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Exploring the Role of Local Administration in Agricultural Innovation Processes – The Case of Agroforestry in Brandenburg

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List of Abbreviations

AECM	Agri-Environment and Climate Measures
AF	Agroforestry
AFIS	Agroforestry Innovation System
AFS	Agroforestry System
AGFORWARD	AGroFORestry that Will Advance Rural Development
AIS	Agricultural Innovation System
AUFWERTEN	Agroforstliche Umweltleistungen Für WERTschöpfung und Energie
BLAk	Brandenburgische Landwirtschaftsakademie
BMEL	Bundesministerium für Ernährung und Landwirtschaft
cf.	confer [Latin: bring together, compare]
DeFAF	Deutscher Fachverband für Agroforstwirtschaft
e.g.	exempli gratia [Latin: for example]
et al.	et alii [Latin: and others]
i.e.	id est [Latin: that is / meaning]
IBID	ibidem
InVeKoS	Integriertes Verwaltungs- und Kontrollsystem
GDR	German Democratic Republic
IS	Innovation System
KULAP	Kulturlandschaftsprogramm
LELF	Landesanstalt für Ländliche Entwicklung, Landwirtschaft und Flurneuordnung
LER	land equivalent ratio
LfU	Landesamt für Umwelt
MLUK	Ministerium für Landwirtschaft, Umwelt und Klimaschutz

mm/a	Milimeters per annum
p.	page
SAFE	Silvoarable Agroforestry For Europe
SDG	Sustainable Development Goals
TIS	Technological Innovation System
USA	United States of America
vs.	versus [Latin: against]

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1 Introduction

Transforming the agricultural sectors of modern industrialized economies is one of the pressing challenges in humanity's struggle for reaching the Sustainable Development Goals (SDGs), while also adhering to planetary boundaries (GERTEN ET AL. 2020; ROCKSTRÖM ET AL. 2017). Rapid loss of biodiversity and soil health threaten the ecological basis of food production. Changing climatic conditions require timely and effective mitigation and adaptation strategies. And widespread wind and water erosion impact air and water quality not only in rural but also in urban landscapes (IPCC 2019).

At the same time, demand for food, fiber and fuel is constantly rising, thereby increasing pressure on land (ZSCHEISCHLER ET AL. 2016). Political and market forces favor standardization and the concentration of land and capital in fewer hands, leading to larger and increasingly monotonous field structures while forcing smaller farms into debt or out of business, thus exacerbating rural poverty (KNICKEL ET AL. 2018). This mode of production, firmly based on the productivist and reductionist paradigms, has become manifested in a self-perpetuating socio-political landscape, posing substantial barriers to potential challengers (DE SCHUTTER 2017; LEVIDOW ET AL. 2014).

However, the conventional agro-industrial paradigm is being questioned. One frontrunner of change is the agroecological movement, which is advocating more integrated perspectives and a variety of tools and technologies, promising holistic solutions to the complex problems at hand (ALTIERI 2018; OLLIVIER ET AL. 2018; WEZEL ET AL. 2014). Part of the agroecological tool box are agroforestry systems (AFS), offering various potential sustainability benefits, while also demonstrating cost-efficiency (IPCC 2019). AFS refer to a form of agriculture, where cropping and/or animal husbandry are integrated with perennial woody vegetation, such as trees or shrubs (BURGESS & ROSATI 2018). Albeit featuring a long history of traditional use, AFS today play only a marginal role in Germany's highly industrialized agricultural sector (DEN HERDER ET AL. 2017; SMITH 2010b).

1.1 Previous Research

Scholarly interest in modern, innovative forms of AFS has increased steadily in the past 20 years (HERZOG ET AL. 2016). Two large pan-European research projects have been conducted, namely SAFE (Silvoarable Agroforestry For Europe, 2001-2005) and AGFORWARD (AGroFORestry that Will Advance Rural Development, 2014-2017). In Germany, hotspots of agroforestry research are the universities of Freiburg and Göttingen as well as the BTU Cottbus, with the latest research project being AUFWERTEN (Agroforstliche Umweltleistungen Für WERTschöpfung und Energie)¹. A central concern of these research projects has been to determine various potential benefits of AFS in the temperate regions, such as the provision of ecosystem services and socio-economic improvements to the individual farm (FAGERHOLM ET AL. 2016; SMITH ET AL. 2013; TORRALBA ET AL. 2016).

Despite growing awareness about the benefits of AF practices, substantial barriers hamper their wider adoption in Germany and practically limit their current application to externally funded research projects (LANGENBERG & THEUVSEN 2018). These barriers include legal and administrative hurdles, substantial economic uncertainty, a general lack of knowledge of the concept and its practical implementation, as well as widespread skepticism among the rural population towards trees on agricultural fields (BORREMANS ET AL. 2016; BURGESS & ROSATI 2018; GARCÍA DE JALÓN ET AL. 2018a; TSONKOVA ET AL. 2018).

Accordingly, a central focus for innovation and transition scholars interested in AF has been on understanding the interplay of these factors and how to facilitate the wider dissemination of AF practices. There have been various approaches to study innovation processes with regard to AFS. Several authors conducted adoption studies in non-temperate regions (MBOW ET AL. 2014; MERCER 2004; PATTANAYAK ET AL. 2003). Akamani and Holzmueller (2017) employed an adaptive governance approach. Schaffer et al. (2019) used the Multi-Level-Perspective to analyze the advance of agroforestry in Sweden. Borremans et al. (2018)

¹ AUFWERTEN provide an extensive overview of all major research project on their website <https://agroforst-info.de/aktivitaeten/>, last accessed 30.08.2020

applied functional analysis to the agricultural innovation system (AIS) perspective to analyze barriers in the development of AF in Flanders, Belgium.

1.2 Research Focus, Questions and Design

The aim of this research is to contribute to understanding the factors influencing the development of agroforestry in Germany. The scope will be subjected to some restrictions. Firstly, I will focus on the particular role of employees of agricultural departments of public administration at the district level in these processes. While analysis of the full range of actors is generally considered useful, agricultural administration has thus far received very little attention in agricultural innovation studies, which usually employ a farmer focused approach (BORREMANS ET AL. 2018). Secondly, I will focus on processes of knowledge dissemination and institutional change, as they are especially relevant in the context of innovation processes (BERGEK ET AL. 2008a). Lastly, I will limit my empirical enquires spatially to the state of Brandenburg.

The guiding research question of this work will be:

What role do employees of local public administration play in innovation processes regarding the development of modern agroforestry systems in Brandenburg?

