

Land cooperatives as a model for sustainable agriculture: A case study in Germany

**Peter Burjorjee
Yoeri Nelis
Benedikt Roth**



Blekinge Institute of Technology
Karlskrona, Sweden
2017

Examiner: Henrik Ny Ph.D.
Supervisor: Professor Karl-Henrik Robèrt
Primary advisor: Edith Callaghan
Secondary advisor: Liesel Carlsson

Land cooperatives as a model for sustainable agriculture: A case study in Germany

**Peter Burjorjee
Yoeri Nelis
Benedikt Roth**

Blekinge Institute of Technology
Karlskrona, Sweden
2017

Thesis submitted for completion of Master of Strategic Leadership towards Sustainability,
Blekinge Institute of Technology, Karlskrona, Sweden.

Abstract:

Agriculture is involved in the sustainability challenge; we need to feed humanity on limited land resources. The concentration of land in fewer hands, its rising price, and the industrialization of agriculture are causing the loss of the small farm. In recent years, cooperatives have been developed in Germany whereby farmland is acquired through their memberships and leased to farmers for small-scale organic farming on a semi-permanent basis.

The contribution to greater sustainability of the cooperatives is investigated through the commons design principles, the adaptive capacities, the sustainability principles and FSSD. This is done through document research and semi-structured interviews with founders and of the BioBoden, Kulturland and Ökonauten land cooperatives in Germany.

Results show that the cooperatives display many of the principles needed for social sustainability directly and for ecological sustainability through their mandated organic farming. Through their democratic structure, they also enable and exhibit some of the Commons Principles needed for successful commons governance.

The cooperatives' role in greater sustainability will depend on their ability to grow their memberships and as niche innovators the cooperatives can act as seeds in helping develop a new and more sustainable agro-social paradigm.

Keywords: sustainability, commons, land cooperative, agriculture, Germany

Statement of contribution

Karlskrona, May 2017

This thesis is the result of the collaborative efforts of Benedikt Roth, Peter Burjorjee and Yoeri Nelis. The written content of the introduction, methods, results, discussion and conclusion where a joint effort while the unique personal creative traits described below raised the quality and standard of the overall final product.

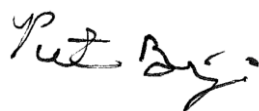
Benedikt has proven a most valuable bridge from Germany to Karlskrona with both his fluency in German and his friendly persona. He maintained contact with the cooperatives throughout the project and reached out to whoever was needed at the time. This social skill also proved valuable to our group, where he repeatedly created visuals of our day-to-day tasks in an engaging way. He is a diligent worker who is committed to the overall process and aims to facilitate for every group member with great empathy. Benedikt proved to be a committed team member whose enthusiasm was uplifting throughout the process and his awareness on the personal level was comforting to work with.

Peter has proven to have a talent for precise and concise writing. He has been a productive force with a clear talent for analysing new information and producing new cohesive ideas with efficiency. His patient posture ensured that everybody was heard and understood correctly before concluding any discussions. This patient calmness also showed during times of high workload where he proved to be a grounding force within the group, contributing to a continuous workflow. His eye for detail in the writing has proved vital. With his ability in English, he meticulously and patiently edited the text, by making corrections and improving the writing for style and content bringing it into one voice. Lastly, his passion for philosophy enriched many team meetings with his opening quotations of our hero Marcus Aurelius who was known to remain calm in a storm.

Yoeri has spent time patiently incorporating feedback from various sources, generating the structure of the report and concepts for various sections, particularly the research design. His clarity helped the team to make smart steps forward. He has repeatedly demonstrated a willingness to revisit the work in form and content, constantly holds an overview and tries to get the group to improve upon it. He has created visuals of concepts on several occasions and his efforts to create schedules have helped keep the group on track. His enthusiasm for food has been a personal benefit to the team and his drive to keep the project moving unwavering.



Benedikt Roth



Peter Burjorjee



Yoeri Nelis

Acknowledgements

This thesis would not have been possible without the support of the community surrounding the Masters in Strategic Leadership towards Sustainability and those who contributed to our work in indispensable ways outside of Karlskrona.

We would like to sincerely thank our primary advisor Edith Callaghan. Throughout the entire process her feedback has been instrumental, precise and motivating. As a group, we feel that she struck the right balance between stretching our abilities as researchers and boosting the group's morale during the challenging process. Our thesis would not have been the same without her direct and timely advice and we are thankful to have both worked and learned with her. We would also like to thank Liesel Carlsson, our secondary advisor, her expertise on the topic of the food system pointed us in the right direction early in the writing process and her uplifting personality, willingness to help and detailed feedback were facilitatory to our end result.

Secondly, a big thank you goes out to the individual contributions of our interviewees so we would like to extend our gratitude to: Alexander Schwedeler, Titus Bahner, Stephan Decke, René Tettenborg and, especially, Tobias Keye whose generosity in hosting us in North-East Germany enabled us to contextualize our work and explore the region with its farms and cultural history.

We would also like to give thanks to the staff at the Department of Strategic Sustainable Development and our classmates and friends of MSLS. Their efforts in coordinating the thesis writing process, holding up valuable mirrors to our work and overall support have been a useful contribution.

Finally, we would like to recognise all the friends and family from the Netherlands, Canada, Germany and beyond, that supported us throughout this academic journey; your encouragement has also been essential to this work.

Executive summary

Introduction

Humanity, numbering around 7 billion, is pressuring our planet's resources and ecosystems, changing fundamental biogeochemical processes and the basic chemistry of the atmosphere and oceans (Steffen et al. 2004). There are few parts of the planet not affected by the demands, waste and reach of modern civilization and agriculture, in attempting to feed our growing numbers, is a substantial contributor to the sustainability challenge. Its industrialization and resultant dependence on vast inputs of energy, largely fossil fuels, and materials such as fertilizers and pesticides mean that growing our food is now toxic to the planet, to say nothing of ourselves and the animals in the food supply chain. Industrial agriculture is causing a loss of biodiversity, a reduction in soil and water quality while contributing GHGs through direct fossil fuel consumption and the emission methane of livestock (Foley et al. 2005).

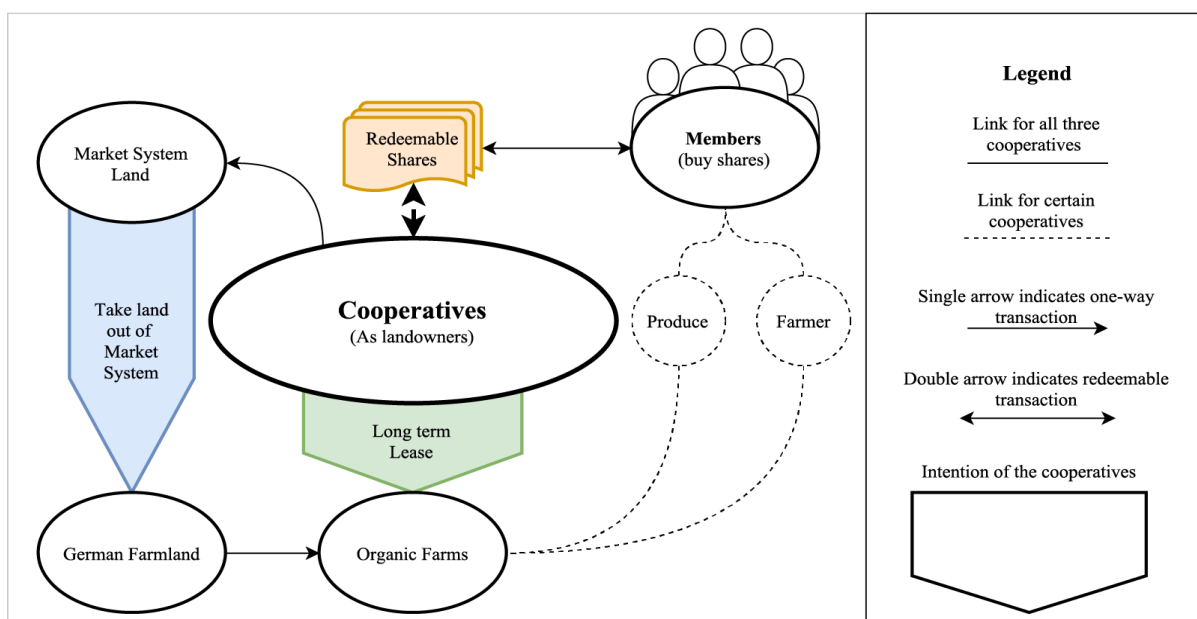
Agriculture, aside from some specialized exceptions, is dependent on land and arable land itself is becoming a scarce resource with almost 40% of the terrestrial surface already under cultivation (Foley et al. 2011). The loss of the small farm is caused by many factors but chief among them is the rising cost of land and its concentration into fewer hands and ever larger corporations. Farmers are being priced out of the land market by other agricultural players, speculative investment and even conservation and renewable energy projects that require land in what has been termed 'green grabbing' (Fairhead et al. 2012). This is happening around the world, where in the wake of the 2008 Global Financial Crisis, investors looking for a safe place to park their money found agricultural land met that requirement with the additional benefit that it could also provide profits through the production of food. Arable land became the new prize with its twinned benefits of steady appreciation not unlike typical real estate and its profitable produce. This change in the perception of arable land (i.e. as an investment vehicle to be divulged at a future date) is significant. Land concentration is occurring in Germany where the number of small farms of 2 ha or less has decreased from 124 000 in 1990 to only 20 000 in 2007 and the trend to larger farms continues (Margulis et al. 2013). The loss of the small farm, the increasing role of speculative investment in agricultural land, and the intensification of agriculture all mean that the historic relationship humans have had with land, soil and our food supply is irrevocably changing.

Various authors are arguing for a change in land policies at both a European (Franco et al. 2015, EESC 2015) and German level (BLAG 2015, Tietz and Forstner 2014). They are arguing for new and stronger regulations including limits on the acquisition of land among other strategies to protect farmers. However, at this time, although awareness of these issues has increased, no policy changes have been made that significantly alter the previously mentioned forces that are at play (Heinke 2016). Thus, there is a need for a novel solution to help small-scale farmers acquire and maintain their holdings for farming.

In response, a new structure has been developed to try to solve the problematics. In Germany, three land cooperatives (BioBoden eG, Kulturland eG and Ökonauten eG) have been founded that are pooling the money of the membership to acquire land from the market and lease it at reasonable rates for organic farming on a semi-permanent basis. By taking land out of the market system, with no intention to sell it for profit, these coops aim to protect agricultural land as a type of common good. They are inviting the membership, the public who buy shares, to collectively purchase land and ensuring that it remains with organic farmers and practice. Three such coops have been founded since 2013, variously acquiring either farmland or land with

farms and/or equipment, and leasing them at fair rates that can be supported by their agricultural production.

The cooperatives intend to not only benefit their own members but also have positive social and ecological sustainability impacts. From the Kulturland preamble (Kulturland eG 2014): “The use of agricultural land should not be determined by only rules to maximize profit. Agriculture should rather preserve the fertility of the soil in the long term, produce plant products combined with high biodiversity and thus support livelihood for humans and animals. It maintains and preserves cultural landscapes as a place and home to human communities.” BioBoden states they are “guided by the common belief to improve the living conditions in rural areas by ecologically operated agriculture and forestry by sustainably and permanently ensuring a responsible use of the resources required” (BioBoden eG 2015). Thus, the cooperatives see themselves as more than a means of farming and speak to both social and ecological sustainability in their visions. A schematic of the cooperative structure is provided below:



The view of land as part of a commons is investigated through the work of Helfrich and Ostrom. Helfrich (2012) finds that there are implications for governance, collaboration and conservation (among others) that stem from the difference of common vs private property. Elinor Ostrom in looking at diverse CPR problems over many years finds that good governance depends on eight commons principles. These design principles are found to be operating where commons are well protected and have continued to provide benefits to users for long time periods; in other words, when the design principles are functioning, they lead to sustainability. They require for example that the users and resources are clearly defined, that rules are collaboratively developed for local conditions by the people using the resource and that monitoring of users and a system of graduated sanctions are in place to dissuade violators and motivate other users to adhere to the rules. The cooperatives, in stating that they view land as commons provide an opportunity to examine the operation of the commons principles.

The three cooperatives are investigated with respect to sustainability by looking at the commons (Ostrom's) and sustainability principles as well as the essential elements (Broman and Robèrt)

found to protect the resiliency of social systems (adaptive capacities). This led to the following research questions:

PRQ: *What is the role of land cooperatives in greater sustainability?*

What can we learn about land cooperatives by observing them through the lens of...

SRQ 1: *...Ostrom's Commons Principles?*

SRQ 2: *...the Sustainability Principles?*

SRQ 3: *...Adaptive Capacities of human social systems?*

SRQ 4: *...the conceptual 5 Level Framework?*

Methodology

The research was based on semi-structured interviews with the founders, farmers and staff of the three cooperatives as well as analysis of their statutes and other documents; a background literature review provided context and the theoretical underpinning of the research. The qualitative interviews had questions focussed on both the SP's and CP's and also contained aspects to investigate protection of the adaptive capacities (Appendices A and B). The selection of the interviewees was made based on expertise with at least two of the following four topics and availability to us: agriculture, finance, land and commons. The interviews were recorded digitally and later transcribed verbatim with the interviews performed in German (i.e. the farmers) then transcribed to English.

The transcriptions of the interviews were coded independently by two researchers for three sets of *a priori* principles, the SP's, AC's, and CP's and then for themes that were emergent from the text itself. The themes found by the two researchers were then compared and where no agreement could be reached the themes were omitted.

Finally, the researchers brought together the data collected from the different sources (document research and interviews) for cross-verification with the purpose of building a more robust research result (Altricher et al. 2008).

Results

The results of the assessment with the SP's, CP's and AC's shed light on the cooperatives' operations and their relation to sustainability; a summary is presented below.

Findings on SP's

Overall the cooperative model does not differ regarding SP1 to any other (organic) farm in its farming operations, they are found to largely adhere to SP2 by not using petrochemical fertilizers and pesticides, SP3 by well-managing ecosystems and protecting biodiversity on land, SP5 by ensuring people's influence on the co-owned land, SP6, by ensuring capacity building on different levels, SP7, through impartial treatment of members and farmers and SP8 by revitalizing a connection of people to the land. However, SP4, protecting health, was less visible in the interviews and documents analysed. This may have been due, in part, to the questions asked. Overall, the findings show that operation of the cooperatives is largely within the boundaries of the SP's indicating that they are having a positive impact and can help in the transition to a sustainable society.

Findings on CP's

The results below demonstrate that the cooperatives align with the principles of establishing a clear boundary, matching rules to local conditions, having the respect of outside authority and

responsibility being nested in tiers from the lowest level up. The modification of the rules by those affected, monitoring of member behaviour by the membership, the use of graduated sanctions for violations and a simple method of dispute resolution were harder to isolate from the interviews and document research. The alignment of the cooperatives with only some of the commons principles shows that there may be room to improve the governance structure particularly with regard to a process of simple dispute resolution. The other elements could be improved or they may not be truly applicable to the cooperative situation where the land is really only used by the appointed farmer; the land, although collectively owned, is not really subject to multiple appropriators.

Findings on AC's

The AC's were used to examine the internal governance structures of the land cooperatives to understand their contribution to sustainable development. This analysis is different from the five social SP's in that they address the basic mechanisms that can systematically undermine the adaptive capacities, not for evidence of their operation. Overall, the results below demonstrate that the cooperatives show evidence for all five AC's: 1) diversity, by having a variety of backgrounds in the governance structure and (assumed) diverse opinions through the membership; 2) self-organization, through the cooperatives' legal structures and local engagement of members surrounding farms; 3) trust, by working together on a friendly and respectful basis without giving interest to the members; 4) self-learning, through capacity building on different levels and 5) common meaning, by having a clear shared purpose; reconnecting people to the land and enabling farmers access to land. Governing, cooperatively owned land trusts in a way that fosters adaptivity in the system is important to be able to adjust to the changing.

Findings based on 5 LF (Appendix C)

System Level	The land market, agriculture and the ownership structure and membership
Success Level	The ability to make farmland available to farmers, to maintain the fertility of the soil, to promote a sense of community
Strategic Level	Acquire land below market price, help farmers in need, protect the soil
Actions Level	Sell memberships, acquire land, lease it to organic farmers
Tools Level	Organic certification (EU/other), cooperative statutes, meetings

Discussion

The cooperatives showed many of the attributes of the CP's, SP's and AC's. Through their use of certified organic farming and democratic, inclusive approach to governance, the cooperatives demonstrate many elements of both ecological and social sustainability but their role in the greater challenge may be limited by their lack of a clear and coherent vision to inform their decisions and engage and inspire their membership.

In terms of greater sustainability, the fact that the cooperatives exhibit many features of good commons governance gives them a better chance of successfully maintaining land for farming and their operations. To the extent that they have made land a commons, they adhere to the commons principles.

Applying the lens of the FSSD to the cooperatives proved challenging. By embracing the SP's as constraints, it will help the cooperatives to select, combine and develop additional strategic guidelines and actions needed to operate in a truly sustainable way. Most importantly, without clear guidelines to decide upon sustainable actions the cooperatives will not be strategically aimed at becoming more sustainable.

Even though the cooperatives (in particular BioBoden) have accumulated a considerable amount of capital from members in a short amount of time, the numbers indicate that the cooperatives cannot presently compete with the rate at which land concentration and loss of the small farm is happening. In short, solving the problems of land concentration through membership funded cooperatives presently has clear quantitative limits. By removing land from the market, the cooperatives are counteracting speculation and have reacted quickly to solve the land problem in a practical way but they will need other actions to expand their influence.

The findings indicate that the cooperatives in bringing land into collective ownership, have tapped into a timely cultural shift. The renewed interest in farmers' markets, locally sourced and organic food, reflect this desire of a more sustainable food system (BMEL 2017). This offers great potential as they are already connected with similar initiatives on a regional and European level. Several civic initiatives have recently emerged that also challenge commonly accepted perceptions of land ownership, farm succession, farmers' identities as well as the role of consumers (Hagenhofer 2015, Rioufoul 2012). The cooperatives can be viewed as niche innovations within the Multi-level perspective on transitions (Geels 2011) and therefore similar actors towards a new agro-social paradigm. These niches are essential for transitions in providing the seeds for systemic change (Geels 2002). In short, the contribution to greater sustainability relies to a significant extent on the cooperatives' effectiveness in utilizing this transitional dynamic to advance to a new agro-social paradigm established on the regime level.

Conclusion

Land cooperatives have a role to play in the development of a more sustainable food system. They are a democratic model that exhibits many features of the commons principles for good governance, and through both their structure, operations and mandated use of organic farming, show alignment with many of the SP's and AC's.

The study revealed that despite having a sustainability 'vision' the cooperatives are lacking a principled approach and here the FSSD can provide guidance, particularly at the success and strategic levels. A robust approach to sustainability can be developed around the 8 SP's and the development of a strategy would help prioritize and guide actions.

The cooperatives developed quickly and provide a practical response to the land concentration problem, removing land from the market and ensuring that organic farming continues. The extent to which the cooperatives can grow may be limited by their ability to tap into a cultural desire for a reconnection to the land, protection of small farms and a sense of community, elements often missing from our present food system. Although presently small, as niche innovators the cooperatives can act as seeds among similar civic initiatives in helping develop a new and more sustainable agro-social paradigm. The ability of cooperatives to raise awareness in the membership of the greater challenge, take political action, share their expertise to spread their model as a means for reconnection to the land, will go a long way in determining their future impact upon greater sustainability challenge.

Glossary

Agro-social Paradigm: Defined by Monllor (2012), who found pattern of civic initiatives that shape attitudes and practices of farmers, contributing to the anchoring of community-connected, ecological agriculture in Europe. The components consist of the local scale, diversity, the environment, cooperation, innovation, autonomy, social commitment, and a 'slow' focus.

Atmosphere: The layer of gases that surround the Earth and support life extending and thinning to the Karman line.

Backcasting: As the opposite of forecasting, backcasting is a strategic planning approach that starts with defining a vision of success in the future based on scenarios or basic principles (i.e., constraints that must be met to maintain a system). Then, the best possible measures are chosen that lead in the right direction toward the vision of success (Broman and Robèrt 2017).

Biogeochemical cycles: any of the natural pathways by which essential elements of living matter are circulated. The term biogeochemical is a contraction that refers to the consideration of the biological, geological, and chemical aspects of each cycle (Enzyklopaedia Britannica 2017).

Biosphere: The global ecological system integrating all living beings and their relationships, including their interaction with the elements of the lithosphere, geosphere, hydrosphere, and atmosphere (and parts of the cryosphere) (Dorph et al. 2017).

Brundtland definition of Sustainability: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Hauff et al. 1987, 41).

Commons: Cultural and natural resources made accessible to all members of society, including natural materials such as air, water, and a habitable earth. These resources are held in common, not owned privately with the aim to preserve their capacity of reproduction on a long-term (Helfrich 2012).

Civic Initiatives: Networks and organisations from civil society which are operationally involved in promoting access to land and sustainable stewardship (Hagenhofer 2015).

Eutrophication: A process by which pollution from such sources as sewage effluent or leachate from fertilized fields causes a lake, pond, or fen to become overrich in organic and mineral nutrients, so that algae and cyanobacteria grow rapidly and deplete the oxygen supply (American Heritage Dictionary of the English Language 2011).

Food system: A system that includes all processes and infrastructure involved in feeding a population, also including the inputs needed and outputs generated at each of these steps.

