been asked by a resident from your district wishing to participate in land consolidation project to provide more information about land consolidation?

- Yes
- No

If YES, how many residents have asked you? Type the number.

Zemes konsolidacijos viesinimas jusu rajone

5. Ar kada nors Jusu rajone vyko seminarai, susirinkimai, pasitarimai su zemes savininkais zemes konsolidacijos tema?

- Taip
- Ne
- Nezinau

[Translation]

Land consolidation public awareness campaigns in your district

5. Were there any seminars, meetings or conferences regarding land consolidation with land owners in your district?

- Yes
- No
- Don't know

6. Ar Jusu rajono savivaldybes pastate yra informacinis stendas, kuriame butu pateikta informacija apie zemes konsolidacija?

- Taip
- Ne
- Nezinau

[Translation]

6. Is there an information stand in your municipality where land owners could find information about land consolidation?

- Yes
- No
- Don't know

7. Kokioje ziniasklaidos priemoneje Jums asmeniskai teko kada nors matyti ar girdeti apie zemes konsolidacija?
(Pazymekite visus tinkamus atsakymus)
(select all that apply)

- TV
- Radijuje
- Spauodoje
- Internete
- Neteko niekur matyti ar girdeti.

[Translation]

7. Please specify all possible variants of the sources of mass media where you ever saw or heard information about land consolidation?

(select all that apply)

- TV
- Radio
- Press
- Internet
- I haven't saw or heard about it

8. Kaip vertinate informacijos sklaidą apie žemės konsolidaciją žiniasklaidoje?
Pasirinkimui spauskite "Select an answer".

	TV	Radijuje	Spaudoje	Internetė
a. Pasirinkite prie kiekvienos žiniasklaidos priemonės vieną iš galimų variantų.	Select an answer ▼	Select an answer ▼	Select an answer ▼	Select an answer ▼

[Translation]

8. How do you rate access to the sources of public media about land consolidation?
For your selection click "Select an answer".

	TV	Radio	Press	Internet
a. Select near each public media source one of available variant.				

Ukiai jūsu rajone

9. Kokie ukiai pagrindė dominuoja Jūsų rajone?

- Stambus virš 50 ha
- Vidutiniai, iki 50 ha
- Smulkus, iki 10 ha

[Translation]

Farms in your district

9. Which farms mainly dominates in your district?

- Large, more than 50 ha
- Medium, up to 50
- Small, up to 10 ha

10. Kaip Jums atrodo (jauciate), ar daug pas Jus rajone yra apleistos, nedirbamos zemes?

- L.daug apleistos zemes
- Daug apleistos zemes
- Nedaug apleistos zemes
- Visa zeme dirbama
- Nezinau

[Translation]

10. How do you think (feel) how much abandoned and vacant land you have in your district?

- Very much abandoned land
- Much abandoned land
- Not much abandoned land
- All land is used
- I don't know

11. Kokios pagrindines apleistos zemes priezastys Jusu rajone?
(Pazymekite visus tinkamus atsakymus)
(select all that apply)

- Dominuoja senyvo amziaus ukininkai
- Zemos produkcijos supirkimo kainos
- Realizavimo centru trukumas
- Didele jaunimo emigracija
- Nederlinga zeme
- Kita (Irasykite)

Jeigu pazymejote KITA, tada nurodykite kitas priezastis. (Optional)

[Translation]

11. What reasons influence land abandonment in your district?

(select all that apply)

- Dominates old age farmers
- Low agricultural production realisation prices
- Lack of centres for production realisation
- High youth emigration
- Land with low soil quality
- Other (write)

If you have selected OTHER, then write other reasons. (Optional)

12. Kiek apytiksliai leidimu nauju sodybu statyboms Jusu rajono kaimo vietovese buvo isduota per 2010 metus? Irasykite skaiciu (Optional)

[Translation]

12. How many permissions for the construction of new farmsteads in your district were provided in 2010? Write number (Optional)