The main research question will be operationalized by splitting it into five distinct subquestions, addressing the two general aspects **knowledge and learning** as well as **institutions and their change**.

A Knowledge and learning

- 1) What do employees of local agricultural departments know about agroforestry and agroforestry-related current developments?
- 2) Where and how do they obtain their knowledge regarding agroforestry specifically and agricultural innovation more generally?
- 3) How do they influence processes of knowledge dissemination and learning of other actors?

B Institutions and their Change

- 4) How do employees of local agricultural departments engage in processes of institutional change, related to the emergence of agroforestry and more generally?
- 5) What factors enable and restrain them in their ability to perform these functions?

Qualitative interviews with agricultural departments of four districts in Brandenburg provide the data for analysis. As a theoretical foundation, an adapted Technological Innovation Systems (TIS) approach will be employed. The TIS approach has been tailored for the systemic analysis of various agricultural innovation (e.g. KÖNIG ET AL. 2018; SCHILLER ET AL. 2020). However, to my knowledge it has neither been used for the case of agroforestry, nor with the explicit focus on local government actors.

1.3 Thesis Outline

The thesis will be structured as follows. In chapter 2, I will present the findings from an extensive literature review. In chapter 3, I will explain my methodological, empirical approach, my selection of interviewees and the procedure of transcription, coding and analysis. In chapter 4, the empirical findings will be presented. In chapter 5, a discussion of these findings regarding the raised research questions and a critical reflection will be conducted. Lastly, chapter 6 will conclude with a summary.

2 Theoretical and Conceptual Background

This chapter lays down the theoretical groundwork for the thesis. Firstly, an introduction to agroforestry as a concept and the main barriers to its wider implementation will be discussed and important recent developments in Brandenburg reviewed (section 2.1). Secondly, central terms and concepts of innovation studies and innovation systems theory will be presented (section 2.2). Thirdly, complementary theory will be introduced, to better adjust the innovation systems approach to the intended micro-level analysis (section 2.3). Fourthly, the particular role of local administration in innovation systems research will be reviewed (2.4). Lastly, an integrated conceptual framework will be developed (2.5).

2.1 Agroforestry – a Brief Characterization

Agroforestry can be defined as “the practice of deliberately integrating woody vegetation (trees or shrubs) with crop and/or animal systems to benefit from the resulting ecological and economic interactions” (BURGESS & ROSATI 2018, p. 803). This integration can take place on a spatial (different plants on the same field) or temporal (regular alternation, e.g. “slash and burn”) scale and exceeds the one-year monocropping cycle (NAIR 1993). Ecosystem services connected to agroforestry systems (AFS) include reduction of pollution (e.g. nitrate leaching, wind erosion), increase in habitats and biodiversity, carbon sequestration potential above- and below-ground, as well as recreational value and landscape aesthetics (FAGERHOLM ET AL. 2016; SMITH ET AL. 2013; TORRALBA ET AL. 2016). On the farm level, higher productivity², increases in soil health, life and fertility, more efficient input management as well as diversification of product portfolios are among the potential gains of implementing AFS (BURGESS & ROSATI 2018; GARCÍA DE JALÓN ET AL. 2018b; SMITH ET AL. 2013).

AFS represent a set of agricultural practices that are originally characterized by great diversity and distinct site- and context-specific adaption. They can be broadly distinguished

² Mixed cultivation often achieves higher land equivalent ratios (LER) due to more efficient harvesting of sun light and niche differentiation (DUPRAZ ET AL. 2018). Several studies have demonstrated this effect for AFS (NERLICH ET AL. 2013; SESERMAN ET AL. 2018; SMITH ET AL. 2013; SWIETER ET AL. 2018).

in three categories: systems that combine woody perennials and crops (silvo-arable systems), systems that combine woody perennials with animal husbandry (silvo-pastoral systems) and systems that combine all three elements (agro-silvo-pastoral) (FAO n.d.)³. All three forms feature a long tradition in Europe, as the earliest forms of deliberate human land use are considered to be agroforestry practices (EICHHORN ET AL. 2006; SMITH 2010b). Due to technological progress and increasing industrialization and mechanization, traditional AFS have in the past one hundred years subsided and today play only a marginal role in Germany (NERLICH ET AL. 2013). The remaining systems of some importance are grazed orchards (“Streuobstwiesen”) and wind breaks at the field’s margins (“Knicks”).

However, starting with research in the 1980s in the USA, over the course of the 1990s in France and Britain and as of 2000 in Germany, the “systematic remarriage of crops and trees” (NAIR 2007, p. 1617) has led to the development of innovative, **modern forms of agroforestry** (HERZOG ET AL. 2016). These are characterized by the fact that they incorporate the ecological and economic benefits associated with AFS, but simultaneously allow for state-of-the-art agro-industrial management (CHALMIN 2008; DEN HERDER ET AL. 2017; SMITH 2010a). Examples of modern AF practices are *alley cropping*, where alternating rows of crops and trees are adjusted to technological equipment of the farm (TSONKOVA ET AL. 2012), or *chicken forests*, where birds roam freely beneath trees, that are harvested at regular intervals for the production of wood chips (SPANGENBERG ET AL. 2012). Alley cropping is often awarded the greatest economic potential, as it shows the easiest integration with current farming systems and can, unlike other forms of modern AFS, already be employed under the given legal framework, albeit only with some creativity and with substantial bureaucratic effort (LANGENBERG & THEUVSEN 2018).

These bureaucratic barriers, together with a number of others, currently prevent the wider adoption of AF practices in Germany and factually limit their current implementation mostly to the scope of research projects (LANGENBERG & THEUVSEN 2018). For one thing, inherent economic uncertainties exist, which are due to the long-term planning horizon, that needs to be adopted when dealing with trees. Also, high initial capital requirements, an anticipated increase in labor cost and elaborate liquidity management need to be taken into consideration.

³ Other classifications exist (e.g. BURGESS & ROSATI 2018; NAIR 1993; UNIVERSITY OF MISSOURI 2018).

Furthermore, a general lack of knowledge of the concept and its implementation, as well as widespread skepticism towards trees on agricultural fields in the rural population can be constituted. Lastly, the regulative framework currently does not provide possibility for receiving subsidies for AFS, which strongly affects implementation choices by farmers (BORREMANS ET AL. 2016; BURGESS & ROSATI 2018; GARCÍA DE JALÓN ET AL. 2018a; TSONKOVA ET AL. 2018).

In the following sub-sections, the two areas of knowledge and regulation will be reviewed in more detail, as they constitute the basis for later analysis.