Hydroponics: Subset of hydroculture, the method of growing plants without soil, using mineral nutrient solutions in a water solvent.

Intensification (of agriculture): Characterised by a low fallow ratio, higher use of inputs such as capital and labour, and higher crop yields per unit land area.

Land concentration: Land control and ownership is becoming concentrated into ever fewer, large holdings under the control of a few corporate entities which undermines the capacity of many farming households to construct and defend their livelihoods and maintain their autonomy (Van der Ploeg et al. 2015).

Land cooperatives: Cooperatives that acquire farmland through pooled use of membership shares and donations and lease it on a long-term basis to organic farmers.

Land grabbing: Extensive purchases of agricultural land by capital-intensive investors, which can be observed on an increasing scale worldwide (Heinke 2016).

Land hunger: Financially sound investors with a non-agricultural background aiming at buying land leading to difficult access to agricultural land on purchase or leasing for small farms in general and start-up farms in particular (Heinke 2016).

Monoculture: The growth of a single species of plant often on a large scale, to facilitate industrial agricultural production.

Socio-ecological (system): Complex adaptive system that consist of the ecological unit, namely the biosphere and lithosphere, and a social unit with its associated social actors and institutions.

Subsistence farming: A type of farming in which most of the produce is consumed by the farmer and his or her family, leaving little or nothing to be sold.

Terrestrial surface: The earth's land (solid) surface.

List of abbreviations

5LF	5 Level Framework
AC	Adaptive Capacity
AC's	Adaptive Capacities
AWU	Annual Working Units
B	Billion
BaFin	Bundesministerium der Finanzen: Federal Ministry of Finance
BLAG	Bund-Länder-Arbeitsgruppe „Bodenmarktpolitik“: Focus Group for Land policy of the federal and states in Germany
BVVG	Bodenverwertungs- und Verwaltungs GmbH, State agency for the privatisation of former state land in DDR
CAP	Common Agricultural Policy
CFC's	Chlorofluorocarbons
CP	Commons Principle
CP's	Commons Principles
CPR	Common Pool Resource
CSA	Community Supported Agriculture
eG	Eingetragene Genossenschaft: Registered Cooperative in Germany
EU	European Union
EUR	Euro
FIMO	Farmland Investment Management Operation
FSSD	Framework for Strategic Sustainable Development
GDP	Gross Domestic Product
GDR	German Democratic Republic (DDR)
GFC	Global Financial Crisis
GHGs	Greenhouse gases
ha	hectare (10 000 m ² or 0.1 km ²)
MLP	Multi-Level Perspective on transitions
NO _x	Nitrogen Oxide
pa	per year
PRQ	Primary Research Question
SIC	<i>sic erat scriptum</i> , "thus was it written"
SP	Sustainability Principle
SP's	Sustainability Principles
SRQ	Secondary Research Question
UAA	Utilised Agricultural Area

Table of Contents

Statement of contribution	i
Acknowledgements.....	ii
Executive summary	iii
Glossary.....	viii
List of abbreviations.....	x
List of figures and tables.....	xiv
1. Introduction	1
1.1 Sustainability challenge and agriculture.....	1
1.2 Land acquisition, a global perspective	2
1.2.1 Land concentration in Europe	2
1.2.3 Acquiring agricultural land in Germany	4
1.3 Land cooperatives in Germany.....	6
1.3.1 Cooperative model and sustainable society	8
1.3.2 Promoting farmland as common resource	9
1.4 Managing commons	10
1.4.1 Commons principles	11
1.5 Framework for Strategic Sustainable Development.....	12
1.5.1 Sustainability principles.....	13
1.5.2 Adaptive capacities of human social systems.....	14
1.6 Addressing the cooperatives sustainability using SP's, CP's, AC's & 5LF	15
1.7 Purpose & research questions.....	16
1.8 Scope and intended audience.....	17
2. Methods	18
2.1 Interviews	18
2.2.1 Selection and sampling	18
2.2.2 Interview protocol	19
2.3 Document retrieval	20
2.4 Data analysis and interpretation	21
2.5 Validity	21
2.6 Limitations.....	22
3. Results.....	23
3.1 Alignment with Ostrom's commons principles.....	23
3.3.1 CP 1: Define clear group boundaries.	23
3.1.2 CP2: Matching rules to local needs and conditions.	23
3.1.3 CP3: Those affected can modify the rules.	24

3.1.4 CP4: Rules are respected by outside authorities.....	25
3.1.5 CP5: for monitoring members' behaviour	25
3.1.6 CP6: Graduated sanctions	25
3.1.7 CP7: Dispute resolution	26
3.1.8 CP8: Nested tiers of responsibility	26
3.2 Alignment with sustainability principles	26
3.2.1 SP1 – Mining	27
3.2.2 SP2 - Man-made pollutants.....	27
3.2.3 SP3 -Physical degradation	27
3.2.4 SP4 - Health	28
3.2.5 SP5 - Influence.....	28
3.2.6 SP6 - Competence.....	29
3.2.7 SP7 - Impartiality.....	30
3.2.8 SP8 - Meaning-making	31
3.3 Alignment with adaptive capacities of human social systems	31
3.3.1 Diversity.....	32
3.3.2 Self-organisation	32
3.3.3 Trust	32
3.3.4 Learning	33
3.3.5 Common meaning.....	34
3.4 Emergent themes	34
3.4.1 Land	34
3.4.2 Financial aspects	35
3.4.3 New forms of ownership.....	36
3.4.4 Unplanned circumstances	37
3.4.5 Future plans.....	37
3.4.6 Barriers to growth	37
3.4.7 Behaviour of members	38
3.4.8 Cultural background / history	39
3.4.9 Farmers perspective on the cooperative BioBoden	39
3.5 Five level framework cooperatives.....	40
4. Discussion	41
4.1 Cooperatives governance as commons.....	41
4.2 Understanding cooperatives through SP's.....	42
4.3 Adaptive governance	42
4.4 5-LF - Cooperatives through the lens of the FSSD	43
4.5 Implications for farmers	45

4.6 Land cooperatives as practical solution to arising land problem.....	45
4.7 Accessing cultural change	46
4.8 Reflection on research methods.....	48
4.9 Potential future research	48
5. Conclusion	50
Appendix A: Interview questions cooperatives	51
Appendix B: Interview questions farmers	52
Appendix C: Five Level Framework Cooperatives.....	53
References	55

List of figures and tables

Figure 1.1 Percent of holdings by size of size of the holding	3
Figure 1.2 Utilised agriculture area by the holding.....	3
Figure 1.3 Decreasing number of farms are managing more land in Germany	4
Figure 1.4 Map of stakeholders related to land cooperatives.....	7
Figure 1.5 CP's and SP's combined.....	15
Figure 1.6 Adaptive governance using the 5 AC's	16
Figure 1.7 Scope of our research.....	17
Figure 2.1 Illustration of alignments principle systems & cooperatives.....	18
Figure 4.1 Multi level Perspective on transition	47
Table 1.1 Agricultural holdings <5 ha and ≥100 ha in Europe	3
Table 1.2 Increase average price land per hectare in Germany	5
Table 1.3 Overview of current cooperatives in Germany and key differences.....	8
Table 1.4 Logic profit maximization vs. logic of the Commons	9
Table 1.5 Five Level Framework with implications if used to plan for sustainability	13
Table 2.1 List of primary interviewees	19
Table 2.2 List of farmers interviewed	19
Table 2.3 Collected documents for document analysis.....	20

1. Introduction

This thesis introduces the global sustainability challenge as related to agriculture and challenges to land ownership. How land financialization and concentration is undermining accessibility for German farmers is explained. In response to these challenges, a new organisational model in the form of land cooperatives has emerged in Germany that are a potential means of acquiring and maintaining land for organic farming as a common good. The chapter further introduces the Framework for Strategic Sustainable Development (FSSD), 5 Level Framework (5LF) Adaptive Capacities (AC's), Sustainability Principles (SP's) and Ostrom's Commons Principles (CP's) as the concepts and tools used to assess in what ways the land cooperatives may be effective at protecting farmland as a common resource and can be seen as a contribution to broader sustainability. Finally, the purpose, research questions and scope of this thesis are presented.

1.1 Sustainability challenge and agriculture

The earth, a brilliant pinnacle of evolved complexity and woven layers of ecological interdependence, now stands on a precipice of our own making. Currently, one creature is the main force shaping the planet; changing its biogeochemical cycles, causing physical degradation of resources and ecosystems, altering the chemistry of the oceans and atmosphere thereby affecting the thermostat of the planet (Steffen et al. 2004). That creature is us, humanity, numbering more than 7 billion people and growing (UN DESA 2015), is rapidly changing the ecosystem of our home planet.

One of the most significant drivers of this global shift is agriculture, the largest use of land on our planet. Apart from hydroponics and a few other specialized techniques, almost all agricultural production relies on arable land and fertile soils. Currently, agriculture occupies 38% of the Earth's terrestrial surface with most of the remaining 62% less suited for farming (Foley et al. 2011). Croplands cover 1.53 billion ha or 12% while pastures (fields covered with grass or herbage suitable for livestock grazing) cover 3.38 billion ha or 26% of the planet's ice-free land respectively (FAO UN 2016). With the expansion of civilisation and increasing demand for cropland, energy and resources, humanity is undermining the capacity of ecosystems to sustain food production, maintain forests, freshwater and regulate the climate (Foley et al. 2011). The two main drivers of environmental impact in modern agriculture are: 1) intensification and 2) pasture expansion (Foley et al. 2005). Through intensification, our need for artificial fertilizer, irrigation, pesticide and energy use has dramatically increased, resulting in reduction in water and soil quality, eutrophication of surrounding waters, and species loss among many others. Secondly, pasture expansion, is responsible for the main conversion of natural ecosystems and therefore physical degradation of the biosphere (Foley et al. 2005).

In short, we are confronted with a challenging balancing act of meeting humanity's food requirements, and maintaining the biosphere's capacity to replenish itself (Alexander et al. 2015). Like air and water, agricultural land makes a critical contribution to humanity across all cultures; as such it can be viewed as a common resource. With the population set to reach 9.7 billion by 2050 people we would do well to find a way using land in a more sustainable way (UN DESA 2015).

1.2 Land acquisition, a global perspective

Historically subsistence farming dominated agriculture with many people working small plots of land. In modern times, however, available arable land, and the essential soil contained therein, is being concentrated into fewer hands, resulting in larger farms and the spread of industrial agriculture. This relies on fewer workers but greater material and energy inputs to drive production and profit (Bahner et al. 2012). Structural forces are at play; recent massive land purchases in the global South by state or institutional investors from the North have come to the public attention but these headline ‘land grabs’ are not the only way that land is being brought under new forms of ownership, foreign or otherwise (Fairbairn 2014). There are a diverse and complex set of factors that are causing the concentration of land in the hands of the few - fundamentally the nature of land as a means of agricultural production is being simultaneously challenged as a tool of financial capital, that can be traded and hedged upon as its value appreciates not unlike other financial instruments (Fairbairn 2014). There is demand for new investment vehicles in the long, wide wake of the 2008 Global Financial Crisis (GFC) and land is an appealing investment. There are two elements to this story 1) the fundamental shift in the perception of land that led to the creation of methods and tools to treat land as a financial product and allow the concentration to happen and 2) the concentration of the land ownership in hands of fewer corporations (Fairbairn 2014). Taken together, these two aspects, fundamentally change the nature of historical land ownership and the methods and means of agricultural production. This has significant impacts on labour, energy requirements, food production, security and ultimately the sustainability of the food system and human and animal lives themselves (Bahner et al. 2012).

1.2.1 Land concentration in Europe

As the population becomes increasingly urbanized and the distance from farm to table grows, people are less likely to think of where food comes from or about farmland. The forces of land concentration are global in nature and Europe is being affected in much the same way as elsewhere. A preliminary analysis of the land concentration and land grabbing in Europe, done by Van der Ploeg et al. (2015), shows that in 2012 there were more than 170 million ha Utilised Agricultural Area (UAA), over 40% of European land area, with 12 million farms and 25 million farm workers and nearly 10 million Annual Working Units (AWU) or full-time equivalent jobs. The first part of the shift occurred with a change in 2010 in EU policy - the Common Agricultural Policy (CAP), which formerly guaranteed *prices*, was altered to subsidise production including payments for leases, in part based on a per hectare subsidy. This created a driving force for farms to grow in size. From 2000 to 2011 product subsidies decreased from 26.6 billion to 4.7 billion € (a decrease of 21.9 billion) but production subsidies rose from 2 billion to 50.9 billion – a staggering net increase of 47 billion € representing a near doubling of total subsidies with much of this dedicated to land. Although bigger farms may not be more efficient at producing food at large scales (the largest farms, occupying 20% of the EU UAA area only produce 11% of the yield (Martins and Tossdorff 2011), they are more efficient at capturing subsidies. In Italy, in 2011 a mere 0.29% of farms captured 18% of CAP subsidies. In Spain 2009, 16% of farms captured a massive 75% of available subsidies (Van der Ploeg et al. 2015). In 2012 the 6 million farms of less than 2 ha of land, representing 49% of all holdings (as visible in figure 1.1), had only 2% of UAA under their ownership (as visible in figure 1.2). Large farms greater than 100 ha, some 3% of farms, held almost half of the UAA of the entire EU-27 (Van der Ploeg et al. 2015). There are no accurate statistics available of farm size distribution (they are simply categorized differently by each member state as ‘large’ above a

certain threshold which may be only 100 ha) but the distribution of farmland is heavily skewed; megafarms may be few but have most of the land already. Farms over 1000 ha represent a mere 0.6% of properties and hold 20% of all UAA in Europe (Martins and Tossdorff 2011) This amounts to 35 million ha which is equal to the total land area of Germany. In short, the biggest farms are already enormous and expanding as they swallow smaller farms and subsidies.

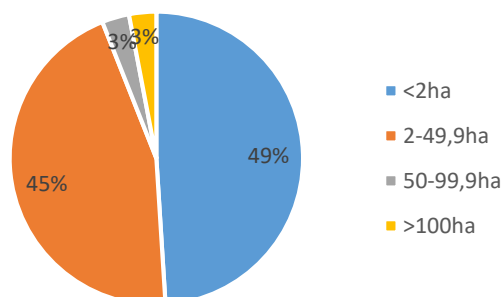


Figure 1.1 Percent of holdings by size of the holding (UAA), 2010 (Coyette et al. 2012)

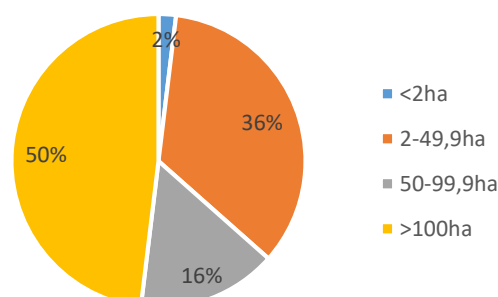


Figure 1.2 Utilised agriculture area by the holding (UAA), 2010 (Coyette et al. 2012)

Table 1.1 Agricultural holdings <5 ha and ≥100 ha in Europe, 2005 - 2013 (Eurostat 2015)

Size of Holding UAA/ Period	2005	2007	2010	2013	2005- 2013
Farms <5ha	10,056,610	9,489,550	8,233,790	7,013,670	≈ -30%
Farms ≥100ha	292,950	305,820	325,860	336,740	≈ +15%

The people that are making these deals represent a new type of financial-agricultural elite. They are politically connected, familiar with the system and have the means, money and influence to make deals for land (Van der Ploeg et al. 2015, Clapp 2014). These actors are looking for places to temporarily park money and realize capital gains and with favourable tax policy to agricultural holdings, production of the land therefore becomes secondary. Overall, Europe's ecological capital is now being concentrated by people and corporations whose primary motivation is not sustainable food production or even agriculture. Small farms, long term fertility of the soil, decent employment opportunities and cultural capital are at risk from this shift (Van der Ploeg et al. 2015).

Surprisingly, the environmental movement itself is in part responsible for the changes that are underway. In what has been termed 'Green Grabbing' (Fairhead et al. 2012), the desire to protect the land for conservation efforts and the space needed for 'renewable' energy projects such as solar and wind are creating other forces for bringing pieces of land together. Incentives for biofuels mean that land that was once under food production is now an intensively grown monoculture, with all its inherent problems. Heavily subsidized solar projects can outcompete farmers for land. For instance, in Sardinia, a 27 MW project by Enervitaio that occupies 64 ha of what was prime farmland had access to annual subsidies of 7 million € over a 20-year period (Van der Ploeg et al. 2015). Land that once brought employment and decent income to families was purchased for 40,000 EUR/ha and now feeds the electrical grid. The intersection of public environmental awareness, energy policy, lobbyists, and agriculture can have unintended effects if not well planned, and the grabbing of land for conservation efforts and the renewable energy sector in particular, is another path by which land is concentrated in Europe.

In short, for Europe the trend of concentration means the further stratification of wealth as landowners can profit from escalating prices and rents, changes to agricultural production, land use, and all too often the loss of the small farm. The diminishing quantity of remaining land facing the pressures of agriculture, conservation and urbanisation is rapidly rising in value making it even more attractive to speculators (and further out of reach of farmers) in a positive feedback loop that supports the upward trajectory of land prices.

1.2.3 Acquiring agricultural land in Germany

In Germany, there are many global and sectoral forces at play that are causing a rapid escalation of land prices (Fabjancic 2016). This combined with the EU's Common Agricultural Policy (CAP) which has shifted from subsidizing products to subsidizing means of production result in *"a CAP subsidy scheme that favours elite large holdings, marginalise small farms and block the entry of prospective farmers"* (Van der Ploeg et al. 2015). Over half of Germany's land is in agricultural use (German Federal Office for the Environment 2016) and in terms of ownership, 38% of the agricultural land is privately owned, 60% is leased to farmers and 1.4% of the land is given to farmers without expecting financial return (German Association of Farmers 2015).

With the number of farms in Germany shrinking from 541,000 in 1991 to 287,500 in 2012 (Margulis et al. 2013) German farms of 2 ha or less decreased in number from 124 000 in 1990 to only 20,000 in 2007 and the trend to larger farms continues as is visible in figure 1.3. Small farms now only hold a small fraction of arable land as farms holding more than 50 ha have increased from collectively holding 9.2 million ha to 12.6 million ha in that same period (Van der Ploeg et al. 2015).

EVER FEWER FARMS MANAGE EVER MORE LAND

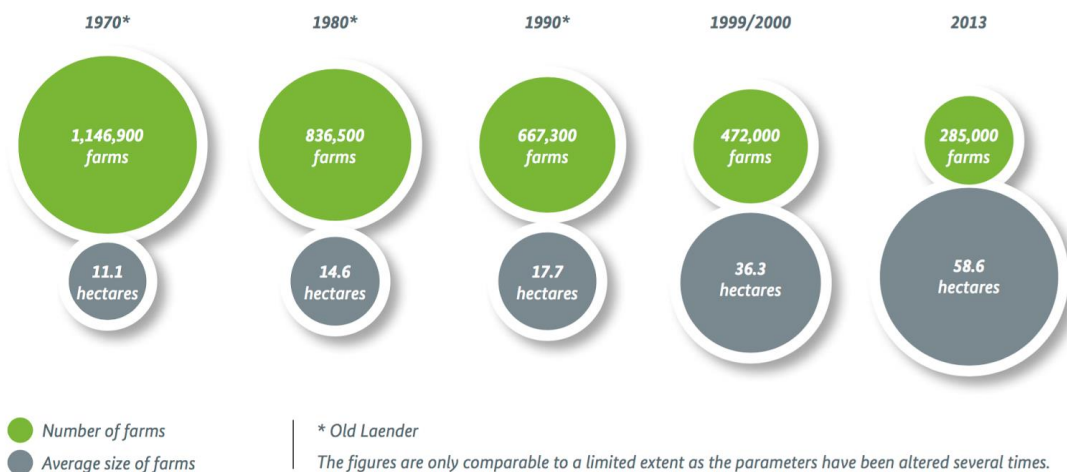


Figure 1.3 Decreasing number of farms are managing more land in Germany (BMEL 2016).

The land market in Germany is regulated by the laws for land property and land lease. There is a right given to existing farmers to have the first opportunity to buy land if they need to expand ('right of pre-emption'). After the reunification of Germany in 1990, there was 1.1 million ha of land to be privatised from state land of former East Germany. The state agency responsible for privatising former state farms Bodenverwaltungs- und verwertungsgesellschaft mbH

(BVVG) still had 300,000 ha available for privatisation by 2015 (Van der Ploeg et al. 2015). Under previous rules (1993) the decision was taken to engage in the privatisation and existing farmers could buy a certain amount of land at a 35% discount from the market rate. However, this was challenged by the EU under rules of fair competition in 2007 and because of the settlement the land could still be bought directly by the farmers but it must be sold at market price which includes all tenders - agricultural or otherwise (Van der Ploeg et al. 2015). If companies are willing to offer more money for speculative or investment reasons, then the farmers had to be willing to pay this price and come up with the money. In practical terms, it meant that farmers could no longer afford to buy available land and that it would therefore be acquired by large agricultural players or bought and taken out of agricultural production altogether.