13. Kiek apytiksliai leidimu rekonstruoti senas sodybas Jusu rajono kaimo vietovese buvo isduota per 2010 metus? Irasykite leidimu skaiciu. (Optional)

[Translation]

13. How many permissions for the reconstruction of old farmsteads in your district were provided in 2010? Write number (Optional)

14. Kokius pagrinde naujus statinius praso statyti Jusu rajono gyventojai gyvenantys kaime? (Optional)

- Gyvenamieji namai
- Ukiniai pastatai
- Vasamamiai
- Pirtys
- Kita (irasyti)

Jeigu atsakete KITA, prasau irasykite.

[Translation]

14. What type of buildings usually your district residents living in the village ask permission for construction? (Optional)

- Living houses
- Farm buildings
- Sumer houses
- Saunas
- Other (write)

If you selected OTHER, please write here.

15. Kokius statinius pagrinde praso rekonstruoti Jusu rajono gyventojai gyvenantys kaime?
(Optional)

- Gyvenamieji namai
- Ukiniai pastatai
- Vasarnamiai
- Pirtys
- Kita (irasyti)

Jeigu atsakete KITA, prasau irasykite.

[Translation]

15. What type of buildings usually your district residents living in the village ask permission for reconstruction? (Optional)

- Living houses
- Farm buildings
- Sumer houses
- Saunas
- Other (write)

If you selected OTHER, please write here.

Kiti klausimai

16. Ar Jusu rajone yra stipri ir veikli Vietos Veiklos Grupe (VVG), kuri bendrai sprendzia ivairius klausimus su savivaldybe?

- Taip
- Ne
- Nezinau

[Translation]

Other questions

16. Do you have in your district viable and vibrant Local Action Group (LAG) which solves various question together with municipality?

- Yes
- No
- Don't know

17. Kaip jus manote, ka Jusu rajono savivaldybe galetu sutvarkyti kaimo vietovese per ateinancius zemes |
Pvz. Suremontuoti arba nuteisti naujus kelius, rekonstruoti sausinimo sistemas, suformuoti rekreacines zonas
Trumpai aprasykite.

Spauskite "Continue>", kad baigti apklausa

Continue >

[Translation]

17. What problems you would like to resolve in rural areas of your region within the ambit of the next round of LC projects?

i.e. Repair old or construct new roads, reconstruct drainage systems, establish territories for recreation, etc.

(Describe shortly)

Click "Continue" in order to finish this questionnaire

Zemes konsolidacija jusu rajone



Page 3 of 3

Apklauso pabaiga

Dekoju Jums uz bendradarbiavima!

Daugiau informacijos apie zemes konsolidacija Jus galite rasti <http://www.konsolidacija.lt>

Pagarbiai,
Giedrius Pasakamis

[Translation]

The end of the survey

Thank you for the cooperation!

More information about land consolidation could be found at www.konsolidacija.lt

Kind regards,

Giedrius Pasakarnis

Appendix 3


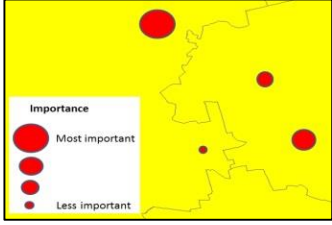
Short instruction on the survey (ReadMeFirst)

Aim of the survey

Despite the fact that Western European countries have long traditions and practice in organizing and implementing land consolidation projects, they still carry various marketing activities, informational campaigns and use other methods to raise public awareness regarding results that are possible within land consolidation (all forms; used alone or joined with other instruments). It is highly likely that such promotional actions influence the number of submitted applications which turns into the detailed investigations and analysis (pre-studies). When doing comparative analysis, it has been noticed that countries (i.e. in Finland and the Netherlands) use maps, where potential territories (regions) for land consolidation are shown; however, criteria vary from country to country and are highly tightened to the national, regional policies and strategies.