2.1.1 The Need for Knowledge

Several studies show that agroforestry is still very little known among farmers and other actors in Germany (GRAVES ET AL. 2009; LANGENBERG ET AL. 2018; TSONKOVA ET AL. 2018). Even if known, the concept is either associated with traditional AFS and hence perceived incompatible with modern agricultural management, or understanding is limited to a small number of fast-growing species (e.g. willow, poplar, locust), managed in short rotation coppice and harvested for energy generation (BÖHM & VESTE 2018). The large variety of different AF forms and the principal possibility to also use high value trees or to include animals are usually unknown (TSONKOVA ET AL. 2018).

In principle, agroforestry practices represent complex knowledge-intensive technologies, characterized by large diversity and high local adaptation, thus incorporating many streams of accrued knowledge (MERCER 2004; NAIR 1993). In contrast to conventional farming operations, which often tend to rely on ready-made standardized packages of inputs and production technologies (MERCER 2004; PLUMECOCQ ET AL. 2018), implementing an AFS presupposes long-term planning horizons and extensive ecological knowledge and skills, as well as economic flexibility. As a result, farmers willing to transition to AF are required to redefine their role as independent managers of their land, to become “knowing agents” (MORGAN & MURDOCH 2000), that are capable and willing to address the particular complexities of their site specific conditions.

At the same time, however, it seems as if the traditional (tacit) knowledge of trees is disappearing, especially among younger farmers (BORREMANS ET AL. 2018). Like other

agroecological practices based on holism and acceptance of complexity, AF does not readily fit the dominant reductionist paradigm (LOUAH ET AL. 2017). Accordingly, Louah et al. (2017) emphasize the importance of ecological education and social learning within multi-actor innovation networks, to overcome these knowledge deficits.

2.1.2 Regulative Framework for Agroforestry in Germany

The political framework of European agriculture is highly complex and subject to regular change. Agricultural production in Germany is affected by a multitude of different regulations. The most important one is the supra-national Common Agricultural Policy (CAP) and its national equivalents (FEINDT 2011). The CAP represents a form of multi-level governance with several layers of interwoven decision making structures and a variety of different actors (public, civic and corporate) at supranational, national and regional level (KNODT & HÜTTMANN 2005). Generally, most decisions in agricultural policy are not made at the local, but on EU-level (FEINDT & RATSCHOW 2003; SCHAKEL ET AL. 2015).

The CAP defines different agricultural forms and practices and sets out the rules for agricultural support. For historical reasons, agriculture has always been one of the most subsidized economic sectors in the EU. As farmers, agricultural enterprises and land owners have learned to depend on these subsidies, therefore it is crucial for the widespread acceptance of any new form of agriculture to achieve eligibility for payments (BÖHM ET AL. 2017b).

CAP payments can be obtained via different programs, which are organized in two pillars. Pillar I encompasses direct payments, which are being awarded to all areas under agricultural use, if compliance to specified criteria is given. Pillar II, on the other hand, aims at providing funds to promote rural and environmental development, thus indirectly benefiting farmers through infrastructural investments, support of research and innovations and rewarding participation in several different programs. Under both pillars, AFS are principally considered eligible for receiving aid (MOSQUERA-LOSADA ET AL. 2016)⁴.

⁴ For reasons of scope and legibility, this matter is described only superficially to the extent necessary. For an in-depth analysis, referencing the relevant regulation in detail please refer to Böhm et al. (2017b) and Mosquera-Losada et al. (2016)

However, payments from both pillars require national governments – in the case of Germany the federal states - to handle the bureaucratic administration of the subsidy procedures. It is within their responsibility to provide monitoring systems and agricultural land use codes, necessary for the application for direct payments, as well as to develop regional support programs for the second pillar. Currently, neither a land use code facilitating support under Pillar I, nor programs associated with Pillar II exist for AFS in Germany (BÖHM ET AL. 2017b)⁵. Exceptions to the rule include traditional grazed orchards as part of established local practices and a special form of alley cropping, where rows of crops are alternated with trees managed under short rotation coppice. Implemented as such however, these projects face high administrative burdens, as the application for financial support cannot be registered for the whole field. Instead each row must be registered and applied for separately, additionally constrained by a minimum requirement of 0,3 hectares per parcel (BÖHM ET AL. 2017b).

The only remaining alternative for trees to be part of the subsidized area is in the form of a landscape element. This, however, goes hand in hand with a strict prohibition of use and harvest, as well as a limit of 100 trees per hectare, which again greatly reduces practical applicability (BÖHM ET AL. 2017a).

Another complication is that trees are addressed by a variety of other policies. Due to the widely recognized high ecological value of woody components on arable land, several ecologically motivated regulations on local, national and supranational level⁶ limit or prohibit the use, harvesting and removal of trees and shrubs, thus rendering their cultivation and economic management as generally intended in modern AFS very challenging (BÖHM ET AL. 2017b).

Taken together, the currently existing legal framework poses a strong barrier for the likelihood of farmers to implement agroforestry systems. This is also regularly conveyed in studies investigating farmer's perceptions of the main challenges with regard to agroforestry (LANGENBERG ET AL. 2018; ROIS-DÍAZ ET AL. 2018; TSONKOVA ET AL. 2018). Accordingly,

⁵ Indirectly, AF is supported through research projects, e.g. SAFE and AGFORWARD, which were funded by pillar II research programs.

⁶ Examples are regulation for the protection of trees and cobses (Gehölzschutzverordnungen) and cross compliance regulation with regard to landscape features.

a question of interest is how the given framework can be changed to facilitate the spread of agroforestry innovation. This question will be addressed more closely in sub-section 2.3.2 considering innovation and transition theory.

2.1.3 Recent Developments Regarding Agroforestry in Brandenburg

There are two recent developments, which might impact the future development of agroforestry in Brandenburg. The first relates to the regulative framework. A current project, initiated by actors from AUFWERTEN group, aims for the integration of AFS as an agri-environment and climate measures (AECM) in Brandenburg. The primary objectives of this project are to develop a definition for AFS that can easily be verified through conventional inspection procedures normally conducted via drones and secondly to demonstrate the sustainability benefits in relation to the costs (BÖHM ET AL. 2020). Should the project be successfully reviewed by the ministry for agriculture in Brandenburg (MLUK), AFS could be integrated in the Kulturlandschaftsprogramm (KULAP), which is the regional Pillar II support program. Eligibility for second pillar support could thus be achieved as of 2022 (BÖHM ET AL. 2020). This is seen as an important example which other states in Germany could then follow. Second pillar support is regarded as a precondition for the possibility of attaining eligibility also for direct payments and the incorporation of an integrated land use code for the entire area encompassed by an agroforestry system into the subsidy guidelines. This would, compared to the status quo, decrease administrative burden and thus facilitate implementation of more diverse and smaller scale systems (BÖHM ET AL. 2017b).