In many parts of Germany, the price of land doubled or even quadrupled in some regions of the North East between 2007 and 2015. There are several factors that help explain the escalating cost of land in Germany. After the GFC of 2008, with interest and therefore bond market rates at all-time lows, investors were looking for a new place to park their money. Land suddenly became a safe haven for short and medium-term investments and it became less important that agricultural production continued. Buying land was simply seen as a safe place to invest - in a sense real-estate without the estate. In fact, analysis by the *Economist* (2015) shows that from 1994 to 2013 investment in agricultural land may have provided the greatest rates of average return with low levels of volatility, exactly the combination crisis-averse investors are seeking (Van der Ploeg et al. 2015). There are also tax policies that make it favourable to hold agricultural land over other investments and huge amounts of farmland are now held as collateral by banks. Globally, state and private investors have been buying up land around the world. This development of treating land as a commodity and purely speculative investment has created strong upward pressure on land prices.

At the same time the German government was promoting renewable energy policy that relied in part on biofuels. The subsidies available meant that acquiring land for biogas or bio-diesel operations became highly profitable - much more so than using the land for food production. These large operations could therefore afford to pay above market price, buying out farmers to access land for the industrial production of corn not to be used as food but as the source feedstock for fuel. Similarly, policy to promote and subsidise both wind turbine, and to some extent solar photovoltaic technologies for renewable electrical generation, meant that multinationals could buy vast areas of land, not for agriculture but for highly profitable energy infrastructure. Farmers cannot compete with the prices the energy companies are willing to pay, putting further demands on land resources and bundling them into large holdings (Van der Ploeg et al. 2015). In the energy vs. agriculture game, the safe, and publicly subsidised money, is on the energy sector. The ongoing pressures of soil erosion, transportation, urbanisation and conservation efforts were all adding their own demands on the available supply of land. The combined pressures have meant that prices have climbed an average of 8.2% in 2015 alone to 19 578 € per ha across the country (Van der Ploeg et al 2015).

Table 1.2 Increase average price land per hectare in Germany (Destatis 2015)

Year	2005	2010	2015
Average price / ha	9,081 €	11,854 €	19,578 €

The average price increase as shown in table 1.2 combined with the low mobility of agricultural land, has resulted in difficulties for small scale farmers, in particular young and start-up farmers, to gain access to land (Heinke 2016, 38). Possible solutions for this so called “land hunger” can be seen in both new financial models¹² integrating alternative ownership structures and political change (Heinke 2016, 40).

Political Attempts to change land policy

Different authors argue for a change in land policies on both a European level (Franco et al. 2015, European Economic and Social Committee 2015) and German context (BLAG 2015, Tietz and Forstner 2014). These arguments revolve around a stronger regulation of capital markets, upper limits in the acquisition of land and the installation of systems such as land banks. Collectively, these aim to facilitate access of land to small farmers and help secure their existence in Europe (Franco et al. 2015, EESC 2015). On a German national-level, investigations executed on behalf of BLAG, reviewed 58 proposals aimed at existing laws and ordinances and concluded with a proposal of higher market transparency through intensified statistics, stronger execution of laws around lease and ownership of land and a regulation of land policy considering the ongoing land concentration, amongst others (BLAG 2015). Although these attempts have resulted in a rising awareness around the problematics of land concentrations on a political level, the practical results have been visible only in the form of set goals and advice; major adjustments in current policy have yet to be seen (Heinke 2016).

1.3 Land cooperatives in Germany

In response to increasing privatisation and concentration of farmland a new organisational model has emerged in Germany in the form of land cooperatives. Their goals are to take land out of the market system, protect existing agricultural land as a 'common good' and allow organic small-scale farming to thrive. Three land cooperatives with this aim were founded in Germany since 2013 (Heinke 2016). By selling memberships as redeemable shares to the public the cooperatives pool money together, purchase land and support farmers through (affordable) long-term leases for organic farming. The shares are redeemable, don't acquire additional value and are paid back in full after a certain notice period (table 1.3) on the start of the fiscal year. This construct allows land to remain under use of organic production and facilitates the access to land for organic farmers (Heinke 2016).

¹ *Direct financing*: direct financial support through funding from people surrounding the farm or indirectly from intermediaries, such as investment funds (Mehnert 2014) realized through shares, silent participation, direct loans, private limited company (AG), limited partnership (KG), cooperative, 'enjoyment credits' (*Genussrechte*, interest paid in produce) or Community Supported Agriculture (CSA) (see e.g. Mehnert 2014, Bahner et al. 2012, Heinke 2016).

² *Indirect financing*: indirect financial support by using the participation of intermediary structures to accumulate capital focussing on three issues: 1) the ownership structures of the land 2) the ownership structures of the farm managing the land and 3) the financing of farms and its activities (Heinke 2016).

Through their own principles, the cooperatives do not only benefit their own members but have “positive sustainable impacts for the general public” (Fabjancic 2016, 41). This construct, as shown in figure 1.4, invites the public to participate in taking shared responsibility to protect agricultural land as a common resource by becoming members of the cooperatives (Fabjancic 2016, Helfrich 2012).

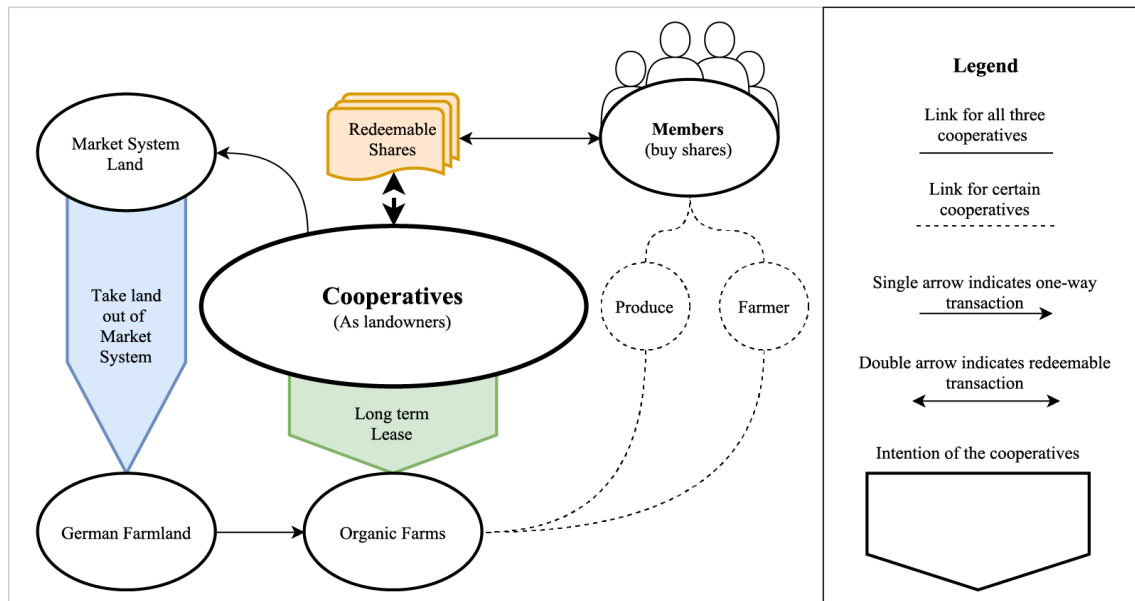


Figure 1.4 Map of stakeholders related to land cooperatives

BioBoden eG was founded in 2015 through GLS Bank that had already developed the Bio Boden Fund in 1994 and has 40 years of experience in financing organic agriculture. In 2016, it had 2,013 private members whose subscription shares were worth approximately 15 million EUR. It has now acquired 1,300 ha of land and 15 partner farms. The main area of farming is situated in the new states of eastern Germany even though activities take place throughout Germany (Heinke 2016).

Kulturland eG was founded in November of 2013 with a desire to help organic farmers in south west Germany with the financing of land. It has 180 members and owns 50 ha of land. Fundamentally they work out of the principled thinking that land is part of the commons. It operates throughout Germany, with six farms in former Western and one in former Eastern Germany (Heinke 2016).

Ökonauten eG was founded in January 2015 to facilitate young farmers in acquiring land and commencing farm operations, because of the difficulties they faced due to dramatic increase of land prices in Eastern Germany. Until the end of 2016, there were 77 members and 4.4 ha of land was acquired collectively. It is located in the states of Berlin and Brandenburg (Heinke 2016).

Table 1.3 Overview of current cooperatives in Germany and key differences (Public documents cooperatives, Fabjancic 2016)

	BioBoden eG	Kulturland eG	Ökonauten eG
Members	2,013	180	77
Hectares of land	1300	50	4.4
Founding year	2015	2013	2015
Supported farms	15	7	1
Price per share (€)	1000	500	250
Average buy-in / member (€, Fabjancic 2016)	± 5,000	± 2,700	± 1,000
Minimum numbers of shares	1	1	2
Supported farmer must work through organic means	yes	yes	yes
Farmer must be a member	no	yes	yes
Dividend offered to members	no	no	no (discount on local produce is offered)
Notice period to redeem share(s)	60 months	(Redeemable after 5 years) 6 months	24 months

1.3.1 Cooperative model and sustainable society

Cooperatives are autonomous groupings of individuals who come together for their collective benefit (ICA 2017). Importantly, the choice to join is voluntary (as opposed to former German state cooperatives), usually involving the purchase of a share (or more) and the cooperative functions to benefit all members through access to markets, goods, promotion or some other common goal. Cooperatives govern themselves through their membership, operate democratically with only one vote per shareholder at annual or governance meetings. Shares may bring with them financial benefit such as interest, be redeemable or not, or simply may secure membership without direct financial gain. Through such a structure the collective, long-term benefit of the members over short-term profit or direct financial gain becomes the focus of the collaborative cooperative effort. Essentially there are some things that can be done better together and the cooperative structure allows for autonomous groups to combine their efforts for the benefit of the group. They may in some cases protect a common resource they use and depend upon (Fabjancic 2016).

Cooperatives are often considered to be a potential role model for a contribution towards sustainable development because of their particular way of organizing and doing business (ICA 2013). Their local nature is a crucial aspect to their ability to target societal needs and contribute

to solving socio-economic and environmental challenges through the social interaction between the members (Elsen 2012, Gertler 2004, Doluschitz 2016). As members of the cooperative take an important role in the governance of the organisation, cooperatives are considered to serve people's needs rather than being used solely as a tool for profit maximization (Gertler 2004, Doluschitz 2016). Because of their commitment to work for the benefit of the community of members, profit becomes a means to do so and not the end purpose, which tends to prevent speculative transactions and unrestrained growth (ICA 2017, Doluschitz 2016).

In short, cooperatives are a mechanism to achieve some specified community goal. They exist throughout the world and are undergoing a resurgence as the restructuring that has taken place under globalisation has caused many to look for better alternatives of organizing themselves within the present economic system. While cooperatives work primarily within privatized market systems, their philosophical approach is reflected in the approach to managing common resources.

1.3.2 Promoting farmland as common resource

To understand what it means to promote farmland as a common good, Helfrich (2012) indicates that the logic of the commons results in a different understanding when compared to the logic of profit maximization in terms of ownership access to resources, impact upon the resource and societal differences as illustrated in table 1.4 below.

Table 1.4 Logic profit maximization vs. logic of the Commons (Helfrich 2012).

Understanding in terms of...	Logic of profit maximization	Logic of the Commons
1. Focus on	Focus on trade Economic growth (GDP) Efficiency Time saving	Use Public interest Complementarity Time expenditure
2. Ownership	Exclusive private property: With my property, I do what I will.	Shared property: For my co-ownership, I have a shared responsibility.
3. Access to rival Resources (e.g. water, land, forests)	Limited access Rules are set by the owner.	Limited access Rules are set collectively by the users
4. Access to non-rival resources (code, ideas)	Limited access Scarcity is artificially produced	Open access
5. Impact for resource	Exploitation Enclosure	Conservation Reproduction Multiplication
6. Impact for society	Individual interests versus general interest Exclusion	The development of everyone is the prerequisite for the development of the others and vice versa. Self-development

When the logic of managing the commons as seen above is applied to the context of agricultural land as managed by the cooperatives, it results in the following, according to Helfrich (2012):

1. land is used for public interest with a collaborative approach in the form of members financing land for farmers;
2. land is co-owned by the user-collective, through democratic methods and the sense of shared responsibility. In this case, every member has one vote and therefore can participate in the decision-making process;
3. the access to land is limited by the rules set by cooperative but can, again, be influenced by both farmers and members;
4. in theory, the cooperative provides an affordable means for every farmer to have access to farmland;
5. the land is protected and conserved in a way that sustainable reproduction is not threatened with the main goal, in the cooperatives case, to maintain farmland for means of sustainable organic farming;
6. the user-collective focuses on their long-term interest, the interdependence here is between farmers and members and vice-versa to maintain farmland for the means of sustainable organic farming.

Thus, the land cooperatives, by treating the land at least conceptually with the logic of a commons, have benefits that may not come through private ownership.

1.4 Managing commons

To understand what it means to protect and manage a common resource in a socially sustainable way the following philosophical background is helpful.

Commons are found both in the form of natural resources, such as water, land, forests and in cultural resources, such as language, knowledge and ideas (Bollier 2009). The ‘commons’ arose as an explicit concept in Europe in the 12th and 13th centuries where farmers could graze cattle on common pastures, shared open areas for grazing, (Pérrileux and Nyssens 2017) but the principle of operation has existed for longer. The principles of inexcludability (access to a resource is not easily limited) and rivalry (if one actor uses the resource another cannot) have always been at play with natural resources; becoming more acute with increasing population and technological pressures. These ideas were modified by Elinor Ostrom, deriving the principle of subtractability from rivalry and introducing the concept of a Common Pool Resource (CPR) (Pérrileux and Nyssens 2017). These CPR's, that share the difficulty of exclusion with public goods and the subtractability of private goods, ‘are highly subject to overuse or underinvestment, which can lead to their destruction, as predicted by Hardin (1968) in his well-known paper ‘The Tragedy of the Commons’ (Pérrileux and Nyssens 2017, p4). Classical economic theory holds that CPR's must be privatized or controlled by the government (nationalized) to prevent misuse. Ostrom’s extensive work, however, proved differently; there were more than these binary solutions available. It pointed to a type of local collective and collaborative governance structure that can be equally effective in ensuring CPRs are maintained in healthy, long-term and sustainable manner without either privatization or state control. This collaborative structure was found to be based on a set of design or management principles.

1.4.1 Commons principles

Elinor Ostrom became the first woman to win the Nobel in Economics in 2009 for her work in showing that people and communities do come together to protect and maintain common resources such as land and water without the need for an authoritarian regime telling them to do it. People, where communication and trust exist, are not simply economic agents trying to maximize profit. The so-called ‘tragedy of the commons’ (Hardin 1968), where common resources are depleted by one actor out of fear that another will use them to the detriment of the resource, can be avoided by a combination of collaborative effort, communication and shared vision (Holte 2014). Fundamentally, the commons can be cared for through a collaborative and community approach where a set of practices, norms, penalties and governance structures are agreed to, monitored and adjusted as needed by those receiving benefit from the shared resource. The eight following principles were found to be in practice in successfully managed commons around the world (Ostrom 1990):

Eight principles to managing common resources (Ostrom 1990, Wilson et al. 2013)

1. Define clear group boundaries. Who are the community of users and what are the boundaries of the resource in question?
2. Match rules governing use of common goods to local needs and conditions. The use and protection of the resource must be matched to local conditions.
3. Ensure that those affected by the rules can participate in modifying the rules. The governance of the community commons must come from the community itself.
4. Make sure the rule-making rights of community members are respected by outside authorities. The rules agreed to by the local community members must have power and not be subjugated to rules of other outside jurisdictions.
5. Develop a system, carried out by community members, for monitoring members’ behaviour. It is important that information about violators is known to the community and that the community sees the benefits of monitoring in maintain trust in the rules.
6. Use graduated sanctions for rule violators. Penalties must be seen as fair but escalate with the nature of the violation.
7. Provide accessible, low-cost means for dispute resolution. Conflict will occur, a simple mechanism needs to be in place to resolve it.
8. Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system. The governance must come from the members and it must be included at all levels to enhance cooperation across scale.

These principles of commons governance are derived from both experiments and empirical data garnered from cases where commons have been effectively managed (Ostrom, 1999). Additional evidence in support of the importance of the design principles in good governance comes from the fact that other researchers looking at different CPR’s found that similar sets of principles were indeed operating (Ostrom 2002). In addition to “official” rules, the personal relationships, friendships and trust between the users is an important aspect of governance. Maintaining a good reputation among the parties is important and a common understanding of the problem is more likely to be developed. There must be legitimacy between the parties and external agents such as local or greater authorities; the decisions by the community in protecting and using the resource must be respected and adhered to otherwise their system will not continue to be valued and upheld. There should be the possibility for actors to leave the arrangement without severe penalty and the community must recognize the extended time horizon of benefit; commons are protected to serve a long-term sustainable purpose. The goal

is to have the commons continue to thrive for benefit of future generations, akin to the Brundtland definition of sustainability. As in any self-organizing, social adaptive system of which collaborative community protection of the commons is one form, the fundamental need is for trust between the actors, individuals and organizations, so that honest communication can lead to reciprocal and desirable behaviour. Without the quality of trust there is no glue to bind the community effort together and maintain a coherent structure of benevolence. Stratified sanctions are an important part of this communication indicating to a member when their behaviour is not in keeping with the established community rules and norms. The knowledge that violators will be prosecuted also promotes adherence by other members of the group. Typically, these take the form of fines, social castigation, other penalty or incarceration (Ostrom 1999).

1.5 Framework for Strategic Sustainable Development

The Commons Principles (CP's) are based on empirical evidence of what was found to enable successful governance (which implies protection of CPRs to maintain their long-term viability, i.e. sustainability) but they do not provide a definition of sustainability to guide actions. To analyse the contribution of the land cooperatives to sustainable development in relation to the complex issues and the many different actors involved, it is important to have a clear understanding and vision of the sustainability goals. One method to facilitate this understanding is by structuring the information through the lens of a conceptual framework. This allows the information to be categorised and simplifies understanding of the greater context and goals that relate to the land cooperatives.

The conceptual generic 5 level framework (5LF) aligns with this methodology and helps plan in complex systems. It can be used to analyse any complex system of any type or scale and helps to plan, decide and act strategically towards success based on principles determined by the working of the system (e.g. protect a common resource). When applied to plan for sustainability it is referred to as the Framework for Strategic Sustainable Development (FSSD). The FSSD was developed by Swedish scientists as a consensus document, elaborated upon by the non-profit group The Natural Step founded by the same original authors and repeatedly reviewed and improved over time (Broman and Rob  rt 2017). The FSSD allows for a systematic and principled approach to planning for sustainability (Broman and Rob  rt 2017). This has the advantages that planning is carried out in a categorized, systematic and principled manner. In this sense, it moves beyond a definition of sustainability (which it contains) and provides an operational tool for planning strategic actions toward a more sustainable society. The 5 levels of the 5LF are given as follows (Broman and Rob  rt 2017):

Table 1.5 Five Level Framework with implications if used to plan for sustainability

1	System Level	The system that is relevant to the overall goal (success) FSSD: Global socio-ecological system
2	Success Level	The overall goal that needs to be achieved in order for the planning process to be successful FSSD: the boundary conditions that establish principled sustainability given by the 8 Sustainability Principles
3	Strategic Level	Guidelines that will be used to choose concrete actions and make planning decisions to prioritize the most effective actions to accomplish the goal FSSD: backcasting approach with 3 prioritization questions: <ol style="list-style-type: none"> 1. <i>“Does this action proceed in the right direction with respect to the sustainability principles?”</i> 2. <i>Does this action provide a “stepping stone” (flexible platform) for future improvements?</i> 3. <i>Is this action likely to produce a sufficient return on investment to further catalyse the process?”</i> (Robert and Holmberg 2000)
4	Actions Level	The tools needed for assessing, monitoring and supporting other levels in the move towards the sustainability goal FSSD: same as above
5	Tools Level	The tools needed for assessing, monitoring and supporting other levels in the move towards the sustainability goal (Same for FSSD)

Together, the SP's, the Adaptive Capacities (AC's) and the 5LF are most salient features of the framework for our work. The AC's and SP's are detailed in the following sections.

1.5.1 Sustainability principles

The SP's provide a principled and robust definition of sustainability set by eight Sustainability Principles (Broman and Robèrt 2017). The SP's are essential boundary conditions; meeting all 8 simultaneously ensures social-economic and environmental sustainability.

Whereas the ecological SP's (SP1-SP3) were built on scientific understanding, including the laws of gravity and the laws of thermodynamics, the Social SP's were derived from the essential elements of complex adaptive social systems that allow change over time in response to their changing environment. These elements were identified by Missimer (2013) as *diversity, learning, self-organization, trust and common-meaning*. The SP's are stated below (Broman and Robèrt 2017):

In a sustainable society, nature is not subject to systematically increasing ...

1...concentrations of substances extracted from the Earth's crust. This means limited extraction and safeguarding so that concentrations of lithospheric substances do not increase systematically in the atmosphere, the oceans, the soil or other parts of nature; e.g. fossil carbon and metals;

2. ... *concentrations of substances produced by society*. This means conscious molecular design, limited production and safeguarding so that concentrations of societally produced molecules and nuclides do not increase systematically in the atmosphere, the oceans, the soil or other parts of nature; e.g. NO_x and CFCs;

3. ... *degradation by physical means*. This means that the area, thickness and quality of soils, the availability of fresh water, the biodiversity, and other aspects of biological productivity and resilience, are not systematically deteriorated by mismanagement, displacement or other forms of physical manipulation; e.g. over-harvesting of forests and over-fishing;

and people are not subject to structural obstacles to ...