With this survey author is trying to develop a criteria system for **COMPREHENSIVE LAND CONSOLIDATION** in Lithuania: 1) to define potential territories and 2) to support decision making when selecting project areas for implementation. Criteria are organized at **National** level (LAU1/NUTS4) and **Project** area level (**Table 1** below). You, as land consolidation expert (practitioner, scientist), are invited to participate as your opinion is highly appreciated and valued.

Table 1: Structure of criteria significance

LAU1 (municipalities) level	Project area level
 A map of Lithuania with its administrative boundaries at the LAU1 (municipalities) level highlighted in yellow.	 A map of Lithuania showing potential project areas. A legend titled 'Importance' indicates that red circles of varying sizes represent different levels of importance: a large red circle for 'Most important' and a small red circle for 'Less important'. Several red circles of different sizes are placed on the map to indicate project areas.

Based on your opinion/practice please **select** if the criteria are important (Yes) or not (No). If selected “No”, a criterion is not important at all and must be excluded

from ranking. Where “Yes” is selected choose the most appropriate “to **maximize** (MAX)” or “to **minimize** (MIN)” function (example **Table 2**). Criteria should be maximized when the larger values are more desirable. When smaller values of criteria are more desirable, the criteria are minimized.

If you notice that very important criteria, according to your practice, is missed you can type it in section “Other” and define maximize or minimize function.

Table 2: Example where important criteria are Maximized or Minimized

<p>Q: Is it important to have “land (soil) productivity score” criteria when defining the potential regions (municipalities) for comprehensive land consolidation? Yes/No</p> <p>Land (soil) productivity score/index shows the agricultural production potential.</p>	<p>If Yes, should there be higher (MAX) or lower (MIN) land (soil) productivity score in the potential regions (municipalities)?</p>
--	--

Please proceed to the survey on <http://www.survey.ljmu.ac.uk/lcpotential>

Appendix 4

Bristol Online Survey questionnaire

Criteria system for defining potential territories for land consolidation



Page 1 of 5

Introduction

Dear Participant,

First of all, thank you for taking the time to respond to this survey, which is part of a PhD research focusing on land consolidation.

With this survey author is trying to develop a criteria system to define potential territories at different levels in Lithuania for comprehensive land consolidation.

You, as land consolidation expert, are invited to participate as your opinion is highly appreciated and valued. The short survey takes approximately 10 minutes to complete. Please note that:

- Responding to the survey is voluntary and you may withdraw at any time
- All data collected will be stored securely by the researcher and not shared with third parties
- All answers will be treated with strict confidentiality.

If you have any questions about this survey or the research itself, please do not hesitate to get in touch with me at P.Giedrius@2008.ljmu.ac.uk or in case of any complaints, my supervisor Dr. Vida Maliene at V.Maliene@ljmu.ac.uk.

Once again, thank you very much for your time and help with the research!

Kind regards,

Please click the “Continue >” button to start the survey.

Note: The deadline for completing the survey is 20th of June, 2014.

Firstly, a few short questions for classification purposes only:

1. What best specifies your expertise in land consolidation?

- Practitioner
- Scientist
- Both
- Other (*please specify*):

2. How many years of expertise in land consolidation do you have?

- Less than 1 year
- 1 - 5 years
- 6 - 10 years
- 11 - 15 years
- 16 - 20 years
- More than 20 years

3. In which country you are currently working as land consolidation expert?

- Austria
- Belgium (Flanders region)
- Belgium (Wallonia region)
- Bulgaria
- Cyprus
- Czech
- Denmark
- Estonia
- Finland
- France
- Germany
- Hungary
- Latvia
- Norway
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- Switzerland
- the Netherlands
- UK
- Other (*please specify*):

Page 3 of 5

Possible criteria for selection of potential regions (municipalities) for comprehensive land consolidation

4. Is it important to have **Local Action Groups** when defining the potential regions (municipalities) for comprehensive land consolidation?