The second development has been the formation of a central information and lobbying network, the Deutscher Fachverband für Agroforstwirtschaft (DeFAF) in 2019, similarly a consequence of the AUFWERTEN research project and headed by Christian Böhm. DeFAF's aim is to champion the systematic development of agroforestry in Germany. For this purpose, DeFAF acts as a networking hub for the connection and dissemination of

knowledge and skills and tries to influence educational and legislative processes across the German Bundesländer⁷.

2.2 Innovation and Innovation Systems

To understand the emergence and spread of new practices such as agroforestry, innovation theory provides rich and diverse approaches. Scholars from several disciplines have studied innovation and its relation to wider socio-economic transitions, which explains the existence of a wide array of conceptualizations, used interchangeably and sometimes contradictorily (GOPALAKRISHNAN & DAMANPOUR 1997; KOTSEMIR & ABROSKIN 2013; MERCER 2004). This section seeks to briefly provide some terminological clarity.

2.2.1 Basic Innovation Concepts

Rural sociologist Everett Rogers (2003, p. 12) defines an **innovation** as “an idea, practice, or object that is perceived as new by an individual, or other unit of adoption”, whereby focus is less on objective but on subjective newness⁸. Braun-Thürmann (2015) additionally stresses an anticipated improvement⁹ to status quo as an important aspect of every innovation.

When studying the uptake and spread of innovation in a particular social environment, the micro and macro level must be distinguished. On the micro level, the focus of interest lies on the decision-making process, leading to the (possible) implementation of an innovation by an individual or an organization. This process is usually called **adoption** and can be formally defined as “a multi-dimensional process dependent on a variety of factors such as perceived profitability, costs of establishment, compatibility with value systems, and the ability to

⁷ For transparency reason, I wish to declare that I am a member of DeFAF and accordingly has access to internal processes and documents resulting also in early access to the AECM concept. Beyond this fact, my membership has not influenced the processes and outcomes of this thesis.

⁸ Meaning that it does not matter how long the innovation has been in existence, but whether the actor in question has yet developed any form of attitude towards it.

⁹ It should be noted, that the degree of *actual* improvements is sometimes harder to estimate and sometimes innovations have outright detrimental consequences with regard to sustainability aspects as time passes by. This is especially valid for technological innovations (e.g. SCHOT & STEINMUELLER 2018)

communicate new knowledge and information between and among adopters and potential adopters” (MERCER 2004, p. 313).

The rate or pattern of cumulative adoption decisions over time and in a given spatial and social context is called **diffusion** and represents the macro-level perspective. Rogers (2003, p. 5-6) defines diffusion as “the process in which an innovation is communicated through certain channels over time among the members of a social system”, whereby communication describes the “exchange of information” between actors, serving the purpose of “creating mutual understanding” and consequently leading to either a convergence or divergence depending on the result of the communication process.

Diffusion of innovation is generally conceptualized either as linear process or as the outcome of systemic/network interaction (GOPALAKRISHNAN & DAMANPOUR 1997; KNICKEL ET AL. 2008; LE GAL ET AL. 2011). Linear models, such as science push, transfer of technology or market pull models, depict diffusion processes as relatively straight forward with limited complexity and few actors and determinants. They are rather static in nature and leave little room for the multifaceted sustainability debates (HERMANS ET AL. 2013; THE WORLD BANK 2006).

In contrast, systems-based conceptualizations emphasize a more nuanced and complex perspective (KLERKX ET AL. 2012). Among these are innovation systems approaches.

2.2.2 Innovation Systems and a Technological Innovation Systems Approach

Following this perspective, innovation processes are essentially seen as the outcome of non-linear interactions within **innovation systems**, which are defined as “networks of institutions, firms, and individuals interacting to design, assist, encourage, and implement innovations (products, processes, forms of organization, policies) at various levels of the network” (LE GAL ET AL. 2011, p. 716). Within and between these networks, collaboration, information exchange and collective learning processes take place, leading to continuous co-production of knowledge, innovations and their adaptations to context specific situations. Consequently, the IS perspective allows for a shift of focus away from innovations as mere “technological artefacts” to investigating their relations as “patterns of interaction between people, tools and

natural resources” (KNICKEL ET AL. 2008, pp. 888–89) and knowledge and learning processes at the core of innovation practices (HEKKERT ET AL. 2007; LUNDVALL 2010).

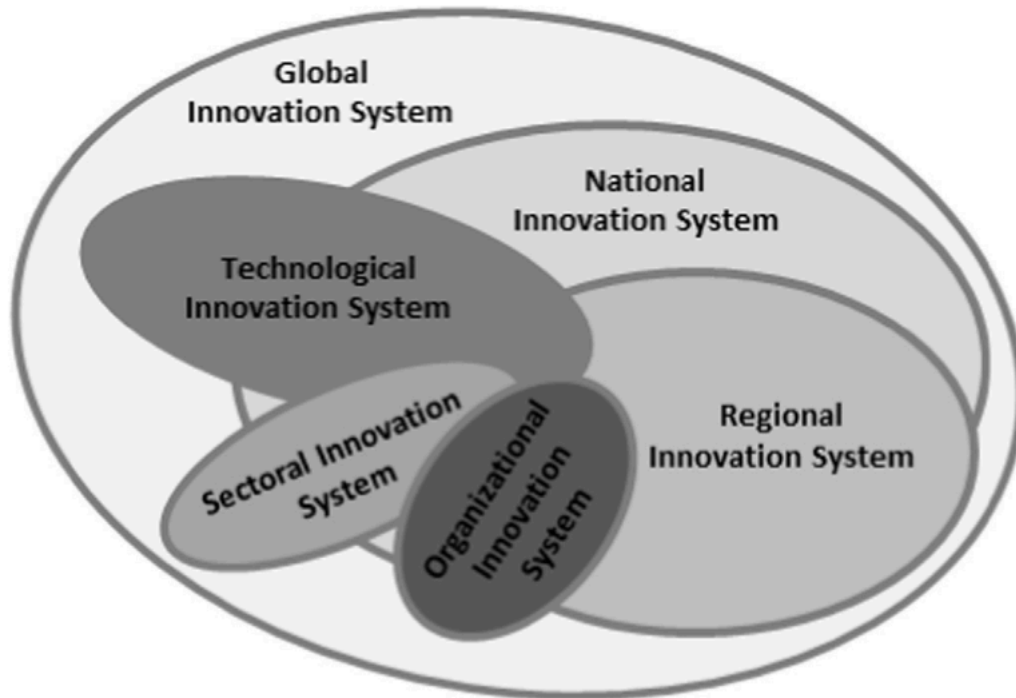


Figure 1: Innovation Systems Overview (VAN LANCKER ET AL. 2016) p. 41

Different innovation system approaches with distinct analytical foci (e.g. national, sectoral, regional, technological, organizational) have emerged over time¹⁰, as depicted in Figure 1. This thesis will employ the **Technological Innovation Systems (TIS)** approach.