4. ... *health*. This means that people are not exposed to social conditions that systematically undermine their possibilities to avoid injury and illness; physically, mentally or emotionally; e.g. dangerous working conditions or insufficient rest from work;

5. ... *influence*. This means that people are not systematically hindered from participating in shaping the social systems they are part of; e.g. by suppression of free speech or neglect of opinions;

6. ... *competence*. This means that people are not systematically hindered from learning and developing competence individually and together; e.g. by obstacles for education or insufficient possibilities for personal development;

7. ... *impartiality*. This means that people are not systematically exposed to partial treatment; e.g. by discrimination or unfair selection to job positions;

8. ... *meaning-making*. This means that people are not systematically hindered from creating individual meaning and co-creating common meaning; e.g. by suppression of cultural expression or obstacles to co-creation of purposeful conditions.

1.5.2 Adaptive capacities of human social systems

As mentioned, the social sustainability principles were derived from the essential elements of complex adaptive social systems. The principles define the basic mechanisms which can systematically undermine these capacities and therefore its sustainability in the long run. Like the ecological principles, the principles derived are necessary, sufficient, general, concrete and non-overlapping.

Complex adaptive systems can respond to pressures and evolve over time. This property of adaptation - resiliency - has been found to depend on several key properties. For a social system to maintain its adaptive abilities these properties must be protected. The essential elements that enable a social system to successfully navigate imposed change are *diversity*, *learning*, *self-organization*, *trust* and *common-meaning* (shared mental model or vision) (Missimer 2013). *Diversity* refers to the state of having access to a range of ideas or views in the different people, groups or organizations that make up the social system. *Learning*, by the system enables the sensing and response to change to allow testing for better solutions. *Self-organization* refers to the ability of the groups to spontaneously arrange into needed forms without direction from an authority. *Trust* is the quality that may exist between actors and their

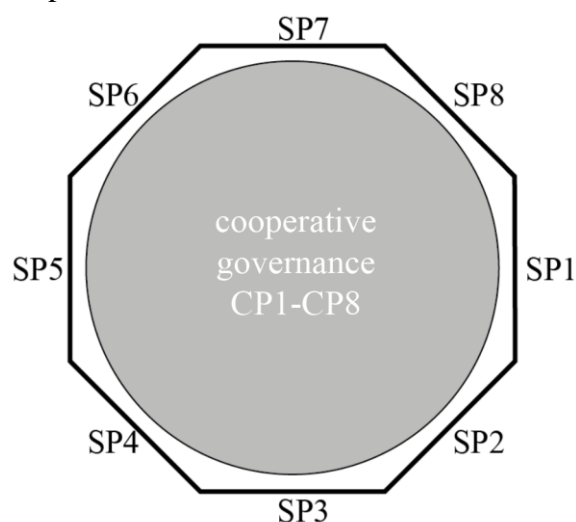
interactions that contains elements of competence, respect and benevolence and is what binds the system together. *Common-meaning* is the shared vision, goal or purpose for which people seek in their lives and can be a proxy for trust (Missimer 2013). These five essential characteristics or adaptive capacities, are what enable a complex social system to adapt to environmental, social or other pressures. By protecting the adaptive capacities, the resiliency of the social system is protected, while increasing its sustainability. These elements form the basis from which the social Sustainability Principles were derived (Missimer 2017).

Cooperative model as related to adaptive capacity and the sustainability principles

Studies comparing sustainability literature with the cooperative principles found the linkages to the social dimensions of sustainability to be stronger than environmental and economic dimensions (Dale et al. 2013). Other research examining how energy cooperatives contribute to a global socio-ecological sustainability (Ayers et al. 2014) find that a strong relation to the adaptive capacities at the core of social sustainability are in place. Although not covering the full spectrum of social sustainability there is an obvious relation between cooperative principles and the social SP's since they address the "impartiality among the membership, competence in the form of employee development as well as a broader commitment of community development" (Hofman et al. 2016, 8) and also influence by the development of co-governance (Fabjancic 2016).

1.6 Addressing the cooperatives sustainability using SP's, CP's, AC's & 5LF

To address the question of how the land cooperatives may be effective at protecting farmland as a common resource and thereby contributing to sustainable agriculture we must understand how the SP's, CP's, AC's and 5LF provide useful lenses through which to observe the cooperatives.



Where the SP's provide boundary conditions to a robust sustainability they do not provide guidance on how to manoeuvre within these boundaries. The CP's on the other hand, are based on empirical evidence of what was found to enable successful governance (which implies protection of CPRs to maintain their long-term viability, i.e. sustainability) but they do not provide a socioecological definition of sustainability to guide actions. With both principal systems combined the CP's provide guidance for the commons management within the boundary conditions of the SP's that assure a socio-ecological sustainable management.

Figure 1.5 CP's and SP's combined

As identified in Ostrom's later work she also emphasized the need for "adaptive governance". She found that sustainable commons governance is best achieved when the system of rules can evolve over time as needed. As also identified by Missimer (2013) there are essential aspects

for human social systems' adaptive capacity that align with Ostrom's thinking: "a set of rules crafted to fit one set of socio-ecological conditions can erode as social, economic, and technological developments increase the potential for human damage to ecosystems and even to the biosphere itself. Furthermore, humans devise ways of evading governance rules. Thus, successful commons governance requires that rules evolve" (Dietz et al. 2003). So, if the governance structure of the commons in the form of rules, norms, and enforcement mechanisms can adapt and evolve over time in accordance with the essential elements of complex adaptive social systems a more resilient system is achieved. And thus, the overall long-term sustainability more likely (Missimer 2013).

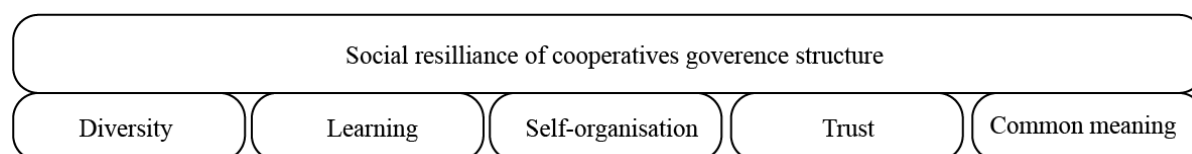


Figure 1.6 Adaptive governance using the 5 AC's

Lastly the 5LF will aid the analysis of the cooperatives by allowing the gathered information to be categorised, contextualized and will overall serve in identifying gaps and contributions of the cooperatives to the realm of sustainable development.

1.7 Purpose & research questions

The primary purpose of this thesis is understanding the sustainability of land cooperatives and their contribution to greater sustainability. Existing literature (Fabjancic 2016, Heinke 2016) already points out the qualitative and quantitative role of the land cooperatives in agriculture; but a structural sustainability perspective has not been applied to the cooperatives to date.

Primary research question:

PRQ: *What is the role of land cooperatives in greater sustainability?*

Secondary research questions:

What can we learn about land cooperatives by observing them through the lens of...

SRQ 1: *...Ostrom's Commons Principles?*

SRQ 2: *...the Sustainability Principles?*

SRQ 3: *...Adaptive Capacities of human social systems?*

SRQ 4: *...the conceptual 5 Level Framework?*

The research questions were designed after conducting a literature review and two preliminary interviews with founders of the cooperatives. The interviews helped the researchers gain insight into identifying in what ways the pragmatic research is relevant to the cooperatives.

1.8 Scope and intended audience

To illustrate the scope of our study we have mapped out the overlapping area of the main knowledge bodies involved. The area of intersection between the philosophy of commons governance (Ostrom 1990), the Framework for Strategic Sustainable development (FSSD) (Broman and Robèrt 2017) and cooperative land ownerships form the research focus as illustrated in Figure 2. The intersection of these three areas with the land cooperatives in Germany as case context is the focus of our thesis.

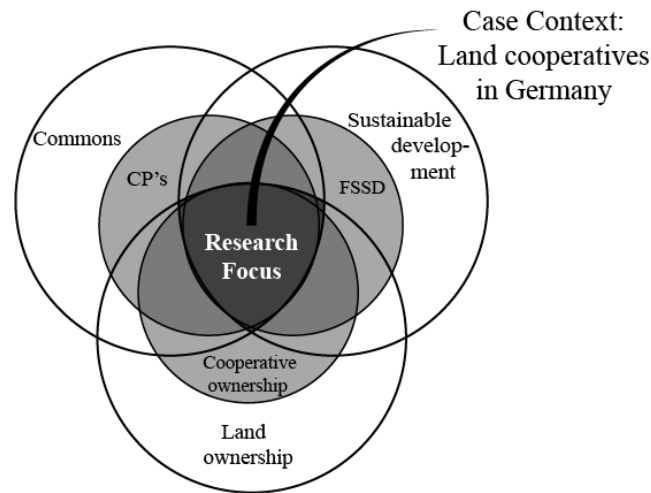


Figure 1.7 Scope of our research

We can define our primary target audience as cooperatives, farmers, landowners, policymakers and individuals that might be interested in a collective effort towards maintaining farmland and creating a sustainable food system. Furthermore, as the phenomenon of land cooperatives is still novel, this thesis will be of interest for sustainability researchers.

2. Methods

To investigate the research questions, the researchers studied three German land cooperatives (BioBoden eG, Kulturland eG and Ökonauten eG) using the CP's to evaluate the governance from a common's perspective and the SP's, AC's using a contained in the FSSD as a structured way to address sustainability.

The researchers have selected the three land cooperatives based on fact that these are the only three cooperatives in Germany. Cooperatives in other countries, such as Terre de Liens in France, are beyond the scope of the present project because of contextual difference and geographic constraints.

2.1 Interviews

The case studies were conducted through eight semi-structured, qualitative interviews at and around the cooperative headquarter farms and offices located in East-Germany near Berlin, Rothenklempenow and Hitzacker. The interviews helped the researchers investigate the potential and limitations of the cooperatives with regard to sustainability, helping answer the secondary research questions 1, 2, 3 and 4; “*What can we tell about land cooperatives by observing them through the lens of [...]*”. With these answered, the researchers were then able to discuss the primary research question as figure 2.1 below illustrates.

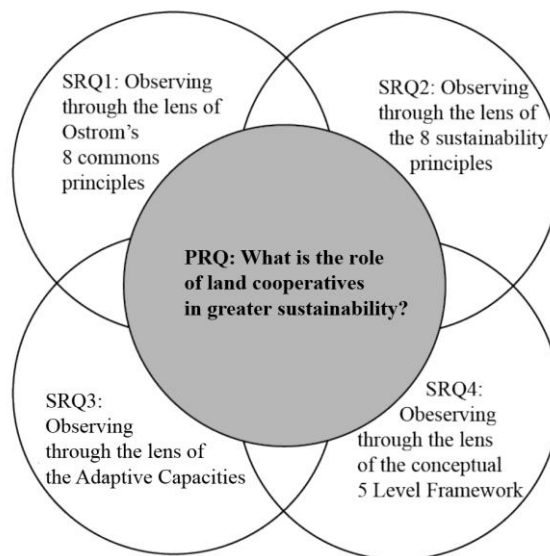


Figure 2.1 Illustration of alignments principle systems & cooperatives

2.2.1 Selection and sampling

To get detailed understanding of the land cooperatives the researchers interviewed managers, founders and farmers who are part of the cooperative's organisation. The selection of the interviewees was made based on the following criteria: 1) experience and expertise with at least two of the four topics listed below (Agriculture, Finance, Land and Commons) and 2) part of one of the cooperatives.

Table 2.1 List of primary interviewees

Name	Position	Agriculture	Finance	Land	Commons
Alexander Schwedeler	Co-founder Kulturland e.G., Former CEO Triodos bank	X	X		X
Titus Bahner	Co-founder Kulturland e.G.	X	X		X
Stephan Decke	Co-founder & CEO BioBoden	X	X	X	
Tobias Keye	Project Developer at BioBoden	X		X	
René Tettenborn	Project developer at Ökonauten and agricultural entrepreneur	X		X	

To further supplement the context in which the cooperatives operate the researchers attempted to interview farmers related to the cooperative organisations during their field research trip

Table 2.2 List of farmers interviewed

Position	Working for cooperative	Region
Organic cattle farmer	Yes, BioBoden e.G.	Mecklenburg-Vorpommern
Organic cattle farmer	no	Mecklenburg-Vorpommern
Organic honey & goat farmer	no	Mecklenburg-Vorpommern

2.2.2 Interview protocol

Using document research and preliminary interviews with both BioBoden e.G. and Kulturland e.G. the researchers produced a questionnaire (Appendices A and B) to find out about motivations, methodologies and operations employed by BioBoden eG, Kulturland eG and Ökonauten eG.

In alignment with the purpose of this research, the questions contained in the interviews were designed to illuminate the operations, structure, motivations and governance of the cooperatives. The questions produced aimed to:

- 1) general information on the role of interviewee related to the cooperative and their general understanding of the cooperative;
- 2) assess the cooperative with respect to the eight Sustainability Principles contained in the FSSD;
- 3) assess the cooperative with respect to the Adaptive Capacities contained in the FSSD;
- 4) assessing the alignment of the cooperative with the eight Commons Principles;
- 5) their view on the future of the concept of cooperative land funds.

Each interview with the cooperatives consisted of a series of 17 evaluative questions (Appendix A) and each interview with the farmers consisted of a series of 15 evaluative questions (Appendix B).

The choice of a semi-structured interview allowed the researchers to bring up new ideas during the interview based on the interviewees' response enabling them to explore topics that might not have been discovered through the literature research and document analyses. Conversely, questions that seemed redundant during the interview could be omitted (Savin-Baden and Major 2013).

The entire interviews were recorded digitally by phone while additional notes were taken by hand. The recordings were later transcribed verbatim by the researchers, allowing them to revisit the data and correctly identify and reference the given speaker. All three researchers were present during the interviews shown in table 2.1 with one researcher asking the evaluative questions while the other two took notes on what was said by both interviewer and interviewee. The interviews with the three farmers as shown in table 2.2 were taken in German, transcribed in German and then translated to English to accommodate all researchers involved.

2.3 Document retrieval

The following documents were collected for the purpose of document analysis:

Table 2.3 Collected documents for document analysis

Cooperative	Document	Availability
BioBoden e.G.	Statutes 29.04.2015	Public (Website)
BioBoden e.G.	Newsletter 01/2016 and 02/2016	Public (Website)
Kulturland e.G.	Statutes v. 20.11.13	Public (Website)
Kulturland e.G.	Newsletters no. 1 to no. 7	Public (Website)
Kulturland e.G.	Info pack v. 18.05.2016	Public (Website)
Ökonauten e.G.	Statutes 28.01.2015	Public (Website)
Ökonauten e.G.	Leaflet, version of 27.03.2015	Public (Website)
-	German cooperative law	Public (Website)

2.4 Data analysis and interpretation

The data collected in transcriptions of the interviews was processed in the following way: Each transcription was coded for 3 sets of *a priori* principles; 1) SP's, 2) AC's, 3) CP's and emerging themes by two researchers.

- 1) The SP's were used to examine the extent to which land cooperatives contribute sustainable development
- 2) The AC's were used to examine the land cooperatives governance structures' internal sustainability
- 3) The CP's were used to examine the extent to which the land cooperatives governance structures' can be viewed as an effective means to manage a CPR sustainably.

Each interview transcript was analysed by at least two researchers independently, to examine reliability and internal validity. The results were structured using a Microsoft Excel template allowing the researchers to compare their results and effectively producing a double-blind coding. During the double-blind assessment, the results were colour coded in three ways: 1) green: result found by both researchers 2) blue: result found by one researcher with consensus after discussion with the second researcher 3) red: result found by one researcher without consensus of the second researcher after which the result was omitted.

The transcriptions were then collectively themed using an emergent, open theming process. Some emergent themes were merged for consistency in comparing the cooperatives.

Finally, the researchers triangulated the data collected from the different sources (document research and interviews) for cross-verification with the purpose of building a more trustworthy and nuanced conclusion to our research questions (Altricher et al. 2008).

2.5 Validity

The researchers interviewed the three cooperatives in Germany during their field research trip. Visiting selected cooperative farms, the region where the cooperatives are active and having face-to-face conversations with the people involved, helped the researchers observe the real context of the cooperatives and supplement their research in the form of field notes. The findings are limited to the extent that the founders' perceptions are correct when assessing their own motivations, interpreting the role of the cooperative and in particular, in evaluating the motivations of members and perceptions of what constitute barriers, limitations etc. The perception of the interviewee may at times not be a reflection of reality and certainly reflect some of their personal biases. It is also possible that there is a limit on the extent to which interviewees told the truth, with regard to conflict within the cooperative for example which may also affect the validity of the results. The results are valid to the extent that the interviews capture the essential elements of the cooperatives correctly and their operations and interactions reflect their statutes and values.

2.6 Limitations

As previously presented, the researchers were only able to interview one organic farmer belonging to the cooperative and two organic farmers active in the same region, but not part of the cooperative. The initial plan was to interview a wide range of farmers working for the different cooperatives, in the same area and active in both organic and conventional farming. During their research trip the researchers found that farmers are a challenging group to interview due to their busy daily schedule and disinclination to participate in interviews. Therefore, analysis from the farmer's perspective has remained limited in this research with only one cooperative farmer interviewed (the others were not part of a coop). The researchers acknowledge that a more complete understanding of what it means to be involved in the cooperatives' organisation as a farmer is still an area requiring further research. It is recognised by the researchers that the cooperatives are still in their start-up phase and are learning to adapt to challenges; therefore, their operational management may yet change. The key limitation of the work is the lack of direct access to the cooperative membership. Understanding their mindset and motivations would likely require a combination of survey and interview that is essential for understanding the collective element of the cooperative more comprehensively. The membership's view on sustainability, land (as a type of commons) and organic agriculture were not directly investigated and remain an element for future research. The use of the interviewees non-native language (i.e. the interviews that took place in English) may also have placed some limits on the precision of the interviews, where the exact words may not have been found or have slightly different meanings from their typical English usage. At least the interviews would likely have been more concise if conducted in the interviewees' native German.

3. Results

The following sections present the key findings related to our research questions. Results are presented according to the three sets of principles that were used for coding data. Findings for set themes are presented in the following order: 1) the Commons Principles (CP's), 2) Sustainability Principles (SP's) 3) the Adaptive Capacities that protect resilience in social systems (AC's). Furthermore, the emergent themes are elaborated upon and, finally the findings structured in a 5LF are presented. Taken together, the results provide insight into the vision and philosophy, organisation, governance, functioning, limitations, operations of the land trust cooperatives with respect to sustainability.

3.1 Alignment with Ostrom's commons principles

The results below demonstrate that the cooperatives align with the principles of establishing a clear boundary, matching rules to local conditions, having the respect of outside authority and responsibility being nested in tiers from the lowest level up. The modification of the rules by those affected, monitoring of member behaviour by the membership and the use of graduated sanctions for violations and a simple method of dispute resolution were harder to isolate from the interviews and document research. The partial alignment between the CP's and governance structure of the land cooperatives indicates that there is room to improve the changes of long-term successfulness of managing the land as a common resource.

3.3.1 CP 1: Define clear group boundaries.

Founders: For the three cooperatives, there were four types of boundaries clearly identified: boundary of farms, boundaries of membership, boundary of cooperative reach and boundaries of management. Both the boundary of the resource (agricultural land owned by the cooperatives) and the authorized users (farmers) are clearly defined within the operations of the cooperative. For the members, the cooperatives define clear group boundaries by establishing a membership that includes a single voting right. Kulturland and Ökonauten include their farmers as members while BioBoden does not mandate that the farmers buy shares in the coop. Kulturland and Ökonauten have a membership that is located closer to the farm. Kulturland uses the farmer's social connections to acquire more local members and the members of Ökonauten tend to come from the Berlin area near the farm. In contrast, BioBoden pools money from a membership that is located across Germany and may not be located near any of their farms. For Kulturland it is clearly a model where both members and farmers are included in the group boundary: "it's not a cooperative of people that support farmers, it's a joint cooperative of farmers and their supporters" (Bahner 2017).

3.1.2 CP2: Matching rules to local needs and conditions.

Founders: Overall, the three cooperatives match the rules to local conditions as their rules for the farmers relate mostly to the certification of organic farming and let the farmer decide what is most appropriate for his local conditions and needs. This must be done in alignment with the accepted criteria for the protection of the resource: in the case of BioBoden and Ökonauten this relates to the regulations set by the labels under which their produce is sold (Bioland, Demeter and Naturland labels) and in case of Kulturland, the EU's Organic Regulation.

In the interviews, it was found that the regional dimension of Kulturland is more important than having explicit rules for a specific label: “You have to establish connections to your region which is not [in the form] of organic regulations [...] so far it's our own regulations”. There is a local and community element to the Kulturland cooperative and though it may not be expressed explicitly in the rules, it is the local membership that is involved in a particular farm. Furthermore, it is stated by Bahner (2017) that there is no rule in place that “prescribes a membership with an organic association, EU-Organic Label is enough, so that we enable the collaboration with CSA farms that are not dependent on an association trade mark. The farm Basta for example works (to) Demeter (standards) but has no label” (Bahner 2017).

Where the farmers for BioBoden just have to meet the criteria set by the organic label additional rules for the farmers are enforced by Kulturland and Ökonauten which go beyond the environmental aspects of land and relate to the local engagement of stakeholders of farms. These are examples of rules matching local conditions.

In Ökonauten eG additional rules apply to the produce harvested from the land. With the lease agreement, the farmers are obliged to sell part of the harvest back to the cooperative. Furthermore, the farmers should attend the cooperative annual meetings to discuss the crop planning. This construction of rules allows the members to buy part of and influence the local produce and support the regional economy. BioBoden states they match rules to local conditions, as they know “every farmer has an own situation, every area has an own area” (Decke 2017) without giving a clear example.