Local Action Groups (LAG) - rural community-based organizations whose actions supported by LEADER axis of RDP.

Number of LAG's could show that in certain region there are active communities which could be interested in rural viability, could provide more desirable targets (objectives) and could take care of project implementation.

- Yes
- No

If **Yes**, should there be higher number (MAX) or smaller number (MIN) of **Local Action Groups** in the potential regions (municipalities)?

- higher number (MAX)
- smaller number (MIN)

5. Is it important to have **areas foreseen for rural urbanization** (before LC) when defining the potential regions (municipalities) for comprehensive land consolidation?

Regions can have areas foreseen for rural urbanization (prepared territory planning documents) and during land consolidation some aspects in parallel could be realized.

- Yes
- No

If **Yes**, should there be higher number (MAX) or smaller number (MIN) of **areas foreseen for rural urbanization** (before LC) in the potential regions (municipalities)?

- higher number (MAX)
- smaller number (MIN)

6. Is it important to have **ongoing infrastructure development projects** (before LC) when defining the potential regions (municipalities) for comprehensive land consolidation?

Regions can have ongoing infrastructure development projects (road construction, sewage disposal, etc.) and during land consolidation some aspects in parallel could be realized.

- Yes
- No

If **Yes**, should there be higher number (MAX) or smaller number (MIN) of **ongoing infrastructure development projects** (before LC) in the potential regions (municipalities)?

- higher number (MAX)
- smaller number (MIN)

7. Is it important to have **cultural heritage conservation objects** when defining the potential regions (municipalities) for comprehensive land consolidation?

During comprehensive land consolidation cultural heritage conservation objects and areas around them can be maintained/developed.

- Yes
- No

If **Yes**, should there be higher number (MAX) or smaller number (MIN) of **cultural heritage conservation objects** in the potential regions (municipalities)?

- higher number (MAX)
- smaller number (MIN)

8. Is it important to have "**number of prepared local development strategies**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Local Action Groups, rural communities and municipalities are developing local development strategies: planning specific activities; infrastructure development and etc. LC projects could follow prepared local development strategies.

- Yes
- No

If **Yes**, should there be higher number (MAX) or smaller number (MIN) of **prepared local development strategies** in the potential regions (municipalities)?

- higher number (MAX)
- smaller number (MIN)

9. Is it important to have "**employable people (20-64 age)**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Employable people -- people who have education and are ready to live and work in rural areas. Such people could have broader attitude to the redevelopment, accept innovations and has less emotional bonds.

Yes

No

If **Yes**, should there be higher number (MAX) or smaller number (MIN) of **employable people (20-64 age)** in the potential regions (municipalities)?

higher number (MAX)

smaller number (MIN)

10. Is it important to have "**abandoned land**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Abandoned land -- land which has a potential, but for some reasons for several years have not been used. Abandoned land could show potential that land could be returned to the agricultural production.

Yes

No

If **Yes**, should there be more (MAX) or less (MIN) **abandoned land** in the potential regions (municipalities)?

more (MAX)

less (MIN)

11. Is it important to have "**parcel size**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Yes

No

If **Yes**, should there be larger (MAX) or smaller (MIN) **parcels (before land consolidation)** in the potential regions (municipalities)?

larger (MAX)

smaller (MIN)

12. Is it important to have "**average agricultural holding size**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Yes

No

If **Yes**, should there be larger (MAX) or smaller (MIN) **agricultural holdings** in the potential regions (municipalities)?

larger (MAX)

smaller (MIN)

13. Is it important to have "**average distance from farmstead to the fields**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Average distance (km) from homestead to the fields. During land consolidation it is possible to concentrate land parcels near the farmstead.

- Yes
- No

If **Yes**, should there be longer (MAX) or shorter (MIN) **distances from the farmstead to the fields** in the potential regions (municipalities)?