The TIS is defined as a “set of networks of actors and institutions that jointly interact in a specific technological field and contribute to the generation, diffusion and utilization of variants of a new technology and/or a new product.” (MARKARD & TRUFFER 2008, p. 611). Technology can thus be conceived of as either a *product*, i.e. a technical artefact (hardware) including related procedures and processes (software) or a (technological) knowledge field, i.e. the entirety of knowledge characterizing a particular technology (BERGEK ET AL. 2008a; HOLMEN & JACOBSSON 2000).

¹⁰ For a general overview, cf. van Lancker et al. (2016)

2.2.3 Structure and Functions of Technological Innovation Systems

A particular technological innovation system can be conceived of as being composed of structural elements (*components*) and key processes (*functions*) that determine its performance with regard to innovation processes and their outcomes. The structural components of an innovation system are *actors*, *networks* and *institutions* (BERGEK ET AL. 2008a)¹¹. **Actors** can be private, public or corporate individuals and organizations, that pursue particular interest with regard to the technology in focus. Their interactions, skills and visions determine the development and performance of the TIS. Central to actors' impact on the system is their agency (see also chapter 2.3.2).

Networks, formal or informal, are constellations of several actors with (temporarily) aligned interest and essentially bind together different parts of the IS (HERMANS ET AL. 2013). They are platforms, where actors collaborate, share knowledge and resources and align perceptions, visions and mental frames, thus facilitating collective action (MUSIOLIK ET AL. 2012). Networks can be distinguished in *learning networks* and *political networks* (BERGEK ET AL. 2008b).

Institutions make up the underlying “rules of the game” (NORTH 1990, p. 3) and frame the range of possible behaviors by actors and determine effectiveness of networks and TIS functions (BERGEK ET AL. 2008a). They can be internal or external to the TIS. As institutions play a crucial role in innovation systems concepts, they will be described in more detail in chapter 2.3.2.

All structural components influence the performance of TIS to some degree and potential weaknesses in their composition may be effectively captured through system failure approaches¹². However, determination of the exact degree of influence through structural analysis alone is seldom possible (ALKEMADE ET AL. 2007; BERGEK ET AL. 2008a; SUURS

¹¹ Various authors include more structural elements, e.g. *infrastructures* (WIECZOREK & HEKKERT 2012) and *technology* (BERGEK ET AL. 2008b; MALERBA 2004) or reframe them, e.g. *interactions* instead of *networks* (WIECZOREK & HEKKERT 2012).

¹² Please see Weber and Rohracher (2012) and Wieczorek and Hekkert (2012) for elaboration on the system failure approach.

2009). Consequently, the TIS approach strongly emphasizes the importance of supplementing it with a process focus or functionalist¹³ analysis (BERGEK ET AL. 2008a; HEKKERT ET AL. 2007).

According to Bergek et al. (2008a), seven¹⁴ typical functions can generally be identified in TIS, namely i) knowledge development and diffusion, ii) influence on the direction of search, iii) entrepreneurial experimentation, iv) market formation, v) legitimation, vi) resource mobilization, and vii) development of positive externalities. In accordance with the focus of this thesis, the two functions knowledge development and diffusions and legitimation will be explained more thoroughly, first in the terms used by Bergek et al. (2008a), and second, complemented by additional concepts, in sub-section 18.

Knowledge development and diffusion is considered to represent the core function of a TIS (JACOBSSON & BERGEK 2011). Especially if technology is conceived of as a knowledge field, creation, development and spread of new knowledge become the central aspects that determine the performance of the supporting TIS. Bergek et al. (2008a) distinguish between different types and sources (scientific R&D activities, learning by doing and application, imitation) of knowledge. Overall, their focus lies mainly on codified, formal knowledge. As this function will be central to later analysis, it will be elaborated more deeply in chapter 2.3.1.

Legitimation is the conscious and dynamic process of generating legitimacy, which Bergek et al. (2008b) consider a prerequisite to the formation of new TIS. Legitimacy denotes the alignment and compliance of an innovation with existing institutions (regulative, cognitive and normative), thereby effecting acceptance of potential new actors as well as the broader society. Especially in the formation phase of new TIS, legitimacy is connected to establishing desirability and acceptance of a new technology with regard to alternative incumbents through expert opinions, technology assessment and rational arguments, thus shaping visions

¹³ Bergek et al. (2008a) use the terms “processes” and “functions” interchangeably

¹⁴ Bergek et al. (2008b) acknowledge the exact number and terminology of the functions to be rather arbitrary. Their selection is, however, based on a literature review of several functionalist TIS approaches and is widely accepted (KLEIN & SAUER 2016). In another paper, Bergek et al. (2008b) include an eight function, *materialization*, which, however, is rarely considered in innovation system approaches.

and expectations (BERGEK ET AL. 2008b). Simultaneously, changes in the regulative framework are often required, which Bergek et al. call manipulation¹⁵ or regulative alignment (2008b). Concepts, more frequently used in the context of institutional change, are institutional entrepreneurship and institutional work. They will be expanded in chapter 2.3.2

All functions are interrelated and dependent on each other with feedback loops existing between them. Several functions are performed and evolve parallelly and co-dependently, changing in character and relative importance over time (SUURS ET AL. 2010). Consequently, when analyzing and assessing the functionality pattern of a particular TIS, its current stage of development plays an important role. In a **formative phase**, knowledge development, entrepreneurial experimentation and legitimation are essential attract new actors and to stimulate further growth. Once established, the TIS then enters a growth phase, where processes of resource mobilization and market formation typically become increasingly important (SUURS 2009).

To reach the full explanatory potential of innovation system analysis, several authors have argued for utilizing a coupled structural-functional approach (KEBEBE ET AL. 2015; LAMPRIPOULOU ET AL. 2014; SCHILLER ET AL. 2020; TURNER ET AL. 2016). Following this approach, the fulfilment of the IS functions are evaluated through the lens of the IS structures, i.e. the question is raised, how particular structural elements impact on the various IS functions (WIECZOREK & HEKKERT 2012). Functions are not necessarily matched with particular actors, i.e. all functions can be served by a variety of actors (BERGEK ET AL. 2008a). However, certain patterns show to exist more frequently than others, e.g. actors from the research domain have distinct impact on knowledge development and diffusion, whereas actors from the enterprise domain tend to engage more strongly in entrepreneurial experimentation.