3.1.3 CP3: Those affected can modify the rules.

Founders: The three cooperatives ensure the modification of rules through their members right to vote, with some reservations. The legal form of a cooperative inherently ensures the possibility to change the rules through a democratic process, in which all members can participate. Therefore, the third principle is theoretically satisfied by the nature of the cooperative and the fact that the membership, with its right to one vote per member, can influence the direction of the cooperative.

One of the ways that the coop ensures that the membership sets the agenda is by having all farmers as members: “we only rent land to members” (Bahner 2017). When asked what influence members have over governance Bahner says “They have more than they exercise”. And overall the cooperatives take their members’ input seriously “if a member would come up with some sort of proposition we would say [...] let's discuss it, let's see what's contributing”. The farmers of BioBoden do not have to be members of the cooperative, which means that the users of the land may not be part of the democratic decisions of the cooperative and be more remote from them.

Farmers: The farmer who uses the land does not have to be part of the cooperative BioBoden and was perceived not to be interested in shaping the rules of the cooperative. Overall the day-to-day tasks of being a farmer seem too demanding to allow for participation in the cooperatives governance in any meaningful way: “Well, right now, I am so busy in the farm that fully invested in its operation, that there is nothing at all” that he can influence in the governance structure of the cooperative. Furthermore, it was stated that “I have not even thought of this. I am concerned with the thoughts of everyday work”.

3.1.4 CP4: Rules are respected by outside authorities.

Founders: The rules of the three cooperatives align with this principle, as they are officially registered and supervised annually according to German cooperative law by German Authority. By meeting German law the cooperative establishes autonomy within the legal framework. All land owned by the cooperatives are made official through contracts and the rules developed by the community of members cannot be subjugated to rules of other outside jurisdictions if they work within the existing legal framework.

Furthermore, the cooperatives are farming according to the aforementioned organic standards (EU, Bioland, Demeter, etc.). Since their land use is already recognized by the guidelines set by these labels/standards the cooperatives do not have to make up these rules themselves.

3.1.5 CP5: for monitoring members' behaviour

Founders: This principle asks for the monitoring of the users of the resources, who are the farmers in this case. The cooperatives align with this principle only to the degree that farmers have to work in accordance to the organic labels/standards, which implies that there is external monitoring. The monitoring of farmers by the cooperatives or members themselves was not explicitly discussed in the interviews but it is alluded to: "as long as he, or she, works within the rules he has security of the land forever even if his son carries on to do it" (Bahner 2017). Furthermore, there was a subtler form of monitoring between the membership and the farmers found in the following statement: "because the members support the farmer, he has to keep them in a good mood because he doesn't want them to give notice and take their money (land) back" (Bahner 2017).

Although the cooperatives have close connections with their farmers and operations, the monitoring is not performed by the cooperative, but through the auditing process of the associations related to each label/standard. Further monitoring of the cooperatives operations is made possible through attendance of annual general meetings where they can review financial statements and the cooperatives must present overall results to the membership.

3.1.6 CP6: Graduated sanctions

Founders: The cooperatives do not have a formal system of graduated sanctions. It is stipulated in the contracts that failure to comply with the rules may ultimately result in the farmer's lease being terminated, there is no evidence of a graduated sanction system towards this concluding enforcement. In the interviews, it was found that the cooperatives tend to first discuss any issues with the farmers but the overall impression was that sanctions have not yet been an issue. This is partly explained by the fact the cooperatives are still in early stages of development and no real conflicts have occurred apart from one problem with a farmer active for BioBoden "if he [does not] talk with us about solutions we will end this lease" (Decke 2017). This shows that graduated sanctions are not in place, but there is a desire to engage in dialogue at least as a first step.

3.1.7 CP7: Dispute resolution

Founders: The three cooperatives have few mechanisms in place to resolve conflict. When questioned about dispute resolution, they state that their first approach will be to discuss the situation with the party in question. They indicate that their rules for organic farming are clear and that disputes thus far have been limited. All three cooperatives aim to explore solutions jointly and have a basic formal procedure given by law which is "a certain quorum of members is putting the issue to the board, the board has to invite for each general assembly, extraordinary general assembly, then we discuss it and then there is a decision by the members and the board has to do it accordingly" (Bahner 2017). Kulturland has little time and resources to solve a problem: "If a farm does not function or a family has a conflict on a farm or one of the farmers leaves the farm, then that could end up in a problem for us. Because we don't have the time to sit there and discuss to solve problems. But that is what we try to avoid by focussing only on the land. Because in the worst case we would just sit it out." (Schwedeler 2017). It is stated by Ökonauten to be a challenge that "sometimes it is really a personal difficulty [...] like a person who has never had something to do with the group and with these farmers. But with the environment with the farm [...] and they can destroy the project" (Tettenborg 2017). If conversations with the farmer do not lead to solutions and rules are being broken, BioBoden will terminate the contract (Decke 2017).

3.1.8 CP8: Nested tiers of responsibility

Founders: The three cooperatives build responsibility for governing the common resource in nested tiers from the farmers on the lowest level up through the members, executive board and advisory boards as the highest level of responsibility.

Whereas BioBoden takes responsibility for both the farmland, the equipment and buildings on the farm, Kulturland and Ökonauten leave that responsibility to the farmer and only manage the farmland putting extra emphasis on the responsibility farmers "so the approach is that they should be responsible for their equipment. When it breaks, they feel it, it's their own and they, repair it" (Schwedeler 2017). The local organization that develops around the farm, particularly in the case of Kulturland, imply a type of nested responsibility and authority. Schwedeler explains that "actually in an ideal world the farm should function on its own, and they should have enough possibility on its own to do it in a proper way. As soon as that would not be the case, we have a problem" (Schwedeler 2017). Thus, there are different levels of responsibility seen in the cooperative structure.

3.2 Alignment with sustainability principles

The SP's were used to examine the extent to which land cooperatives contribute sustainable development. The results below demonstrate that within the cooperatives operations apart from the use of petrol (SP1) no major violations were found regarding SP2-SP3 and structural obstacles of SP4-SP8 and that they overall operate within the boundaries set by the sustainability principles as illustrated in Figure 3.1. Summarizing, they operate in accordance to SP2 by not using petrochemical fertilizers and pesticides, SP3 by well-managing ecosystems and protecting biodiversity on land, SP5 by ensuring people's influence on the co-owned land by the cooperative they are part of, SP6, by ensuring capacity building on different levels, SP7, through impartial treatment of members and farmers and SP8 by revitalizing a connection of

people to the land. However, the operation in accordance to SP4, protecting health, was less visible in the interviews and documents analysed. Overall, the findings show that operation of the cooperatives is largely within the boundaries of the SP's indicating that, with some points of improvement, their operation is currently sustainable. It should be noted that the researchers are aware of some conceptual overlap between the CP's and SP's and that below some repetitive results are to be expected in relation to the SP's.

3.2.1 SP1 – Mining

Founders: There may be reduced fossil fuel/petrochemical use compared to industrial agriculture through the mandated organic farming but this reduction is not explicitly stated as a goal. At BioBoden there are solar panels on roofs and the statutes mention “Ecological production of renewable energy for private consumption and selling” (BioBoden Statutes 2015). Overall the cooperative model does not differ regarding SP1 to any other (organic) farm in its farming operations.

3.2.2 SP2 - Man-made pollutants

Founders: There are clear reductions in the use of petrochemical fertilizers and pesticides or herbicides implicit in the nature of mandated organic farming under EU-regulation, under which Kulturland operates and the Bioland, Demeter and Naturland labels under which BioBoden and Ökonauten operate. Again, the cooperative model does not differ regarding SP2 in comparison to any other organic farm in its operations. Furthermore, there were no explicit points reducing SP2 violations found in the interviews.

3.2.3 SP3 -Physical degradation

Founders: The aim of the cooperatives is to secure land for long-term organic agriculture. For the time the land is taken out of the market and used for organic farming, it is protected from physical degradation (i.e. it cannot be converted to a different use) and as the cooperatives buy land of already functioning farms, no land was recently converted from forest (or nature) to farmland. The cooperatives hope to do this on a permanent basis.

The simple statement “all the farms have to be ecological aligned with EU regulations which is the basic level” shows that there is a clearly defined and regulated aspect to the ecological aspect of the organic farms. Biodiversity is explicitly mentioned by Kulturland where farming “needs to meet biodiversity criteria and organic criteria” (Schwedler 2017). In the preamble of the statutes of Kulturland it is defined that “Agriculture is said to maintain the fertility of the soil in the long term and should produce plant products with maximum biodiversity and thus create a livelihood for humans and animals” (Kulturland Statutes 2013). BioBoden states “they have to follow our rules and the rules are membership in an organic association like Bioland, Demeterland, Naturland”, (Decke 2017). BioBoden also mentions the protection of unique species as a reason why wind power cannot be implemented. Furthermore, the statutes of BioBoden declare the main goal is “to ensure sustainable living conditions in rural areas by means of ecological managed agriculture and forestry, and to ensure a responsible handling of the necessary resources on a lasting basis” and aims to secure and improve “biodiversity, soil quality and water protection” (BioBoden Statutes 2015). Thus, the elements of biodiversity,

land and soil protection are common themes that relate to preventing the physical degradation of the land.

Farmers: The coop-farmer emphasises several times in the interview the positive impact of BioBoden on organic agriculture through its governance structure. This is by being a reliable and trustworthy partner through long-term lease contracts while “really emphasizing the ecological idea” and secure land against investors from outside the agricultural sector. He perceives having a “safe partner, who is pro-ecological, that is behind me with my agriculture, that even in a generational conflict (i.e. succession), will not sell the land”. Through the long-term contracts with the cooperative the farmer gains personal motivation to care for the soil quality because he knows he will be able to farm it for a long time. Practically, the farmers comply with the label “Bioland” which is stated to be “much stricter” than the basic standard of EU organic label. The work it takes to improve the soil fertility is stated to be “a very long-term story” and that a typical market-based five-year lease contract diminishes the personal motivation of the farmers to improve or maintain the fertility of the soil. The farmer states that it is only possible to care for the soil fertility with “a long-term partner (...) that gives me a long-term perspective and says and you can and you have to do something about this” (coop farmer). This long-term perspective helps in preventing physical degradation of the soil.

In general, the farmers believe in producing organic foods at a high standard, as they are complying with the rules of the German organic association label Bioland and make their operations transparent to the public. Advantages can be seen due to a preserved “biodiversity”, “different variety on the farm than around us”, “no spray, no fertilizers being used” and “that it does not harm the soil, and builds humus” (coop farmer). However, it is recognized that organic farming is a kind of cultivation, and therefore has impacts (coop farmers). It is stated that “Money is in second place and animal welfare always comes first” (coop farmer), and state that they “like to do organic farming”, while it seen as “an important part to get organic farming further forward in Germany” (coop farmer).

Other conventional farms in the area are stated to contribute to a loss of biodiversity and fertility of soil, due to their homogenous plantation of crops and even affect the groundwater with the quantity of liquid manure being used (coop farmer).

3.2.4 SP4 - Health

Founders: Overall the cooperative model aims to provide a solution to the practice of land-grabbing that might undermine the health and integrity of local communities due to the loss of small scale farming. Interestingly, there are no statements in the interviews of the founders and statutes that directly relate to health. Even though organic farming might lead to better health impacts for farmers and possibly consumers as there are no harmful fertilizers and pesticides used. However, there is no evidence found in the data analysed and therefore difficult to see a clear alignment with this principle.

3.2.5 SP5 - Influence

Founders: Four means of influence were found in the interviews: the members' right to vote and the opportunity to bring new ideas into the cooperative, the farmers gaining access to farmland and the cooperatives' communal influence on the co-owned land. In spite of the fact

that the farmers of BioBoden do not have to be members and the low participation in the democratic processes, the cooperatives do allow for people to influence its structure.

The coop's democratic nature and principle of one vote per member (not one vote per share held), provides fertile ground for investigating influence. Members have the influence of their single vote at meetings to elect both the advisory board and the executive board directly: “everyone has one vote; every member, doesn't matter if you give one thousand Euro or 1 million Euro” (Decke 2017). In the interviews, it was found that their suggested ideas are welcomed by the cooperatives but that the influence they possess is often limited by their lack of participation in the democratic processes and involvement in the cooperative. It seems the majority of the members in all the cooperatives are “silent members”; they buy their shares “just wanting to have (...) impact in this topic” (Keye 2017) but may not attend meetings. Participation ranges from 9% (BioBoden) to 25% (Ökonauten) at annual meetings (Fabjancic 2016).

Fundamentally the cooperative model removes the need for a high mortgage and bank loan, giving access to farmland and providing a link to people who wish to farm or support organic farming. There are also intentional limits to the influence of members through shares, Bahner states “we have an upper limit of membership of participation of 40 shares at 500 euro a piece so it's 20 000 Euros” to avoid concentrating power, and money that might have to be returned, in one member (members have the ability to redeem shares after a period of time with a notice period that differs between the different cooperatives).

The cooperatives perceive themselves as a horizontal structure that enable member influence, this horizontal structure is discussed by Kulturland as follows “it acquires agricultural land (...) in the sense of a modern ‘commons’, to keep it long-term in communal ownership” (Kulturland Statutes 2013). It is also stated that the cooperative wants further “contribute in developing new and future forms of ownership for sustainable agriculture. It sees itself as a bridge between owners and users, that enables different intensities of participation in land, up to donation and gifting” (Kulturland Statutes 2013).

Farmers: The coop farmer interviewed from BioBoden does not have to be part of the cooperative and is not interested in shaping the rules of the cooperative because of time constraints. Surprisingly, it was found that the farmer had no understanding of the legal implications of working on cooperative soil, stating: “I have too little legal knowledge”. The coop-farmer is able to decide what to crop to grow but stays in a constant dialogue with the cooperative. The daily work of the farmer seems too demanding to allow participation in the cooperative's governance in any meaningful way: “Well, right now, I am so busy in the farm that fully invested in its operation, that there is nothing at all” and “I have not even thought of this. I am too concerned with the thoughts [of] everyday-work”.

3.2.6 SP6 - Competence

Founders: Competence is promoted by the cooperatives by providing learning opportunities, cross-farm learning, and knowledge sharing with other organisations, even though the cooperatives do not have a lot of time and resources to support farmers in building capacity. Farmers seem to have the advantage of the active promotion of cross-farm learning and Ökonautens' statutes align clearly with SP6 “supporting and advising farm start-ups and the protection of farms in the agricultural sector”, “supporting agricultural holdings in marketing

and sales”, “supporting and implementing the logistics and administration for farms”, “promoting urban-rural relations through joint educational and cultural work” (Ökonauten statutes). The development of farming, organizational and educational capacities are all explored in the interviews and range from limited resources available for the purpose to internships available to organic farmers: “we also cooperate with ecological associations like Demeter or Bioland to give opportunities for young farmers to practice ecological business, not only at the university but on a practical farm outdoors” (Decke, 2017) and “we start talking to potential farmers or to young farmers who are still studying for example” (Tettenborn 2017). The cooperatives seem willingly to share what they have learned with other organisations, even if the mechanisms by which to share are not yet fully developed. In terms of how the cooperative is able to spread its knowledge, Bahner states that there is a platform where different organizations related to the land issue meet and share information with each other and “it's very good, because we realized that we all working really at the same issue and there's much space for everybody so [there is] no sense of competition and it's really sharing and helping each other” (Bahner 2017).

Kulturland makes a point out of being exclusively owner of the land and not of the equipment of a farm because of the conviction that the farmer will take more responsibility for equipment if they own it implying an intention for farmers to be self-responsible with their operations and not dependent on another organisation. Furthermore, although Kulturland wishes to provide a learning environment for its farmers it has limited capacities to provide learning opportunities for the farmers as they state: “I don't think that we have a lot of time and resources to really support farmers to really building that capacity. Our model is low cost, we only buy the land” (Schwedeler 2017).

Farmers: The cooperative is perceived to provide a useful network of information with which the farmer can exchange ideas or equipment: “it's helpful to exchange machines or help with animals where we exchange for example, our equipment”. Overall the network of farms provided by the cooperative helps the farmer in his day-to-day farming practice “I simply know where I have contacts where I can ask or learn from how it works on other establishments”, the farmer states.

3.2.7 SP7 - Impartiality

Founders: There is an element of fairness inherent to the cooperative democratic structure. As the lack of gender equality in the governance structure is only stated by one cooperative with the intend to change this in the future and it is not existent in the other two cooperatives, there is no evidence found that the cooperatives do systematically support partial treatment.

The cooperatives cannot take action against the farmers unless they violate the statutes or lease agreements, which can be seen as an even playing field for all farms and farmers: “We cannot give notice to a farmer on our own terms, unless the farmer breaks the rules of the rental contract” (Bahner 2017). Membership is open to anyone who wishes to and can afford to buy at least one share in the cooperatives, ranging from 500 to 1000 EUR. The openness of membership and impartiality of rules for all farmers and members imply alignment with elements of impartiality. In discussing the location of the general assembly, different ideas were evaluated for fairness to attend: “we couldn't motivate many people except the ones who were really connected to these farms living nearby to come. So, we will change the strategy and do it in the middle of Germany so everybody has to travel” (Bahner 2017). However, there is a

lack of gender diversity: “we are lacking ladies in this [governance] structure [of the administration] - we are trying to do something against it but it's not so easy” (Bahner 2017). This problem cannot be seen in the governance structure of the other two cooperatives.

3.2.8 SP8 - Meaning-making

Founders: Overall the cooperatives enable individual and collective meaning making through their work as they help people to revitalize a connection to the land, their benefit for members is not materialistic but idealistic in nature and they enable farmers to find purposeful conditions for themselves.

As part of the philosophy to remove land from pure market forces and price increases and not see it as a commodity, no interest is given to members on their shares (although BioBoden may offer some small amount in the future if profit is made) and shareholders seem to find other motivation than money for being part in the cooperatives. The founding of the coop was based on an existential idea that people craved a more meaningful connection to the land and the practical one of removing land from the market to support organic farming in the long view. The lack of connection between modern life to the land was mentioned several times.

There was a vital thread of spirituality that ran through parts of the interviews with Kulturland. Rather than a practical or technical approach to sustainability we discovered that the spiritual or psychological dimension was central to the founder's vision and the reason that the cooperatives have come into being. Thus meaning-making, revitalizing a connection of people to the land, is central to the founding vision of the cooperatives: “people aren't happy with the current farms which result in land market speculation [...] [land market speculation] is only happening because people are separated - from the land for instance” (Bahner 2017).

Farmers: Overall, the ability to work on the cooperative land enables the farmer to create purposeful conditions for himself: “I am an eco-farmer, I like to do organic farming and for me it is an important part to get organic farming forward in Germany”. Even though the farmers have limited time available for significant involvement in the communal aspect of the cooperative it is perceived as a community that “stands behind” the farmer, referring to being in the cooperative community as “very pleasant so far”.

3.3 Alignment with adaptive capacities of human social systems

The AC's were used to examine the land cooperatives governance structures' internal sustainability contributing to overall understand their contribution to sustainable development. This analysis is different from the 5 SSP's in that it looks at basic mechanisms that can systematically undermine the adaptive capacities, not for evidence of their operation. Overall, the results below demonstrate that the cooperatives have evidence for all five AC's: 1) diversity, by having a high diversity of backgrounds in the governance structure and diverse opinions through the members; 2) self-organization, through the cooperatives' legal structure and local engagement of members surrounding farms; 3) trust, by working together on a friendly and trustful basis without giving interest to the members; 4) learning through capacity building on different levels and 5) common meaning by having a clear purpose; reconnecting people to the land and enabling farmers access to land. Governing organic, cooperatively owned land trusts

in a way that fosters adaptivity in the system is important to be able to adjust to changing environment in which it is nested and ensure overall sustainability throughout time.

3.3.1 Diversity

Founders: Overall the cooperatives bring together a high diversity of opinions and capacities through their members and governance structure. The cooperative structure prevents a single person from controlling the agenda or making the decisions. The diversity of competencies in banking, farming, legal and financial sector expertise that was and is put up by the founders and needed to form and maintain the cooperatives has already been mentioned. There is a legislated diversity among the boards (advisory and executive) and a diversity of people who must staff the positions on the board. The greatest diversity is of course found in the membership whose different viewpoints, motivations and mindsets were not explored in this work. It can be seen in the “non-formal meet-ups organised by Ökonauten where “interested people can come to us and we just talk in a normal way. And also, we invite them to the farms which are part of us. Or like, who are members of us. We invite them to this. So, we try to make an exchange.” The strength of the cooperative is seen to be cooperation across diverse opinion.

3.3.2 Self-organisation

Founders: At a fundamental level the cooperatives provide a legal structure for collectively acquiring land while at the same time prohibiting itself from being able to easily sell the land because of the collective interest of its members. The cooperative can therefore be seen as a self-organising legal structure ensuring farmland stays farmland.

There are many elements of the structure that are flexible enough to allow local communities to organize themselves around the farm. “The farmers ask his customers, his friends and the surroundings, the social surroundings of the farm to support him in securing the land and to become members of the coop which is just a structure to help the farmer secure his land with his people” (Bahner 2017). Thus, formation of the membership is loosely organized around the local farmer and her social circle. Schwedeler (2017) explains that Kulturland tries to develop organizational structures that distribute responsibility in an even way by saying: “how can we both be responsible for certain areas and work together well in a horizontal way?” This “horizontal way” is a non-hierarchical structure where self-organization would be possible.