- longer (MAX)
- shorter (MIN)

14. Is it important to have "**average land fragmentation index**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Land fragmentation index - index which takes into account shape, size, ownership and etc. **The smaller the value, the higher the degree of land fragmentation.**

- Yes
- No

If **Yes**, should there be higher (MIN) or lower (MAX) **degree of fragmentation** in the potential regions (municipalities)?

- higher (MIN)
- lower (MAX)

15. Is it important to have "**land (soil) productivity score**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Land (soil) productivity score/index shows the agricultural production potential.

- Yes
- No

If **Yes**, should there be higher (MAX) or lower (MIN) **land (soil) productivity score** in the potential regions (municipalities)?

- higher (MAX)
- lower (MIN)

16. Is it important to have "**average area owned by land fund/bank**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Land fund/bank (government) may give land for public needs, for land reform corrections, in order to facilitate land mobility, to support young farmer's establishment and etc.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **area owned by land fund/bank (government)** in the potential regions (municipalities)?

- more (MAX)
- less (MIN)

17. Is it important to have "**average area for afforestation**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

During land consolidation poor soil productivity land and land with inconvenient relief could be foreseen for afforestation.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **area foreseen for afforestation** in the potential regions (municipalities)?

- more (MAX)
- less (MIN)

18. Is it important to have "**average area for soil erosion prevention**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Water, wind affects soil erosion. Prevention may be done during LC by introducing specific measures i.e. hedge rows.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **area foreseen for soil erosion prevention** in the potential regions (municipalities)?

- more (MAX)
- less (MIN)

19. Is it important to have "**average area for natural resource conservation**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Natural resource conservation -- land to be excluded from intensive farming.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **area foreseen for natural resource conservation** in the potential regions (municipalities)?

- more (MAX)
- less (MIN)

20. Is it important to have "**average area with natural habitats**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Vulnerable areas which is potential for protection.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **area with natural habitats** in the potential regions (municipalities)?

- more (MAX)
- less (MIN)

21. Is it important to have "**number of ongoing alternative energy projects**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Solar, wind, water power projects. During land consolidation some aspects in parallel could be realized.

- Yes
- No

If **Yes**, should be higher (MAX) or lower (MIN) **number of ongoing alternative energy projects** in the potential regions (municipalities)?

- higher (MAX)
- lower (MIN)

22. Is it important to have "**average area for renaturalization**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Renaturalization - restoring swamps, streams which were regulated during melioration projects and etc. During land consolidation some aspects in parallel could be realized.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **area foreseen for renaturalization** in the potential regions (municipalities)?

- more (MAX)
- less (MIN)

23. Is it important to have "**average area for re-cultivation**" criteria when defining the potential regions (municipalities) for comprehensive land consolidation?

Re-cultivation of areas previously used as waste dump, quarry, etc. During land consolidation some aspects in parallel could be realized.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **area foreseen for re-cultivation** in the potential regions (municipalities)?

- more (MAX)
- less (MIN)

24. If you notice that a very important criteria (for region/municipality level), according to your practice, is missed you can type it here and define maximize (MAX) or minimize (MIN) function. *(Optional)*

[Continue >](#)

Possible criteria to choose (rank) projects for implementation from all wishing applications for comprehensive land consolidation

25. Do areas foreseen for rural urbanization shows the potential for comprehensive land consolidation?

Projects can have areas foreseen for rural urbanization (prepared territory planning documents) and during land consolidation some aspects in parallel could be realized.

- Yes
 No

If **Yes**, should there be larger (MAX) or smaller (MIN) **areas for rural urbanization** in the potential territories?

- larger areas (MAX)
 smaller areas (MIN)

26. Do areas in bad road infrastructure condition shows the potential for comprehensive land consolidation?

Areas with bad road infrastructure condition could show potential for comprehensive land consolidation, as it is possible to improve situation.

- Yes
 No

If **Yes**, should there be larger (MAX) or smaller (MIN) **areas in bad road infrastructure condition** in the potential territories?