2.2.4 System Delineation and Conceptualization of Context

The TIS approach has been criticized as being overly focused on inward processes, failing to adequately address contextual factors (MARKARD ET AL. 2015). Accordingly, a

¹⁵ Alternative strategies include *conformance* (following existing framework) and *creation* (developing new frameworks) (IBID).

contextualization can be useful. TIS are primarily analytical constructs, developed for researchers and policy makers to facilitate their understanding of innovation processes, identify blockades and to serve as a basis for policy advice (BERGEK ET AL. 2008a; HEKKERT ET AL. 2007; MARKARD & TRUFFER 2008). They do not represent actually existing entities, but are rather combinations of abstract ideas and empirically determinable objects (MARKARD ET AL. 2015). Moreover, TIS building blocks (actors, networks, institutions) generally overlap with other IS-constructs (national, regional, sectoral) and serve additional purposes outside of the TIS. Accordingly, proper system delineation is crucial (CARLSSON ET AL. 2002; MARKARD & TRUFFER 2008).

An initial delineation is made through choice of technology and level of analysis (knowledge field, product or range of applications) and setting of geographical boundaries (BERGEK ET AL. 2015). The resulting analytical delimitation can be called a focal TIS (BERGEK ET AL. 2015). Furthermore, Markard and Truffer (2008) suggest distinction on the basis of whether structural elements are supportive of an innovation or whether they oppose it. Only those elements that actively contribute to the system's development and that show systemic interdependencies are considered part of the TIS (BERGEK ET AL. 2015). Accordingly, opposing actors or institutional barriers, while influencing the TIS in its performance, would not be considered part of the system, but of the environment or context¹⁶.

A further possibility of capturing the context of a TIS is by incorporating aspects of the Multi-Level-Perspective (HILLMAN ET AL. 2011). Several authors have argued for integrating the Multi-Level-Perspective (MLP) and other concepts from transition theory (MARKARD & TRUFFER 2008; MEELEN & FARLA 2013; WEBER & ROHRACHER 2012). Within the MLP, innovations are conceptualized to originate from the interaction between different organizational fields, located at three analytical levels, the macro-level landscape, meso-level socio-technical regimes and micro-level niches (GEELS & SCHOT 2007). Whereas regimes represent relatively stable configurations of dominant practices, technologies, norms and rules and change only incrementally, niches represent agile places of experimentation and deviation from those dominant configurations and ultimately account for radical innovation (GEELS 2011). If such innovation lead to fundamental changes of the culture, structure and

¹⁶ This is also reflected by the distinction between internal and external institutions (cf. chapter 2.3.2).

practices of the regime, inducing a shift from one stable configuration to another, it is usually referred to as regime transition (LOORBACH ET AL. 2017). The landscape, on the other hand, represents the exogenous environment, composed of political ideologies, macro-economic patterns and societal values (GEELS 2011)¹⁷. According to Markard and Truffer (2008), TIS are located below the regime level, usually encompassing one or more niches, i.e. application

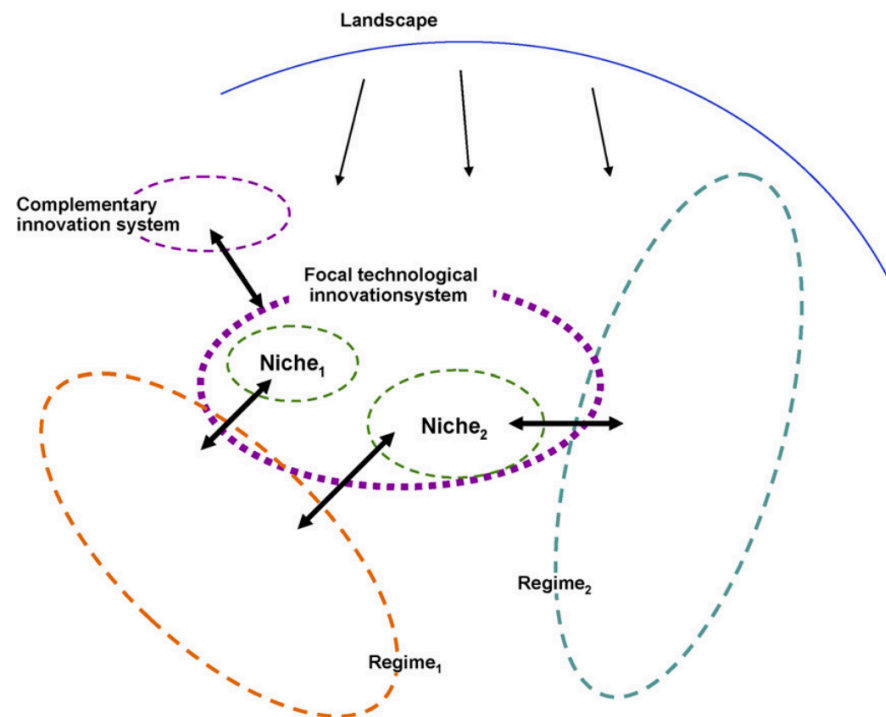


Figure 2: TIS and MLP, an integrated framework (MARKARD & TRUFFER 2008, p. 612)

contexts. Figure 2 shows a graphical representation of this interrelation.

2.3 Complementary Concepts

The theory reviewed thus far conceptualizes innovation to develop through the interplay of a number of structural elements and important system functions. As such it provides a rather broad, meso-level perspective. To better grasp micro-level interactions, it needs to be refined (BINZ ET AL. 2016). Accordingly, the aim of this chapter is to review several concepts, that elaborate on and more thoroughly explain relevant aspects of the TIS framework. In line with the research objectives, this will be restricted to the functions of knowledge creation and

¹⁷ For an in-depth reflection, comparison and integration of the two frameworks, please see Markard and Truffer (2008)

diffusion (sub-section 2.3.1) and legitimation (sub-section 2.3.2). Additionally, intermediation as a support function to both processes will be introduced (sub-section 2.3.3).

2.3.1 Knowledge and Learning

The first function we focus on for the purpose of this research is knowledge creation and diffusion. From an IS perspective, an innovation's knowledge base and its further development are at the heart of the innovation process (BERGEK ET AL. 2008a; HEKKERT ET AL. 2007; LUNDVALL 2010). A differentiation is often made between **explicit and implicit knowledge** (PROBST ET AL. 2006). Whereas the former is factually oriented, easily recordable, codifiable and transferable, the latter results from experience of individuals which is much harder to convey to others and is often also referred to as tacit knowledge (COLLINS 2010).