Farmers: The coop-farmer sees the cooperative as a community where he knows other farmers and the board and can share his questions and struggles. Furthermore, the cooperative structure allows for exchange of machines, resources and knowledge with other cooperative farms.

3.3.3 Trust

Founders: Trust has elements of competence, benevolence, significance and integrity embedded within its concept. Different levels of trust were identified through the interviews: between the members, between members and the board, between the board and the farmers and between society and the cooperatives' operations. The cooperatives depend on all mentioned levels of trust, in order to function. Trust between the board members allows for delegation of tasks reflecting the element of competence, trust between farmers and the board allows the farm

to function autonomously. Trust between the cooperative and members is necessary to grow the membership. Overall a moderate to high level of trust is found throughout the cooperatives. As the cooperatives together already accumulated over 15 million EUR since 2015 without any financial incentive for members, a high level of trust is assumed. Referring to the members BioBoden states that they gave their money "to do good thing with this money" (Decke 2017) and Kulturland states: "of course they like it and they are supporting it" (Schwedeler 2017).

Though, the fact that most of the members rather stay passive without getting involved in the farms of the cooperative indicate a reasonable level of trust (Decke 2017). Kulturland was founded by experts who knew each other: "basically we knew each other personally when the thing got starting in German cooperative law" and were friends "he is a good friend of mine and he brought me into the group. And he himself is a good friend of Thomas" providing an initial place of friendship from which trust could grow.

On a societal level, it was noted that a challenge to Ökonauten was in the way that they were at times perceived: "sometimes people think that you are the big investor and we are the big investor and want to take away land, which is not at all our aim" furthermore stating "We try to organise ourselves for the worst case, but work in a way that we are more like a, not family, but on a very friendly and trustful base" (Tettenborg 2017).

Farmers: The coop-farmer states to have trust in the long-term partnership with the cooperative and values its mission to support organic farmers.

3.3.4 Learning

Founders: Overall learning is promoted by the cooperatives by providing learning opportunities, cross-farm knowledge sharing, and knowledge sharing with other organisations, even though the cooperatives do not have a lot of time and resources to support farmers in building capacity.

The cooperatives enable self-learning through meetings, workshops, internships, cross-farm learning and less formal group discussions. They seem willing to share the expertise and capacities that they have developed and are willing to take on ideas suggested by the membership. Although they state they might "wish we would do this a bit more - enable learning" (Bahner 2017), the cooperatives do demonstrate a willingness to share and learn. They have "one first case, where this Brandenburg project was going to the Freiburg project (...) to tell them how they did it" (Bahner 2017), a clear case of sharing expertise. The cooperatives provide a learning environment and can educate the membership about farming: "somebody who wants to connect with the farm has to have the opportunity to go there to be explained and be shown the land" and "actually, in our newsletters a prominent part is to explain what's happening on the farm and of course to explain it you have to understand it" (Bahner 2017). Also by going into debt a little bit, Kulturland allows responding effectively to their executive directors' need to earn a living from this" (Schwedeler 2017). This is an example of how new responses are prototyped in order to learn.

Farmers: The coop-farmer state the ability to exchange knowledge, machines and resources (such as cattle) in order to help and learn from each other inside of the cooperative.

3.3.5 Common meaning

Founders: Humans need to have meaning in their lives and participate in a shared purpose. As was the case for SP8 meaning-making, references to common meaning can be found in many parts of the interviews and point to a strong existence of this Adaptive Capacity. As there is no financial incentive for members to join the cooperative, they must be doing so to satisfy some other need. Indeed, it is in bringing people together to help them support organic farming and thereby enabling them to reconnect with the land, that is the strength and purpose of the cooperative. In the case of Kulturland and Ökonauten the people tend to be located close to the farm, where for BioBoden, members are found across Germany. Perhaps it is most explicitly stated here: “we aren't assembling members for their economic benefit but for their idealistic benefit which is an extension of the cooperative idea, it's not very new, others have done this also but it's quite deliberately and especially this way” (Bahner 2017). On the benefit of meaning to the farmer: “...he gets much more security and emotional perspective, it can be a much more interesting job because he's not the bad farmer who is destroying the environment but he gets recognition for what he's doing from the local people” (Bahner 2017). The common purpose of the cooperatives is shown in the following statement: “the members are clear they want to support the farmers, the farmers are clear they are happy that the members are giving them money” (Bahner 2017).

3.4 Emergent themes

Emerging themes which came up during the interviews with the cooperatives' founders and farmers include issues around land, financial aspects, new forms of ownership, unplanned circumstances, future, barriers to growth, behaviours of members, cultural background and the farmers' perspective on the cooperative BioBoden. Supplementary to the *a priori* evaluation, the emergent themes contribute to the understanding of the challenges and opportunities perceived by the cooperatives. This perception aids the understanding of their sustainability in topics that were not covered by the CP's, SP's and AC's.

3.4.1 Land

Founders: Land is repeatedly mentioned during the interviews in relation to the topics of land acquisition and high prices, challenges for farmers to get access to land, the reason to found a cooperative and start in East Germany, new forms to finance land and the cooperatives' criteria to buy land.

Through the acquisition of land, the cooperatives are helping farmers that might otherwise have difficulties securing their own or new land: “And so he would buy this land or they would lose it, because the neighbour farmer or some other farmer or investor would buy it” (Bahner 2017). The cooperatives are mostly approached by existing farmers who request help with their concrete challenge to finance the land they are already working on. This was one of the reasons for the cooperatives to start their work. Overall, challenges are high land prices, land speculation and low availability of land: “more and more land gets sold on [...] a speculative basis - at least a basis where people want to make money and the farmers cannot afford it anymore because it's so expensive” (Bahner 2017). Meanwhile the cooperatives declare their aim is not to “grow the prices in the area” and deny paying the highest prices, Decke (2017). The reasons to start in East Germany are grounded in lower prices in East Germany (compared

to West Germany) and the BVVG selling former state-owned land, thereby making it available for purchase. As the land market in Germany is in favour of active farmers, new legal structures had to be found in order to realize the purchase of land through the cooperative. It is stated that people are disconnected from the land and it is this separation which makes speculation possible in the first place. Land concentration and new forms of financing land are stated to be challenging for the cooperatives to promote to their members because of the abstractness of the topic. The criteria for the cooperatives to buy land depends always on the surrounding conditions of a certain farm: “the connection between the farmer, the land and the people who support the farmer, connected to the land” (Schwedeler 2017).

Farmers: The prices for land are stated to be very high in comparison to recent years and is a reason that farmers have difficulties to get land at all: “everything is sold, there is nothing more to get” (farmer). For farmers “who do not have equity, it is almost impossible to buy a land or buy a farm, if you do not have someone to give you money in your family” (coop farmer). At the same time the farmer would sell his land, once he will retire because of no one in his family to take his land. At the same time the problem of speculation with land by non-agricultural investors is clearly seen and small farms are challenged “to secure land, to assert themselves against the investors” (coop farmer).

As an additional topic, the farmers mention the long-term security of the lease of land. Farmers state that small farmers are challenged to secure their own land against investors from non-agricultural background. Furthermore, the lease development is detrimental for them as “people do not bind themselves anymore and give you a 12-year leasing contract [as a farmer]”. It is stated that farmers are “always interested to have a longer contract to have more security” (Decke 2017). However, landowners seem to want shorter term contracts (coop farmer). The farmer states the coop is a helpful, reliable partner by aiming for long-term leases and securing the land.

3.4.2 Financial aspects

Founders: Financial matters were found strikingly often in the interviews, whether as a practical funding strategy, as an internal challenge of the cooperative or a cause of the land problem.

As farms face financial challenges with their own business or their landlord wanting to sell the land they work on, cooperatives see themselves as a means for farmers to avoid unmanageable debt. The development of supply chains and fair prices for their products are stated as a remaining challenge for farmers. Through the collective-ownership, the farmers cannot sell the land nor use it as a security deposit for a bank loan, which is stated to be “the only thing which makes a difference” between the long-term cooperative lease and outright ownership (Bahner 2017). The financial situation of the cooperatives varies from a strong stability through partnerships with other organizations and salaries for 5 full-time employees to completely dependence on voluntary engagement. Two cooperatives aim to keep its expertise in paid positions and “went out to create a professional structure that is not on a voluntary basis” (Bahner 2017), whereas Ökonauten is based entirely on voluntary efforts. However, it is a short-term challenge to afford salaries “it is really that we don't have enough money to pay for salaries and to grow further” (Schwedeler 2017). This simultaneously acts as a barrier for attracting new members “because then we [Kulturland] don't have the marketing cost” (Schwedeler 2017). The business model of the cooperative is stated to be “low cost, we only buy the land”

(Schwedeler 2017). Although Kulturland and Ökonauten have limited equity available they are very careful not to create any debt and are therefore only able to expand gradually as their member population grows. BioBoden was founded in cooperation with GLS Bank and other companies related to the organic food industry (processors, wholesalers and retailers) which have provided a strong supportive foundation during its start-up period. These partners bought shares, provided grants and supported the membership recruitment among their customers. In contrast, Kulturland rejected a partnership with Triodos Bank during its start-up phase to maintain its independence, stating “I felt like Triodos would already be too big and inflexible to grow a really good concept that is near to need of the market” (Schwedeler 2017).

Presently, the three cooperatives do not give any interest to their members because “the basic reason is to not have any incentive for the members to say, let's sell land in order to realize profits” (Bahner 2017). Tangible return on investment is given by Ökonauten in the form of member discounts on the local farmers produce and BioBoden is considering giving interest to members in “five six or ten years” when expects to start making a profit (Decke 2017).

Farmers: The farmers mention the financial struggle in the area of East Germany repeatedly. In the area of East Germany, it is stated that the financial situation is difficult, as some smaller businesses had to give up with the reason that “the people around here do not have so much money”. At the same time, there is little money spend on food (in East Germany) which increases the pressure on income for farms. Even though as a farmer “You will not get rich”, farmers income is stated to be enough to “live as a farmer” (non-coop farmer).

“To secure land and to assert (...) against the investors” is seen as the main challenge for small farmers (coop farmer). In addition to this, it is stated to be “impossible” to maintain a farm without investment capital for “technology, building” etc. Especially in East Germany, because this capital is otherwise simply not there.” (coop farmer). Because “investors with lots of money” are able to buy large farms, everything is sold (coop farmers). Especially because of the difficult financial situation in East Germany and recent developments of land purchase through insurance companies from South Germany the farmers “find it particularly important for East Germany to secure these large farms” (coop farmer).

3.4.3 New forms of ownership

Founders: New Forms of ownership where mentioned in particular by Kulturland in relation to shared responsibility and a future vision of collective forms of ownership.

Two out of three cooperatives state that this new form of ownership creates more responsibilities for the farmer apart from just farming. Working on cooperatively owned land the farmer might have to both engage with cooperative members, the board and the local stakeholders to attract new members.

Overall the cooperatives provide a philosophical and legal framework in which society and farmers can involve themselves to secure farmland and aim to make this the societal standard: “The long-term goal would be that it really becomes the norm and it's a normal thing for farmers work on cooperative land” (Bahner 2017).

Farmers: The farmers support the philosophy that farmland should be treated like the air, the light and the water too, “we have to deal with it responsibly” (farmer) and It “is actually a common property, for everyone, a common good” (Coop farmer). The farmers are concerned that land “does not end up as a speculative object in the hands of any investor” (coop farmer),

because “land does not belong to individual or any industries or group of companies, but land belongs to me like water, light, air” (coop farmer). For the farmers, it is important that the land stays in hands of organic farming “in what form (...) whether it is then cooperative or whatever” is not important.

3.4.4 Unplanned circumstances

Founders: Overall the cooperative model is turning out to operate largely as its founders envisioned apart for a few unexpected developments at the Ökonauten and Kulturland in the relation between farmer and members, local community engagement and growth.

Due to the rate at which members were visiting the farms the farmer felt like being an attraction for its members instead of providing an opportunity to bring society closer to the practice of farming “you feel like it when all the people look at you; Wow you are doing farming! Wow cool!” (Tettenborg 2017). And secondly, the growth of Kulturland is stated to go “slower than we thought” (Bahner 2017). The involvement of the local community surrounding the farms, initiated by the farmer to re-finance the money spend by the cooperative to acquire the land, “did work in Basta, did not work in Luzernerhof and does more or less work with other projects” (Schwedeler 2017).

3.4.5 Future plans

Founders: While all three cooperatives expressed their desire to grow their membership and increase the amount of farmland managed organically, their general ideas about the future relate to: 1) growing carefully by attracting new members without getting into debt, 2) development of local hubs and several offices per cooperative, 3) development of measurable sustainability parameters, 4) further development of cross-farm knowledge sharing, 5) investment in renewable energies, 6) engagement of local community surrounding the farm and 7) the development of more learning opportunities for young farmers to practice organic farming and farm management.

The increasing problem of farm successions due to retiring farmers is recognized and stated as being one motivator to keep growing: “because we see that there is more [available land] coming” (Decke 2017) and all three cooperatives would appreciate a spread of the concept Germany-wide and worldwide. Further plans of the cooperatives aim to “see the environmental or sustainability impact of our loans” to communicate the sustainable impact of the cooperative with its members and the public (Schwedeler 2017). The local engagement of stakeholders is mentioned twice: “involve the local players like the mayor (...) and the people here in the area so we want to get more employees working here, we want more value-added in the area (...) and we want to get new corporations here working together with the town, the communities here” (Decke 2017).

3.4.6 Barriers to growth

Founders: As the cooperatives state their current challenges, several barriers to growth were found throughout the interviews including traditional ownership views, lack of liquidity, lack of partner organisations, legal challenges, lack of available land, no interest given to members.

1) the traditional psychological attachment to private ownership that came from the hard-fought battle to own land after the end of the feudal system, and “only after second world war that (...) it became more and more normal that people would rent their land again because with the structural change in farming (...) in the 1950's, 1960's the vast majority of farmland was privately owned by the farmers” (Bahner 2017).

2) A lack of liquidity: “on the short term I would say it is really that we don't have enough money to pay for salaries and to grow further...there is no money for salaries but also no money for marketing” (Schwedeler 2017). Through the recent decision of the board and advisory board members “to allow for a little and controlled loss making. To give it a bit more room for growth and a bit more possibility (...) to take some fees for their work” may change that (Schwedeler 2017). It is stated that if there is land available to buy, the cooperative does not always “have enough money to do it” (Decke 2017).

3) The lack of partner organisations, such as a GLS Bank with BioBoden, is stated to be a disadvantage by Kulturland, as BioBoden can attract many new members (through GLS advertising) and have financial security through the bank. This goes together with the ability to create a better communication network in order to improve the involvement of current and new target groups (Schwedeler 2017).

4) Legal challenges can slow down the process of buying new areas of land because according to German law farmers have the first right to buy agricultural land, so that “legally viable” ownership forms have to be found (Bahner 2017).

5) The lack of available land is a problem: “we talk about this like there would be people selling land every day, but it is not like that. So, that’s the limiting factor, we cannot scale up freely” (Decke 2017).

6) Not giving interest to members and the lack of understanding in society about land cooperatives is perceived as slowing down the growth: “so that’s a reason why we don't grow like other businesses because there are a lot of people that think ‘What - no interest - so why are they doing it?’” (Decke 2017).

3.4.7 Behaviour of members

Founders: The regional versus nationwide focus of the cooperatives leads to different expectations and relationships with members which are stated throughout the interviews.

The reconnection to the land, and a desire for organic produce is perceived as the reason why members join the cooperatives. At Kulturland members have a possibility to support a specific farm. All three cooperatives make it easily accessible for members and the public to see where land been acquired for a farm and “farms are all obliged to be open to people [members]”. Members of Kulturland are “surprisingly passive” and “aren't really actively requesting or trying to propose changes” (Bahner 2017). It is stated that all three cooperatives are repeatedly asked by their members: “why don't we get any interest on our share? And why don’t you sell the land for higher prices and share this [the revenue] among the members?” (Bahner 2017).

Farmers: The farmer perceives “very little personal relationship between me and members. It is a goal to involve the people on the marketing, so far the involvement is minimal, because it

is also still in the beginning” (coop farmer). “Too much community” is considered as “difficult” because farmers are not used to it, but the overall involvement with the members so far is stated to be “very pleasant (...) if you can not only deliver to retailers but also a community that stands behind you” (coop farmer).

3.4.8 Cultural background / history

Founders: During the interviews, the historical background is explained several times being impacts on East Germany through the former GDR structures, history of ownership. One interviewee expressed “East-Germany is still like a completely different country [...] because the mindset of the people is so completely different. Civil society in the west is good” (Tettenborn 2017). As cooperatives were found in former GDR times but were organized undemocratically, cooperatives are often still seen as having communist roots and that most of the German cooperatives are now in the west. Formerly state farms in the GDR were very large in size, which still is common in East Germany today. When explaining that long-term plans might fail, they refer to the former GDR: “you can't plan the whole country like they tried here. It worked twenty thirty years but then broke totally down” (Decke 2017). Because of the historical development in East Germany “the idea of organic farming is not so popular like in west Germany, the way of thinking is more developed in West Germany” and that people in East Germany are used to “producing their own meat or own vegetables at home” (Decke 2017). On the history of landownership, it is stated that: “it's not so long ago that land became a private property here in Germany 150 year. (SIC)” and this structural change, resulting in a “very heavy rate of farms being given up which is still going on” (Bahner 2017). When asked about the founding Rochdale principles of cooperatives it is stated that “in Germany people are quite proud of their own cooperative history, cooperatives are a common thing in Germany” (Bahner 2017).

Farmers: The farmers mention big changes in agriculture overall and particularly in East Germany since the turnaround (from GDR to Federal Republic of Germany). Before this, land “belonged to everyone” and with the turn and the selling of former state-owned land by the BVVG “it was difficult to get the own area back again” (farmer). In GDR “all areas had to be big” and the small farms were rationalized, “so small farms have not been around here since the 50s”. After the turnaround farms with “more than 100 hectares, were all expropriated and they did not get back their land” (farmer).

3.4.9 Farmers perspective on the cooperative BioBoden

Farmers: Interviews found that BioBoden was unknown to the organic farmers who live close to the farm that is owned by BioBoden which demonstrates how little the cooperative is perceived in its local surroundings.

The cooperative was unknown to one farmer that is working in the next village to where one cooperative-owned farm is situated. He is unaware that there is a cooperative owning several organic farms in the region. After the concept of the cooperative is explained, the farmer replies to the question whether he likes the idea with: “Yes would be nice, if it goes on organically and that it does not belong to any other company. I cannot say so much as a small farm. Since I now do not have such a great influence now. But that would be good if there were no conventional farms in between and make their profit with it” (farmer).

The coop farmer states that he got to know the cooperative at his former workplace where the farm was almost shut down and the request was made to BioBoden to buy the land because of the insufficient financial means of the farmers. The request was denied by the landowner and no contract with BioBoden was made. When the cooperative needed a farm manager in the North East of Germany and he accepted and came to work at his present workplace.

The coop farmer perceives the positive contributions of BioBoden in the following ways: 1) to evolve the eco-agriculture in Germany and embrace the idea of ecological farming, 2) to secure large farms thereby protecting the land from investors, 3) as a reliable long-term partner for organic farmers that is not focussed on maximum profit, 4) as a network that enables exchange of information, machines, animals etc., 5) to help establishing a secure network of customer to buy farm products in the region.

Working on a farm, owned by the cooperative does not impact the practice of the farmer, as he works according to organic rules and gained similar experiences of community and knowledge exchange in other organisations before. Furthermore, it is stated not to be “a worry-free package, it is an attempt to bring ecological agriculture forward [...] but it does not solve all problems” (coop farmer). The cooperative is perceived to be “still a young child” because “some things are still in the development, as well as the marketing” (coop farmer).

3.5 Five level framework cooperatives

The results of the document analyses and interviews are summarised by means of a five-level framework (Appendix C). This helps simplify and structure the accumulated data relating to the goals, motivation and larger context of the cooperatives. The success level presents what the cooperatives aim for while the other levels are based on what the cooperatives have realised so far. Further implications of these findings as related to the cooperatives’ contribution to sustainable development will be addressed in the discussion.

4. Discussion

Results show that land cooperatives offer value in both managing a common resource and helping to reduce society's unsustainability. As a systematic review to their sustainable contribution was still missing in current literature, through interviews with practitioners and document analysis, we found data relevant to the secondary research questions. Below, we synthesize this evidence to discuss and relate the results to the primary research question: *What is the role of land cooperatives in greater sustainability?*

4.1 Cooperatives governance as commons

Although not a true commons or CPR problem, as the farms have clear boundaries of ownership and multiple appropriators are not involved, the cooperatives are allowing people to invest into land collectively. The results show that the cooperatives align with the principles of establishing a clear boundary, matching rules to local conditions, having the respect of outside authority and responsibility being nested in tiers from the lowest level up (the member or farmer to the executive board). The modification of the rules by those affected, monitoring of member behaviour by the membership, the use of graduated sanctions for violations (beyond the ultimate removal of the lease) and a simple method of dispute resolution were harder to distinguish from the interviews and statutes. For example, at the general meetings where members can participate and influence board decisions, attendance rates between the cooperatives varied (Fabjancic 2016) from 9% at BioBoden (180 people), 13% at Kulturland (20 people) and 25% at Ökonauten (15 people). The higher attendance rate of Ökonauten is partially explained by the fact that most of its (small number of) members are concentrated in Berlin and Brandenburg close to the location of meetings. Monitoring of the farm processes is performed through external audits and certifications, while the 'mechanism' for dispute resolution was often stated as discussion escalating to the ultimate removal of the lease. The apparent lack of member motivation seen in the low meeting turnout, may mean that they are satisfied with having bought their shares, they are unaware of how they might participate more fully or they simply do not have available time or energy to be more involved.