- larger (MAX)
 smaller (MIN)

27. Do areas in bad drainage/irrigation infrastructure condition show the potential for comprehensive land consolidation?

Areas with bad drainage/irrigation infrastructure condition could show potential for comprehensive land consolidation, as it is possible to improve situation.

- Yes
 No

If **Yes**, should there be larger (MAX) or smaller (MIN) **areas in bad drainage/irrigation infrastructure condition** in the potential territories?

- larger (MAX)
 smaller (MIN)

28. Is it important to have "average number of locals" criteria when selecting from several potential project territories for comprehensive land consolidation?

Locals - people living in the project territory or near it. People living locally can be more attached with the land and are more motivated for improvements.

- Yes
 No

If **Yes**, should there be more (MAX) or less (MIN) **locals** in the potential project territory?

- more (MAX)
 less (MIN)

29. Is it important to have "**number of countryside tourism objects**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Countryside tourism objects shows that rural dwellers have alternative sources of income and has a broader attitude (not only focusing on agriculture).

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **countryside tourism objects** in the potential project territory?

- more (MAX)
- less (MIN)

30. Is it important to have "**average number of prosperous farmers**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Prosperous farmers - (young) farmers who are work fulltime and persist only from agricultural activities.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **prosperous farmers** in the potential project territory?

- more (MAX)
- less (MIN)

31. Is it important to have "**number of abandoned structures**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Abandoned structures - fallow collective or State farm buildings, infrastructure objects which could be demolished in parallel with land consolidation project.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **abandoned structures** in the potential project territory?

- more (MAX)
- less (MIN)

32. Is it important to have "**number of objects foreseen for public needs**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Objects foreseen for public needs - various public spaces: beach, marketplace, cemeteries, cultural houses and etc. which could be developed in parallel with land consolidation project.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **objects foreseen for public needs** in the potential project territory?

- more (MAX)
- less (MIN)

33. Is it important to have "**employable persons (20-64 age)**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Employable people - people, who have education and are ready to live and work in rural areas. Such people could have broader attitude to the redevelopment, accepts innovations and has less emotional bonds.

Yes

No

If **Yes**, should there be more (MAX) or less (MIN) **employable people (20-64 age)** in the potential project territory?

more (MAX)

less (MIN)

34. Is it important to have "**abandoned land**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Abandoned land - land which has a potential, but for some reasons for several years have not been used. Abandoned land could show potential that land could be returned to the agricultural production.

Yes

No

If **Yes**, should there be more (MAX) or less (MIN) **abandoned land** in the potential project territory?

more (MAX)

less (MIN)

35. Is it important to have "**average parcel size**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Average parcel size (ha) - agricultural or forest land. Small parcels can show that there is urgent need to increase parcel size.

Yes

No

If **Yes**, should there be larger (MAX) or smaller (MIN) **parcels** in the potential project territory?

larger (MAX)

smaller (MIN)

36. Is it important to have "**average agricultural holding size**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Yes

No

If **Yes**, should there be larger (MAX) or smaller (MIN) **agricultural holdings** in the potential project territory?

larger (MAX)

smaller (MIN)

37. Is it important to have "**average distance from farmstead to the fields**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Average distance (km) from homestead to the fields. During land consolidation it is possible to concentrate land parcels near the farmstead.

- Yes
- No

If **Yes**, should there be longer (MAX) or shorter (MIN) **distances from farmstead to the fields** in the potential project territory?

- longer (MAX)
- shorter (MIN)

38. Is it important to have **average land fragmentation index** criteria when selecting from several potential project territories for comprehensive land consolidation?

Land fragmentation index - index which takes into account shape, size, ownership and etc. The smaller the value, the higher the degree of land fragmentation.

- Yes
- No

If **Yes**, should there be higher (MIN) or lower (MAX) **degree of fragmentation** in the potential project territory?

- higher (MIN)
- lower (MAX)

39. Is it important to have "**average soil productivity score**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Land (soil) productivity score/index shows the agricultural production potential.