Processes of **learning** yet await in-depth conceptualization in the context of innovation system approaches, despite being often emphasized as highly important (VAN MIERLO ET AL. 2010). According to them, learning can be understood as alterations in a person's or organization's state of knowledge or understanding (IBID). Importantly, this involves not only formal and codified types of knowledge, but incorporates all kinds of perceptions, aspirations and beliefs that form an actor's identity.

Van Mierlo and Beers (2020) further suggest to creatively combine insights from a variety of learning traditions. In their review, they draw on education and learning science, management studies, natural resource management and institutional economics which all address different actor groups, societal levels, time frames and normative foundations. On an individual level, learning is a cognitive process of individual actors that is dependent on a variety of factors, such as problem perception and sense of responsibility (VAN MIERLO & BEERS 2020). However, learning could also be viewed as a social process, during which perceptions are shared and meaning is negotiated between different actors, resulting in aligned mindsets and new patterns of coordination of action (VAN MIERLO ET AL. 2010). Depending on the scientific tradition, different terms have been coined, such as collaborative, interactive, social or organizational learning (VAN MIERLO & BEERS 2020).

Collaborative learning takes place in a “situation in which two or more people learn or attempt to learn something together” (DILLENBOURG 1999, p. 1). Learning is conceptualized as a process of negotiation between different cognitive perspectives of individuals, as “sense-making rather than knowledge transfer” (VAN MIERLO & BEERS 2020, p. 12).

Organizational learning on the other hand describes learning among and between individuals within organizations, facilitated by communication (VAN MIERLO & BEERS 2020). It is perceived to result in updated theories-in-use which consist of the assumptions and reasons that guide organizational behavior and can differ with respect to the depth of the change, which are often classified as single-loop or double-loop learning (ARGYRIS & SCHÖN 1978). In the context of public administration, Klimecki et al. (1999) portray organizational learning as a process of information processing, which involves five components: learning factors, learning catalysts, learning carriers, learning media and learning results (see Figure 3).

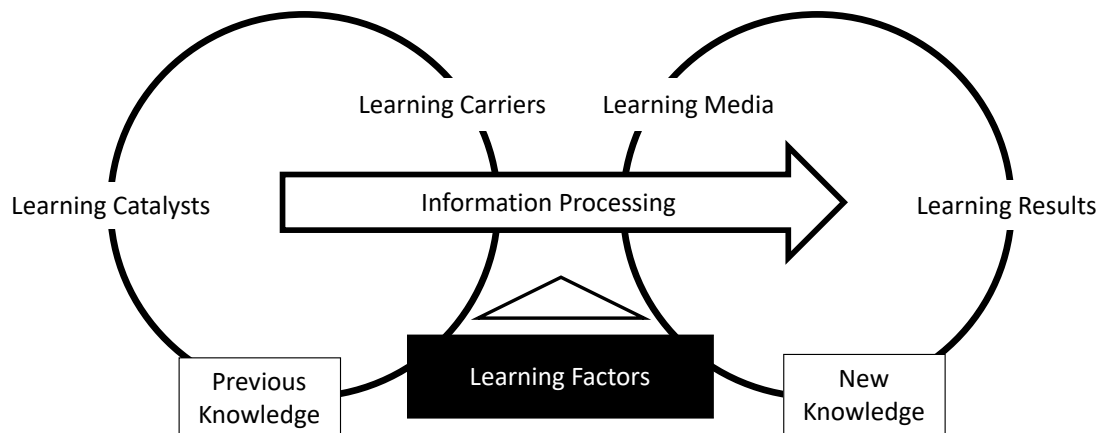


Figure 3: Simplified Model of Organizational Learning (adapted from KLIMECKI ET AL. 1999, p. 12 and KOZICA ET AL. 2013, p. 7)

Interactive learning contributes to this pool of concepts, by emphasizing tacit knowledge, by addressing processes of unlearning as well as by offering a knowledge typology by distinguishing between **know-what** (facts), **know-how** (skills), **know-why** (general principle and laws) and **know-who** (who can do what) (VAN MIERLO & BEERS 2020).

2.3.2 Institutional Work and Agency

The second function we focus on for the purpose of this research is legitimation, which denotes the alignment of an innovation with existing institutions (BERGEK ET AL. 2008a).

Generally, institutions are the rules which shape actors' behavior. They can be formal or informal. Formal institutions, also called hard institutions, are written rules, such as laws and contracts, and their enforcement, whereas informal – soft – institutions incorporate normative rules, conventions, codes of conduct and also cognitive frames (JACOBSSON & BERGEK 2011; NORTH 1990). Institutions restrain and limit possible behavior on the one hand, but may also incentivize and enable it on the other (ROHRACHER ET AL. 2008). In a TIS context, one can further distinguish between **internal and external institutions**. Internal institutions are those having originated from within the TIS, whereas external or contextual institutions are independent of TIS activity, but nonetheless influence the TIS (MARKARD & TRUFFER 2008; ROHRACHER ET AL. 2008). In early, formative phases of emerging TIS, internal and formal institutions are mostly lacking (SUURS 2009), leaving its development subject to constraints associated with the existing external institutional framework. This is why actors regularly attempt to influence the institutional setting through legitimation and regulative alignment (cf. chapter 2.2.3).

The micro processes of creating legitimacy remain vague in innovation studies, and thus need to be extended (BINZ ET AL. 2016). A concept widely employed is that of institutional entrepreneurship (PACHECO ET AL. 2010). Institutional entrepreneurs are actors actively breaking with existing institutional logics¹⁸, and, consequently, institutionalizing alternatives (GARUD ET AL. 2007). However, the concept has been criticized for overemphasizing the role of powerful individuals and faces theoretical struggles with regard to explaining their agency (DUYGAN ET AL. 2019). A reformulated version of institutional entrepreneurship is that of **institutional work**, which pictures institutional change more subtly as the consequence of the many “day-to-day adjustments, adaptations, and compromises of actors attempting to maintain institutional arrangements”, rather than resulting from directed effort of singular actors (LAWRENCE ET AL. 2009b, p. 1). Lawrence et al. (2009b) identified several forms and

¹⁸ Institutional logics can be defined as “the socially constructed, historical patterns of material practices, assumptions, values, beliefs, and rules by which individuals produce and reproduce their material subsistence, organize time and space, and provide meaning to their social reality” (THORNTON & OCASIO 1999, p. 804)

practices of institutional work that can be categorized as either creation, maintenance or disruption¹⁹ of institutions.