A key point of good commons governance is that local people, who are affected by and use the resource, are involved. Perhaps the cooperatives are not investing enough in community building; there does not seem to be a strong connection between the farm and community. They are dependent on members for financing land acquisition and operations but as they grow, it becomes more difficult to maintain the sense of community, particularly for BioBoden whose members are from across the country and not necessarily located near any farm. This may make it more difficult to match rules to local conditions, have local members modify the rules, and monitor members; CPs that become difficult without that sense of shared community. The inability to protect these principles may prove to be a future difficulty.

In terms of greater sustainability, the fact that the cooperatives exhibit many features of good commons governance gives them a better chance of success. To the extent that they have made land a commons they adhere to the principles. Some of the principles, graduated sanctions against members for example, may not in fact apply to the specific structure of the cooperative where most members are not farmers (users) so there is no direct rival use of the land. The membership may have differing ideas on what the land should be used for but this does not require sanctions nor monitoring to enforce. If we look at the method of dispute resolution, the

shortcoming has more significant implications. If the cooperatives grow, they might compete among themselves for both members and available land, increasing the need for effective dispute resolutions. The ability to successfully resolve disputes efficiently and at low cost will be important to the cooperative development.

4.2 Understanding cooperatives through SP's

The results clearly show the cooperatives do not have a robust, principled vision of sustainability from which they are working. There are elements of a sustainable vision and even a philosophy but it is not clearly articulated in a structured manner. Even so, by mandating certified organic farming (EU or other German organic label) they are inherently preventing certain violations of SP1, SP2 and SP3. This is because the EU legislation (European Commission 2007) and German organic labels include statements that aim to reduce external inputs to agriculture, protect biodiversity and the soil itself. The regulations are comprehensive, allowing for exemptions only when a natural compound is unavailable for example and even set conditions for livestock practices such as animal husbandry and living conditions, which the SP's do not address. It does however seem unlikely, that the legislative rules set out for organic farming will lead to the same type of systemic change enabled by the guidance of the SP's (or another principled approach). The extent to which the cooperatives can continue to enhance their alignment with the SP's, i.e. become more sustainable, depends on having a vision and taking decisions to achieve it. In view of the greater sustainability challenge, and the many interconnected problems, the need for a principled approach from which they can build a plan is essential for the cooperatives, and should be a priority on their progression towards the future.

On the social side, much more direct evidence was found of at least partial alignment with ideas of competence, influence, impartiality and meaning-making. The practices and operations of the cooperative show a respect for democratic process and a basic respect for people to develop competency, influence the cooperative structure and decisions, and enable meaning in their lives, notably from their ability to reconnect with the land. Fundamentally, the cooperatives demonstrate many elements of both ecological and social sustainability but their role in transitioning society may be limited by their lack of a clear and coherent vision to engage and inspire their membership.

4.3 Adaptive governance

Overall it can be stated that the land cooperative's governance structure is adaptive and effective at dealing with change and disturbances. With common meaning (shared purpose) the members are supporting the purchase of land, organic farming and reconnecting with the land themselves. The legal structure of cooperative makes them socially resilient to the extent that loss of key people (i.e. founders or farmers) will not lead to the sale of the land because of the collective interest of its members. The redundancy of the founders and farmers as related to the ownership of the land provides an effective buffer that has, so far, proven to effectively take land away from market forces for the long term. There is, however, potential to improve their adaptive capacity by strategically involving their members.

The cooperatives' big potential for diverse creative input, through the membership, seems largely untapped. Apart from the newsletters and general annual meetings, the membership does not come together to enable a more diverse portfolio of problem-solving strategies. The

governance of the farmland requires creativity, especially as the cooperatives are still in their start-up phase, and within the diversity among the membership innovative solutions may exist. As Ostrom emphasised, this creative engagement of the actors can be enabled by providing information about flows and processes within the resource being governed: “effective governance requires not only information about the state of the environment and human actions but also information about uncertainty and values” (Dietz et al. 2003). Only Ökonauten seems to be involving its members in the uncertainty as identified by Fabjancic (2016) who characterised the general annual meetings of BioBoden and Kulturland as informational sessions with discussion opportunities but no effective changes to basic rules and strategies. In contrast “Ökonauten eG discussed significant issues of internal governance and strategic decisions with amendments being proposed and adopted” (Fabjancic 2016). This is evidence that Ökonauten has been the most successful in tapping into the diverse creative input of its members.

The cooperatives could invest in providing technological infrastructure to allow their members and farmers to be more involved in their governance. For example, streaming meetings over the internet and allowing online voting might substantially increase participation. Currently member involvement is low due to the long-distance travel necessary to attend general annual meetings. And although all three cooperatives are, for instance, connected to the civic initiative of “Access to land”, an organization that aims to “work together to strengthen practical knowledge - on both problems and solutions - in the field of access to land for agro-ecological farmers hereby promoting the emergence and consolidation of grassroots initiatives” (Accesstoland 2017), they have made no effort in providing an online platform that would allow their own members and farmers to connect with each to promote discussion and ideas.

4.4 5-LF - Cooperatives through the lens of the FSSD

This section elaborates on the alignments and gaps between the 5-LF of the three cooperatives (Appendix C) and the FSSD to expand on the implications of the cooperatives structure and operations regarding strategic sustainable development.

System

Regarding the systems level, the land cooperatives align with the FSSD as they take the social and ecological system into account and emphasize the interdependence of both systems through their work. Correspondence is also evident in their awareness of their dependence on the general regional and global support systems as well as their embeddedness in value chains and other stakeholder networks such as the land market and organic farmers and farms. The cooperatives understand the nature of the challenge regarding agriculture: access land for farmers, decrease of biodiversity and loss of soil quality through industrial agricultural practices and aim to operate in an alleviating way.

Success

Even though the cooperatives are not applying a principled approach to sustainability, such as the 8 SP's used as a success level in the FSSD they do exhibit evidence of complying with the SP's as shown in the results section. As is evident in Appendix C the cooperatives' definition of success is categorized in three levels; economic, ecological and social. On the economic level their definition of success mainly relates to farmers being able to keep farming. This corresponds to SP4, health, because it enables farmers to make a decent living and SP5 influence and SP8, meaning making, by keeping farmers on the land. On the ecological level,

their efforts to increase the acreage under organic farming corresponds to SP2 and SP3 of the FFSD as shown earlier in the results section. And lastly, on a social level they comply with SP6, competence and SP8, meaning making. The absence of a structured, intentional approach to sustainability may make it difficult for the cooperatives to improve practices and eliminate other unsustainable practices. By fully embracing the SP's as constraints it would help the cooperatives to select, combine and develop additional strategic guidelines and actions needed to operate in a truly sustainable way.

Strategic guidelines

The lack of a long-term cooperative vision impairs the development of clear strategic guidelines. The operational guidelines in Appendix C are mostly concerned with the day-to-day practice of the cooperatives and unlike the FSSD, they do not use questions that ensure that chosen actions enable a flexible platform for future actions. The guidelines aiming at benefits for members, local communities, greater society and improving the soil on a long-term basis relate to the first prioritization question "*is it a step in the right direction?*". The guideline concerning the attraction of more members or financial resources and therefore ensuring the coops' financial security correlates with the third prioritization question regarding the return on investment. However, no evidence was found of a backcasting approach and it remains doubtful how strategically sustainable the cooperatives can become without a structured way to address the sustainability of their practices. Without this structured approach, the cooperatives could take a multitude of routes and actions that may not prove sustainable.

Actions

Like the strategic guidelines, the actions employed by the cooperatives are mostly concerned with the day-to-day practice of the cooperatives. The lack of a structured way to address the sustainability of their practice was again evident as there is, for instance, little effort to phase out non-renewable energy sources on the farms and educate staff on sustainability. The FSSD includes concrete measures on the actions level "that have been prioritized by the specific organization into a strategic plan, using the strategic guidelines and the vision to inspire, inform, and scrutinize the possible actions" (Broman and Robèrt 2017). But as evident from Appendix C there is no strategic plan arising from the strategic level related to these actions. Therefore, there is no correlation with the FSSD on the actions level and, like the strategic level, without clear guidance the sustainable contribution uncertain.

Tools

The cooperatives make use of tools aligned with their vision of success and most importantly monitor the sustainable management on their farms through organic labels that contain both ecological and social standards. As seen in Appendix C the statutes were categorized as a tool since it is the main structuring element that allows many of the operational success criteria. Comparing this to the tools level of the FSSD that concerns "*methods, tools and other forms of support that are often required for decision making, monitoring, and disclosures of the actions to ensure they are chosen in line with the strategic guidelines to arrive step-by-step at the defined success in the system*" (Broman and Robèrt 2017) the cooperatives seem to have an operational application of tools as envisioned by the FSSD.

Limitations FSSD in the context of the cooperatives

There is a clear difficulty between contextualising an organisation in a 5-LF and finding the correlation with the FSSD. Firstly, the cooperatives are not a planning instrument and fitting it into a tool for planning in complex systems is not simple since deciding which aspects of the

organization belong in each level is not straightforward. For example, there was debate as to whether the cooperative governance system was part of the cooperative ‘system’ or a tool itself. In particular, the strategy level proved problematic; the reasons why an organization choose to do something may not be stated or be ambiguous and blur into actions. With this uncertainty of the 5-LF structure in mind finding correlation with the FSSD contributed to the difficulty in determining their strategic nature. The cooperatives have clearly found a governance structure that takes a strategic approach in protecting farmland – but finding proof in the way the FSSD looks at strategic sustainable development for a governance structure remains challenging.

4.5 Implications for farmers

The three farmers interviewed were convinced that farmland should be protected as a common good; they think that land, like air or water, is essential to human life and society should therefore be able to have access and take responsibility for this resource. But even with this conceptual knowledge the farmers did not seem overly interested in the structure of the cooperatives - they were there to farm and busy with daily operations. They are aware of the greater problems of land ownership relating to agriculture but not the details of the land cooperatives that are helping them. The farmers themselves have limited influence with one vote if they are a member and no voting rights in the case of BioBoden where they do not (have to) own shares. This lack of understanding on the part of the farmers may reduce their enthusiasm for interaction with the public, at open houses for example, and slow the spread of the concept. They were explicit however in acknowledging that it was the long-term nature of the lease that allowed them to care for and invest in the soil. It takes time to make changes to soil conditions and the semi-permanent nature of the cooperative lease agreements (they can be rolled-over or passed on to children) enable the farmers to invest in methods and practices that are needed to maintain soil for organic farming. This is considerably different than a shorter/uncertain lease period where the incentive to invest in such a long-term strategy would be less likely for a farmer. Lastly, the findings indicate that educating the farmers about the cooperatives and business might be useful.

4.6 Land cooperatives as practical solution to arising land problem

The cooperatives have been able to respond quickly to the agricultural land issue. In only a few years they have shown a capacity to develop a membership, acquire suitable land and have organic production take place. Currently the cooperatives own a collective total of about 1,355 ha. BioBoden is expecting its membership, and therefore land they will be able to buy, to grow at the rate of previous years with some 2,000 new members a year. Kulturland has set a goal to secure 50 partner farms holding 500 hectares within the next 5 years and Ökonauten estimates that will be able to afford about 10 hectares of new land during the next 5 years. Using these numbers as a basis, the three cooperatives would collectively manage about 6,000 ha by 2020 (1339 ha/ year, Fabjancic 2016). Comparing that to the total of 1,047,633 hectares under organic use in 2014 (BMEL 2016), this amounts to around 0.6%. And if we compare this to the rate at which German farms under a 100 ha are losing farmland, 110,680 ha/year from 2010 to 2015 (BMEL 2016), the cooperatives are expected only to offset 1.2% of that loss.

The cooperatives have effectively reacted to the land issues presented the introduction in the following ways: 1) The establishment of the cooperative structure has proved faster than the necessary policy changes to reduce some of the systematic problems that farmers are facing.

The problem of farm succession will rise in the next decade as many farmers will retire. Currently 66% of all farm managers in Germany are 45- 64 years old and another 6% older than 65 years (Destatis 2014). Even though their reach currently is minute compared to the scale of the succession issue overall, they provide a practical solution to this problem, 2) They counteract the speculation of land and further rise of prices. By embedding land as a common resource in a community again, land is not seen as a commodity that can be used as a financial tool. 3) The cooperatives contribute to food security in Germany and local food production. 4) They counteract the intensification of agriculture and physical degradation of agricultural land by following organic farming principles and maintaining soil quality.

If they can meet the challenge of expanding their memberships and holdings, while remaining true to their philosophy, then they will have a greater impact on sustainability. It will be interesting to observe what happens if they decide to offer interest and what role a larger membership will play in these decisions. Presently, Kulturland sees the distribution of interest as profit off the land which is expressly opposed to its view of the land as a commons resource that should not be used to generate profit itself. BioBoden has mentioned offering some small amount of interest in the future, if the farms are profitable. Yet the most common question from the membership revolves around making some profit on their shares. A factor that should be considered is that the cooperatives were founded in times of low interest rates and it may become more difficult to attract members if other investments become attractive. With banks offering almost no interest, the cooperative model seems like a meaningful way to invest as the opportunity cost is low. There is a dichotomy here between the desire for interest among the membership and the principle that none should be offered by some of the cooperatives. Presumably the cooperatives would have to be slightly profitable in order to offer interest on shares and this could have implications for their business model in the future. Both Ökonauten and Kulturland see the increasing price of land as detrimental to the concerns of the essential farmers and oppose giving interest.

Even though the cooperatives (in particular BioBoden) have accumulated a considerable amount of capital from members in a short amount of time, with the numbers in mind it is clear that the cooperatives cannot presently compete with the rate at which land concentration and loss of the small farm is happening. In short, solving the problems of land concentration through membership funded cooperatives presently has clear quantitative limits.

4.7 Accessing cultural change

With the quantitative limit of the cooperative model addressed it is therefore important to elaborate on the qualitative contribution of the cooperative in the greater sustainability challenge. The findings indicate that the cooperatives in bringing land into collective ownership, have tapped into a timely cultural shift. The renewed interest in farmers' markets, locally sourced and organic food, reflect this desire of a more sustainable food system (BMEL 2017). This offers great potential, particularly for the model of Kulturland and Ökonauten, for future collaboration, as they are already connected with similar initiatives on a regional and European level. Both cooperatives are part of the European network "Access to land" and engaged in the campaign "Save our Soils". On a local level the cooperatives already seek to contact to politicians which could stimulate the development of new systems for sustainable management of agricultural land. BioBoden and Kulturland might have the strongest influence on this level as the founders have many partnerships in the organic food sector including an

ethical bank (GLS) as co-initiator and the latter is active as is an expert at meetings with the Federal Ministry of Food and Agriculture to advise on the current land market situation.

The idea that land should be a public commons is far from mainstream, but growing in light of other civic initiatives supporting farming in Europe and Germany (Hagenhofer 2015). In the context of current trends of land concentration and price increase, several similar civic initiatives have emerged over the past decade in Europe challenging commonly accepted perceptions of land ownership, farm succession, farmers' identities as well as the role of consumers (Hagenhofer 2015, Rioufoul 2012). They are mostly citizen and/or farmer-led and aim for a closer relationship between farmers and consumers/community members, to engage in a broader range of stakeholders and attempt to protect the environment through agriculture as a "public good" (Rioufoul 2012). A study analysing twenty European civic initiatives, with Kulturland being one of them, conducted by Hagenhofer (2015) finds that these initiatives can be seen as similar actors towards a new agro-social paradigm. Therefore, the cooperatives can be viewed as 'niche-innovations' within the Multi-Level Perspective on transitions (MLP) as shown in figure 4.1 among the other civic initiatives in Europe all supporting community-connected, ecological farming by proposing, testing and spreading new tools for ensuring farm continuity (Geels 2011). These niches are essential for transitions in providing the seeds for systemic change (Geels 2002) and in this way, the cooperatives and similar civic initiatives act as multipliers of their visions and values. Thus, the cooperatives are clearly playing a vital role in promoting and advancing to a new agro-social paradigm established on the regime level within the MLP (Hagenhofer 2015).

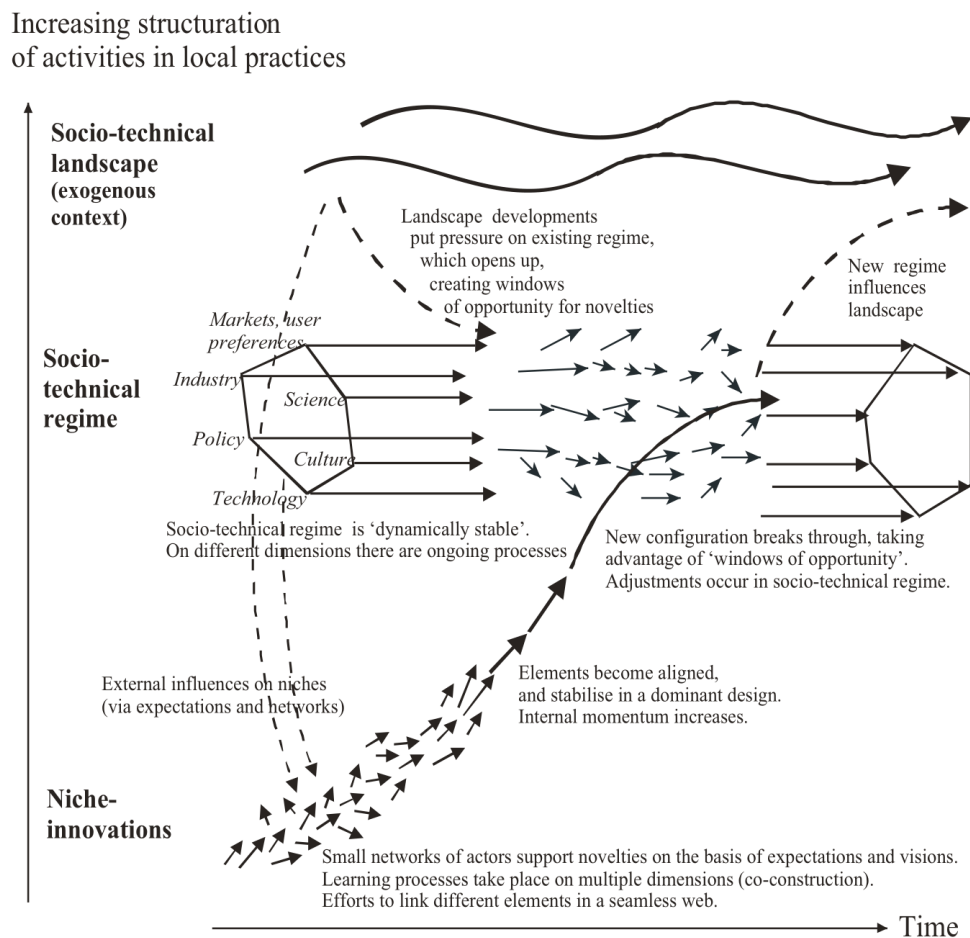


Figure 4.1 Multi level Perspective on transition (Geels 2011)

So, while the individual quantitative impact of the cooperatives and comparable civic initiatives in Europe may be limited, their potential role in increasing the development of community-connected and organic farming is significant. Using this transition perspective, it becomes clear “that a main strength of the civic initiatives active in this field lies not only in their innovative proposals as such, but in their way of connecting different actors and creating new networks. By focusing their support on community-connected, ecological farming in general and organic farming in particular, they are actively contributing to the sustainable development of European agriculture, and show potential for pushing the transition towards a more sustainable food system” (Hagenhofer 2015). In short, the contribution to greater sustainability relies to a significant extent on the cooperatives’ effectiveness in utilizing this transitional dynamic to help advance a new agro-social paradigm.

4.8 Reflection on research methods

The research proved both fruitful and frustrating. By allowing semi-structured interviews and fairly open questions responses were at times convoluted and ambiguous. It could be difficult to precisely capture the meaning and context of what was being said (see section 2.6 Limitations). Certainly, more exact questions may have clarified answers, but they would not have allowed for the same breadth of response. There is a difficult balancing act in developing questions that allow for both sufficient leeway of discussion and maintain the required precision in probing for an answer.

Coming to holistic conclusive insights regarding our primary research question proved challenging due to the lack of a clear unifying framework integrating. Even though it was clear that the CP’s are complementary to the SP’s and *vice versa*; in the scope of this research, we did not find appropriate ways to synthesize the concepts. The AC’s provided a clear complementary value in analysing the social sustainability of a governance structure by strengthening insights from a SP assessment. Lastly, separating the FSSD analysis and the SP’s, proved valuable in not merely evaluating an organisations’ contribution to sustainability, but also to identifying how their definition of success is related to the SP’s.

The inability of the researchers to have direct contact with the membership was already pointed out as a limitation of this work. The motivations and mind-set of the membership could only be assessed through the second-hand perception of the other interviewees. It would be extremely interesting to perform a survey the membership to ascertain their reason for joining, their views on sustainability and willingness to forgo interest for example. Interviews with a few members could provide further details about their knowledge of the cooperatives and willingness to participate in its governance. It may also prove useful in illuminating steps the cooperatives could take to grow the membership and what barriers presently exist.