- Yes
- No

If **Yes**, should there be higher (MAX) or lower (MIN) **soil productivity score** in the potential project territory?

- higher (MAX)
- lower (MIN)

40. Is it important to have "**number of land use constrains**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Land parcels may have land use constrains (mortgage, arrest) that can influence land mobility.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **land use constrains** in the potential project territory?

- more (MAX)
- less (MIN)

41. Is it important to have "**number of land tenure constrains**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Land tenure after land reform may have land tenure constrains: no access, land conflicts with neighbours and etc.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **land tenure constrains** in the potential project territory?

- more (MAX)
- less (MIN)

42. Is it important to have "**average area owned by land fund/bank**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Land fund/bank (government) may give land for public needs, for land reform corrections, in order to facilitate land mobility, to support young farmer's establishment and etc.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **area owned by land fund/bank (government)** in the potential project territory?

- more (MAX)
- less (MIN)

43. Is it important to have "**average area for afforestation**" criteria when selecting from several potential project territories for comprehensive land consolidation?

During land consolidation poor soil productivity land and land with inconvenient relief could be foreseen for afforestation.

- Yes
- No

If **Yes**, should there more (MAX) or less (MIN) **area foreseen for afforestation** in the potential project territory?

- more (MAX)
- less (MIN)

44. Is it important to have "**number of eco-farms**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Eco-farms - farms which declares ecological farming.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **eco-farms** in the potential project territory?

- more (MAX)
- less (MIN)

45. Is it important to have "**average area for soil erosion prevention**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Water, wind affects soil erosion. Prevention may be done by introducing specific measures i.e. hedge rows.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **areas for soil erosion prevention** in the potential project territory?

- more (MAX)
- less (MIN)

46. Is it important to have "**average area for natural resource conservation**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Natural resource conservation - land to be eliminated from intensive farming.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **areas for natural resource conservation** in the potential project territory?

- more (MAX)
- less (MIN)

47. Is it important to have "**average area with natural habitats**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Vulnerable areas which are potential for protection.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **areas with natural habitats** in the potential project territory?

- more (MAX)
- less (MIN)

48. Is it important to have "**number of ongoing/planned alternative energy projects**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Solar, wind, water power projects.

- Yes
- No

If **Yes**, should there be more (MAX) or less (MIN) **ongoing/planned alternative energy projects** in the potential project territory?

- more (MAX)
- less (MIN)

49. Is it important to have "**average area for re-naturalization**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Re-naturalization - restoring swamps, streams which were regulated during melioration projects and etc. During land consolidation some aspects in parallel could be realized.

- Yes
 No

If **Yes**, should there be more (MAX) or less (MIN) **areas foreseen for re-naturalization** in the potential project territory?

- more (MAX)
 less (MIN)

50. Is it important to have "**average area for re-cultivation**" criteria when selecting from several potential project territories for comprehensive land consolidation?

Re-cultivation of areas previously used as waste dump, quarry, etc. During land consolidation some aspects in parallel could be realized.

- Yes
 No

If **Yes**, should there be more (MAX) or less (MIN) **areas foreseen for re-cultivation** in the potential project territory?

- more (MAX)
 less (MIN)

51. If you notice that a very important criteria (for project level), according to your practice, is missed you can type it here and define maximize (MAX) or minimize (MIN) function. *(Optional)*

[Continue >](#)

Criteria system for defining potential territories for land consolidation



Page 5 of 5

End of survey

THANK YOU FOR TAKING THE TIME TO COMPLETE THIS SURVEY
YOUR CONTRIBUTION IS HIGHLY APPRECIATED

If you have any questions, comments or any material relevant to the survey please contact:

Mr. Giedrius Pasakarnis,
PhD researcher at Liverpool John Moores University
Mobile: +370-616-10343
Skype: konsolidacija
E-mail: P.Giedrius@2008.ljmu.ac.uk