4.9 Potential future research

There are several areas of future research to further develop the understanding of the cooperatives and their role in the transition to a sustainable society. The first is that of the mindset and motivation of the membership that was not directly investigated in this work. The interviewees suggested reasons as to why people joined the cooperatives but a survey of and interviews with the membership itself needs to be conducted in order to obtain first-hand information. What does the membership know about the commons and what is their vision of

sustainability? What direction would they like to see the cooperatives take? What do they see as the role of the cooperatives in the transformation towards a sustainable society?

Furthermore, the paper “Coevolving Ostrom’s Social-Ecological Systems (SES) Framework and Sustainability Science: four key co-benefits” by Partelow (2016) may offer an interesting framework from which the cooperatives can be analysed. It suggests the combination of an SESF (social-ecological system framework developed based on the commons principles by Ostrom) infused with sustainability science could provide key benefits in evaluating social-ecological problems (Partelow 2016). The SES framework allows a structured approach for generating and testing theory as well as characterizing elements and their interactions involved in driving sustainability challenges (Partelow 2016). By combining it with elements of sustainability science the application of the SESF could provide new insights into the functioning and structure of the coops and their role in sustainability.

And lastly, If the CP’s are to provide good governance of the commons, protecting it into the future, and the SP’s offer a robust set of principles that provide the boundary conditions for true sustainability, then one would expect that there would be overlap between the two sets of principles. Future research could investigate this overlap and how they both can benefit from each other. The creation of a theoretical model integrating CP’s and SP’s might contribute to both sustainability literature and help organizations to practically aim for sustainability and protect the commons.

5. Conclusion

Land cooperatives have a role to play in the development of a more sustainable food system. They are a democratic model that exhibits many features of the commons principles for good governance, and through both their structure, operations and mandated use of organic farming, show alignment with many of the SP's and AC's.

The study revealed that despite having a sustainability 'vision' the cooperatives are lacking a principled approach and here the FSSD can provide guidance, particularly at the success and strategic levels. A robust approach to sustainability can be developed around the 8 SP's and the development of a strategy would help prioritize and guide actions.

The cooperatives developed quickly and provide a practical response to the land concentration problem, removing land from the market and ensuring that organic farming continues. The extent to which the cooperatives can grow may be limited by their ability to tap into a cultural desire for a reconnection to the land, protection of small farms and a sense of community, elements often missing from our present food system. Although presently small, as niche innovators the cooperatives can act as seeds among similar civic initiatives in helping develop a new and more sustainable agro-social paradigm. The ability of cooperatives to raise awareness in the membership of the greater challenge, take political action, share their expertise to spread their model as a means for reconnection to the land, will go a long way in determining their future impact upon greater sustainability challenge.

Appendix A: Interview questions cooperatives

Note: Some interview questions were added and/or omitted based on the interviewee and their specific knowledge and experience.

- 1) How did you come to be part of this cooperative and what is your role here?
- 2) What do you like most about your work involving the cooperative?
- 3) What are the main challenges you are facing?
- 4) How did you gain access to your first piece of land?
- 5) What was the last big discussion you had and how was it resolved? How were the decisions made? What was the motivation behind the decision?
- 6) How does the cooperative enable learning and skill development for individuals and the community? What about knowledge sharing? (farmer to farmer)
- 7) What is your definition of sustainability?
- 8) What are your main measurements or targets in addressing the sustainability of your cooperative?
- 9) What are the main difficulties and challenges implementing sustainability?
- 10) How is the local community involved? (Do they benefit from your vision?)
- 11) How do members participate in the coop? (What influence do they have?)
- 12) How do you see the relationship between the members and the farmers?
- 13) What influence do the members have on the cooperative governance?
- 14) Do you have an example of a conflict and how it was resolved? (Is there a formal system for conflict resolution?)
- 15) How would you describe the financial health? What financial decisions are you making to ensure long-term durability of your organisation?
- 16) What are your long-term goals for the cooperative?
- 17) What fields of expertise are involved in founding a cooperative and why?

Appendix B: Interview questions farmers

Note: Some interview questions were added and/or omitted based on the interviewee and their specific knowledge and experience.

- 1) How did you come to be part of this cooperative and what is your role here?
- 2) What do you like most about your work involving the cooperative?
- 3) What are the main challenges you are facing?
- 4) How did you gain access to your first piece of land?
- 5) What was the last big discussion you had and how was it resolved? How were the decisions made? What was the motivation behind the decision?
- 6) How does the cooperative enable learning and skill development for farmers and the community? What about knowledge sharing? (farmer to farmer)
- 7) What is your definition of sustainability?
- 8) What are your main measurements or targets in addressing the sustainability of your farm?
- 9) What are the main difficulties and challenges implementing sustainability?
- 10) How is the local community involved? (Do they benefit from your vision?)
- 11) How do you see the relationship between the members and the farmers?
- 12) Do you have an example of a conflict with the cooperative and how it was resolved? (Is there a formal system for conflict resolution?)
- 13) What are your long-term goals for the farm?
- 14) What fields of expertise are involved in working with the cooperative and why?

Appendix C: Five Level Framework Cooperatives

	Results applicable to all three cooperatives		
	Specific to BioBoden e.G.	Specific to Kulturland e.G.	Specific to Ökonauten e.G.
System Level	<ul style="list-style-type: none"> - Biosphere and agricultural system - Land market - Financial support and membership - Organic farmers and farms - Ownership and cooperative law 		
	<ul style="list-style-type: none"> -Geographical boundary: Germany -Partner organisations in organic sector -GLS Bank 	<ul style="list-style-type: none"> -Geographical boundary: Germany 	<ul style="list-style-type: none"> -Geographical boundary: Berlin-Brandenburg
Success Level	<p>Economic:</p> <ul style="list-style-type: none"> - Ability to make farmland accessible to (small scale) farmers for organic food production - Remove land from market forces and speculation - Support economic development of rural local communities - Ensure fair lease price for organic farmers <p>Ecological:</p> <ul style="list-style-type: none"> - Increase biodiversity in the area of the farm - Maintain fertility of soil - Increase area of agricultural land for permanent organic farming <p>Social:</p> <ul style="list-style-type: none"> - Protect farmland as common good - Enable members to democratically take responsibility for land - Organic farms are locally embedded within communities 		
	<ul style="list-style-type: none"> -Ability to make farms and equipment accessible to farmers -Reduce imports of organic food to Germany 	<ul style="list-style-type: none"> - Enable people to locally engage and connect with an organic farm - Develop a sense of local community surrounding the farm - Spread new forms of collective ownership 	<ul style="list-style-type: none"> - Enable people to locally engage and connect with an organic farm - Develop a sense of local community surrounding the farm
Strategic Level	<ul style="list-style-type: none"> - Does it help to improve soil on a long-term basis? - Buy land below market price if possible - Does it benefit members, local communities and greater society? - Does it attract more members or financial resources and therefore ensures the coops' financial security? 		
			.. in the region of Berlin-Brandenburg

Actions Level	<ul style="list-style-type: none"> - Sell memberships as redeemable shares to public - Buy land - Take loans from public with modified conditions depending on the amount - Connect purchased land with organic farmers - Provide (affordable) long term lease to organic farmers - Create relationships between the public and farms to raise awareness and understanding - Promotion of the cooperative - Provide possibility to donate shares or money - Daily operations 		
	<ul style="list-style-type: none"> - Buy entire organic farms - Potentially offer interest in the future if profit is made - Enable farms to donate land - Production of renewable energy 	<ul style="list-style-type: none"> - Acquire more members through farmer's local network 	<ul style="list-style-type: none"> - Acquire more members through farmer's local network
Tools Level	<ul style="list-style-type: none"> - Cooperative statutes - Open houses - Newsletter and online marketing - Annual General Meetings - Audits and certification to secure land on long-term basis 		
	Organic labels (Demeter & Bioland)	EU-Organic label	Organic labels (Demeter & Bioland)

References

- Accesstoland. 2017. "Accesstoland. A European Network of Grassroots Organisations Securing Land for Agroecological Farming." Accessed May 14, 2017. <http://www.accesstoland.eu>.
- Agrawal, Arun. 2002. "Common Resources and Institutional Sustainability." In *The Drama of the Commons*, edited by Elinor Ostrom. 41–86. National Academies Press.
- Alexander, Peter, Mark D. A. Rounsevell, Claudia Dislich, Jennifer R. Dodson, Kerstin Engström, Dominic Moran, Institutionen för naturgeografi och ekosystemvetenskap 2015. "Drivers for Global Agricultural Land Use Change: The Nexus of Diet, Population, Yield and Bioenergy." *Global Environmental Change* 35, no. Journal Article (2015): 138–147. doi:10.1016/j.gloenvcha.2015.08.011
- Altricher, Herbert, Bridget Somekh, Peter Posch, and Allan Feldman. 2008. *Teachers Investigate Their Work: An Introduction to Action Research across the Professions*. 2nd ed. Book, Whole. Florence: Routledge Ltd. doi:10.4324/9780203978979.
- American Heritage Dictionary of the English Language. 2011. *Collins English Dictionary - Complete and Unabridged*. Eutrophication. Accessed May 2, 2017. <http://www.thefreedictionary.com/eutrophication>.
- BLAG. 2015. "Agricultural Land policy: General Situation and options for action." May 26. *German Federal Ministry of Food and Agriculture*. Accessed March 2, 2017. https://www.bmel.de/SharedDocs/Downloads/Landwirtschaft/LaendlicheRaume/Bodenmarkt-Abschlussbericht-Bund-Laender-Arbeitsgruppe.pdf?__blob=publicationFile.
- BREL. 2016. "Understanding Farming: Facts and Figures about German Farming." *German Federal Ministry of Food and Agriculture*. Accessed March 5, 2017. <http://www.bmel.de/SharedDocs/Downloads/EN/Publications/UnderstandingFarming.html>.
- BREL. 2017. "Ecological Farming in Germany." January 12. *German Federal Ministry of Food and Agriculture*. Accessed May 19, 2017. http://www.bmel.de/SharedDocs/Downloads/Landwirtschaft/OekologischerLandbau/OekolandbauDeutschland.pdf?__blob=publicationFile.
- Bollier, David. 2009. "Elinor Ostrom And The Digital Commons." *Forbes*. October 13. Accessed March 7, 2017. <https://www.forbes.com/2009/10/13/open-source-net-neutrality-elinor-ostrom-nobel-opinions-contributors-david-bollier.html>.
- Clapp, Jennifer. "Financialization, Distance and Global Food Politics." *The Journal of Peasant Studies* 41, no. 5 (September 3, 2014): 797–814.
- Destatis. 2014. "Agriculture, forestry, fisheries. Labour force agricultural structure report." *Federal Office of Statistics*. June 26. Accessed on May 22, 2017. https://www.destatis.de/DE/Publikationen/Thematisch/LandForstwirtschaft/Betriebe/Arbeitskraefte2030218139004.pdf?__blob=publicationFile.

- Destatis. 2015. "Agricultural Land overall including organic." *German Federal Statistical Office*. Accessed on May 22, 2017. <https://www.destatis.de/DE/ZahlenFakten/Wirtschaftsbereiche/LandForstwirtschaftFischerei/LandwirtschaftlicheBetriebe/Tabellen/LandwirtschaftlicheBetriebeOekologischerLandbauBundeslaender.html>.
- Dorph, Jesper Revald, Nicole Harvey, and Pieter Ploeg. 2016. Master Thesis "Planetary Boundaries and Sustainability Principles: An Integrated Approach in the Context of Agriculture." Karlskrona: *Department of Strategic Sustainable Development, Blekinge Institute of Technology*. <http://www.diva-portal.org/smash/record.jsf?pid=diva2:941085>.
- Economist. 2014. "Investing in Agriculture. Barbarians at the Farm Gate: Hardy Investors Are Seeking a Way to Grow Their Money." December 30. Accessed March 10, 2017. <http://www.economist.com/news/finance-and-economics/21637379-hardy-investors-are-seeking-way-grow-their-money-barbarians-farm-gate>.
- EESC. 2015. "Land Grabbing in Europe/Family Farming." European Economic and Social Committee. January 20. Accessed March 2, 2017. <http://www.eesc.europa.eu/?i=portal.en.nat-opinions.32593>.
- Encyclopaedia Britannica. 2017. "Biogeochemical Cycle." Accessed March 10, 2017. <https://www.britannica.com/science/biogeochemical-cycle>.
- European Commission. 2007. "EU Law on Organic Production: An Overview." Agriculture and rural development. Accessed May 19, 2017. https://ec.europa.eu/agriculture/organic/eu-policy/eu-legislation/brief-overview_en.
- Fabjancic, Nina. 2016. Master Thesis: "New models of community funding of organic agriculture. An empirical study of three land cooperatives." Berlin: *Berlin School of Economics and Law, Sustainability and Quality Management*.
- Fairbairn, Madeleine. 2014. "'Like Gold with Yield': Evolving Intersections between Farmland and Finance." *The Journal of Peasant Studies* 41 (5): 777–95. doi:10.1080/03066150.2013.873977.
- Fairhead, James, Melissa Leach, and Ian Scoones. 2012. "Green Grabbing: A New Appropriation of Nature?" *The Journal of Peasant Studies* 39 (2): 237–61. doi:10.1080/03066150.2012.671770.
- FAO UN. 2016. "SAVE FOOD: Global Initiative on Food Loss and Waste Reduction: Key Facts on Food Loss and Waste You Should Know." *Food and Agriculture Organization of the United Nations*. Accessed April 7, 2017. <http://www.fao.org/save-food/resources/keyfindings/en/>.
- Foley, Jonathan A., Navin Ramankutty, Kate A. Brauman, Emily S. Cassidy, James S. Gerber, Matt Johnston, Nathaniel D. Mueller, et al. 2011. "Solutions for a Cultivated Planet." *Nature* 478 (7369): 337–42. doi:10.1038/nature10452.

- Foley, Jonathan A., Ruth DeFries, Gregory P. Asner, Carol Barford, Gordon Bonan, Stephen R. Carpenter, F. Stuart Chapin, et al. 2005. "Global Consequences of Land Use." *Science* 309 (5734): 570. doi:10.1126/science.1111772.
- Franco, Jennifer C, Sofia Monsalve, and Saturnino M 2015. "Democratic Land Control and Human Rights." *Environmental Change Issues* 15 (August): 66–71. doi:10.1016/j.cosust.2015.08.010.
- Geels, Frank W. 2002. "Technological Transitions as Evolutionary Reconfiguration Processes: A Multi-Level Perspective and a Case-Study." *Research Policy* 31 (8): 1257–74. doi:10.1016/S0048-7333(02)00062-8.
- Geels, Frank W. 2011. "The Multi-Level Perspective on Sustainability Transitions: Responses to Seven Criticisms." *Environmental Innovation and Societal Transitions* 1 (1): 24–40. doi:10.1016/j.eist.2011.02.002.
- Hagenhofer, Katharina. 2015. Master Thesis: "Civic Initiatives Supporting New Entrants Into Farming In Europe: Drivers Of A New Agro-Social Paradigm?" Vienna: *Department of Sustainable Agricultural Systems. University of Natural Resources and Life Sciences, Vienna*.
- Heinke, Steffen. 2016. Bachelor Thesis: Farmlands in hands of citizens. Kassel: *Kassel University, Faculty of Organic Agricultural Sciences*.
- Helfrich, Silke. 2012. Commons - For new politics beyond market and state (German: Für eine neue Politik jenseits von Markt und Staat). Bielefeld: *transcript Verlag*.
<https://www.boell.de/sites/default/files/2012-04-buch-2012-04-buch-commons.pdf>.
- Hofmann, Johanna, Luigi Viscardi, and Marijs van Hoek. 2016. Master Thesis "Opportunities to Enhance Cooperatives' Long-Term Success through Strategic Planning." Karlskrona: *Department of Strategic Sustainable Development, Blekinge Institute of Technology*.
<http://urn.kb.se/resolve?urn=urn:nbn:se:bth-12156>.
- Holmberg, J., and K. -H Robert. 2000. "Backcasting - a Framework for Strategic Planning." *International Journal of Sustainable Development & World Ecology* 7 (4): 291–308. doi:10.1080/13504500009470049.
- Holte, Chris. 2014. "Elinor Ostrom and Her 8 Principles of Managing A Commons." Holtes' Thoughts. September 30. Accessed April 2, 2017.
<http://holtesthoughts.blogspot.com/2014/11/elinor-ostrom-and-her-8-principles-of.html>.
- Lattimore, Richmond. 1951. *The Iliad of Homer*. Chicago, USA: University of Chicago Press.
- Ostrom, Elinor. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action. The Political Economy of Institutions and Decisions*. Cambridge; New York: *Cambridge University Press*.
- Margulis, Matias E., Nora McKeon, and Saturnino M. Borrás. 2013. "Land Grabbing and Global Governance: Critical Perspectives." *Globalizations* 10 (1): 1–23. doi:10.1080/14747731.2013.764151.

- Mehnert, Gabriel. 2014. Master Thesis: Equity capital in financing of small-scale agriculture. Stuttgart-Hohenheim: University of Hohenheim, *Institute of Agricultural Management, Agrarian education and Management*.
- Missimer, Merlina, Engineering Sciences Section, and Blekinge Institute of Technology. 2013. The Social Dimension of Strategic Sustainable Development. Vol. 3. Book, Whole. Karlskrona: *School of Engineering, Blekinge Institute of Technology*.
- Missimer, Merlina, Karl-Henrik Robèrt, Göran Broman, Blekinge Institute of Technology , Institution for Strategic Sustainable Development and Technical Faculty. 2017. "A Strategic Approach to Social Sustainability – Part 2: A Principle-Based Definition." *Journal of Cleaner Production* 140 (Part 1): 42–52. doi:10.1016/j.jclepro.2016.04.059.
- Monllor, Neus. 2012. "Farm Entry: A Comparative Analysis of Young Farmers, Their Pathways, Attitudes and Practices in Ontario (Canada) and Catalunya (Spain), Final Report." Accessed May 22, 2017. http://www.accesstoland.eu/IMG/pdf/monllor_farm_entry_report_2012.pdf.
- Ostrom, Elinor, Thomas Dietz, and Nives Dolsak. 2002. *The Drama of the Commons*. Edited by National Research Council (U.S.). Washington, DC: National Academy Press. Périlleux, Anaïs, and Marthe Nyssens. 2017. "Understanding Cooperative Finance as a New Common." *Annals of Public and Cooperative Economics*, January. doi:10.1111/apce.12160.
- Ostrom, Elinor. 1999. "Coping with Tragedies of the Commons." *Annual Review of Political Science* 2 (1): 493–535. doi:10.1146/annurev.polisci.2.1.493.
- Ostrom, Elinor and Paul C. Stern. 2003. "The Struggle to Govern the Commons." *SCIENCE* 302 (5652). doi:10.1126/science.1091015.
- Partelow, Stefan. 2016. "Coevolving Ostrom's Social-Ecological Systems (SES) Framework and Sustainability Science: Four Key Co-Benefits" 11 (3): 399. doi:10.1007/s11625-015-0351-3.
- Ploeg, Jan Douwe van der, Jennifer C. Franco, and Saturnino M. Borras Jr. 2015. "Land Concentration and Land Grabbing in Europe: A Preliminary Analysis." *Canadian Journal of Development Studies/Revue Canadienne D'études Du Développement* 36 (2): 147–162.
- Rioufoul, Veronique, and Peter Volz. 2012. "Civic Initiatives on Access to Land for Local, Sustainable Farmers in Western Europe." *Nourish Scotland*. http://www.nourishscotland.org/wp-content/uploads/2014/06/WS3.2-RioufolVolz_vf.pdf.
- Steffen, Will, Regina Angelina Sanderson, Peter D. Tyson, Jill Jäger, Pamela A. Matson, Berrien Moore III, Frank Oldfield, Katherine Richardson, Hans-Joachim Schellnhuber, Billie L. Turner, Rober J. Wasson. 2004. *Global Change and the Earth System: A Planet Under Pressure*. Springer-Verlag.

Tietz, Andreas, and Bernhard Forstner. 2014. "Speculative bubbles on the market for agricultural land." *Reports Agricultural Journal of Agricultural Policy and Agriculture* 92 (3). <http://buel.bmel.de/index.php/buel/article/view/63/tietz-92-3-html>.

UN DESA. 2015. "Development." *United Nations Department of Economic and Social Affairs*. Accessed March 2, 2017. <https://www.un.org/development/desa/en/>.

Wilson, David Sloan, Elinor Ostrom, and Michael E. Cox. 2013. "Generalizing the Core Design Principles for the Efficacy of Groups." *Journal of Economic Behavior & Organization*, Evolution as a General Theoretical Framework for Economics and Public Policy, 90, Supplement (June): S21–32. doi:10.1016/j.jebo.2012.12.010.

Documents

BioBoden eG. 2015. "BioBoden Statutes." Accessed 2, March 2017.
<https://BioBoden.de/genossenschaft/satzung/>.

Kulturland eG. 2014. "Kulturland Statutes." Accessed 2, March 2017.
http://kulturland-eg.de/download/beitritt/Satzung_Kulturland_eG_20141119.pdf.

Ökonauten eG. 2016. "Ökonauten Statutes." Accessed 2, March 2017.
http://www.oekonauten-eg.de/wp-content/uploads/2016/10/SatzungOekonauteneG_Web.pdf



Master's Programme in Strategic Leadership towards Sustainability
Blekinge Institute of Technology, Campus Gräsvik
SE371 79 Karlskrona, Sweden

Telephone: +46 455-38 50 00
Fax: +46 455-38 55 07
E-mail: sustainabilitymasters@bth.se