Creation involves practices that revolve around political work aiming at configuring and reconfiguring institutions. Examples for creative practices are advocacy (mobilization of political and regulatory support), defining (construction of rule systems) or mimicry (associating new practices with established and accepted practices) (IBID). **Maintenance** involves practices that verify and enact existing institutional configurations by supporting, repairing or recreating mechanisms that ensure compliance. A prominent form of maintenance is policing (ensuring compliance through enforcement, auditing and monitoring) (IBID). **Disruption**, lastly, involves practices that aim at destabilizing existing institutions by undermining compliance with them (FÜNFSCHILLING & TRUFFER 2016).

The concept of institutional work explicitly accounts for the embedded nature of agency²⁰, thus acknowledging the constraints exerted on actors by the institutional environment, while simultaneously capturing the possibilities for change, deriving from that same institutional setting (FÜNFSCHILLING & TRUFFER 2016). Agency thereby denotes an actor's capacity for conscious decision making, their capability of setting preferences and pursuing them, constrained by the limitations of the surrounding structure (FÜRSTENBERG 2016), or, more generally, their ability to take action and influence the course of events (GIDDENS 1984). In this context, **agency** is a measure of an actor's ability to perform the various forms of institutional work and should be conceived of as being relational, i.e. resulting from the interaction between actors and other structural elements (DUYGAN ET AL. 2019; FÜNFSCHILLING & TRUFFER 2016). It can exist both on an individual as well as on a collective level, such as an organization.

¹⁹ Bergek et al. similarly distinguish three strategies engaging with institutions: creation, conformance and manipulation (BERGEK ET AL. 2008a).

²⁰ The question of how actors can transform the institutions that fundamentally guide their behavior and their personalities, and that they are embedded in, is referred to as the "structure-agency debate" or the "paradox of embedded agency". See Garud (2007) for an in-depth discussion.

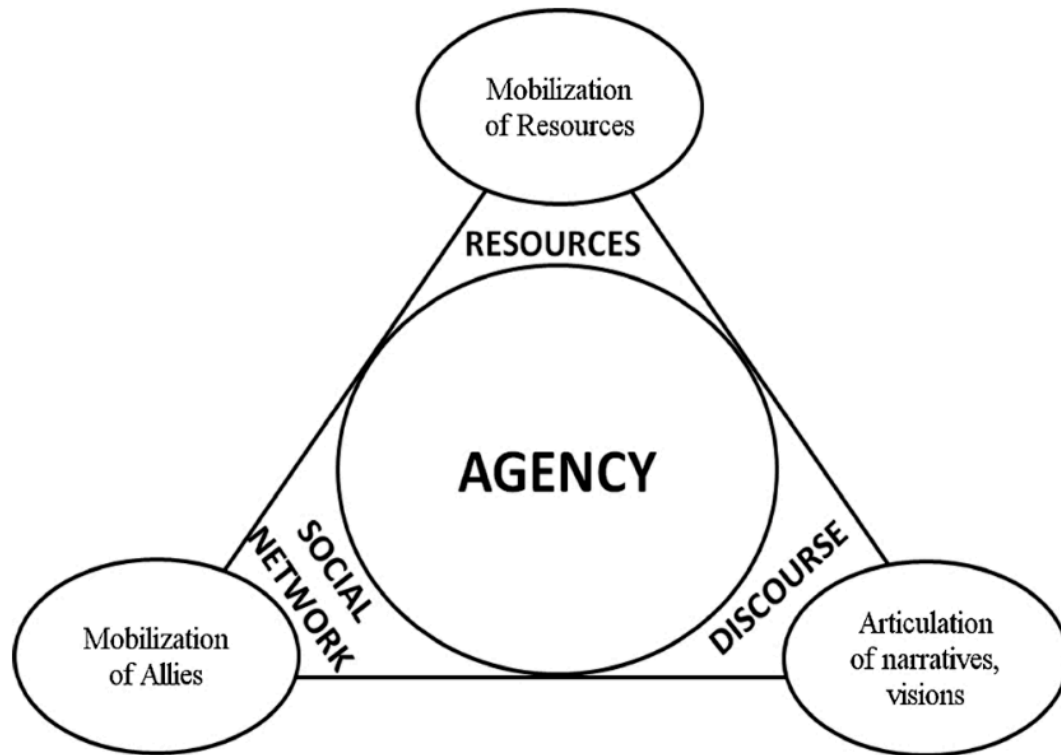


Figure 4: Key constituent elements of agency: resources, discourses and social networks. (DUYGAN ET AL. 2019, p. 7)

As depicted in Figure 4, three key constituents of agency can be distinguished, although not all have necessarily to be present to determine whether an actor possesses strong or weak agency (DUYGAN ET AL. 2019). Firstly, control over resources and their mobilization forms the basic precondition for exercising agency. Four different kinds of resources can be distinguished: physical–material, financial, intellectual and politico–judicial. Secondly, shaping discourses can be viewed as a “means of mobilizing normative and cognitive elements in the form of narratives” or as the process of constructing meaning and framing perception through storylines (DUYGAN ET AL. 2019, p. 7). The role of networks, lastly, highlight the embedded and distributed nature of agency, emphasizing the necessity for actors to interact and share competencies in order to develop strategic agency. According to Fischer and Newig (2016), the interdependency aspect is crucial, as agency is almost always related to and dependent on actor networks.

2.3.3 Innovation System Gaps and Intermediation

Any innovation system may display imperfections in its setup, which can be termed gaps, leading to a decline of effective communication, network building and learning (KLERKX &

LEEUEWIS 2009). These **gaps** have been identified in differing aspects. It has been distinguished between cognitive gaps (differences in understanding and normative backgrounds of actors), information gaps (information asymmetries, especially with regard to existence and capabilities of other actors), managerial gaps (inability of actors to adopt and implement an innovation) and system gaps, i.e. the conformity of the innovation with the existing socio-technical regime (KLERKX & LEEUEWIS 2009). These gaps may ultimately lead to innovation system failures (WEBER & ROHRACHER 2012).

To bridge these gaps, another function can be identified, namely innovation **intermediation**, itself again consisting of a multitude of sub-functions, such as communication and dissemination of knowledge, education and training or technology assessment and evaluation (KIVIMAA 2014; LUKKARINEN ET AL. 2018). These intermediary processes can be seen as a support function of the main innovation system functions (sub-section 2.2.3) in the sense, that intermediary activity can positively contribute to the performance of each function (LUKKARINEN ET AL. 2018).

The provisioning of innovation intermediation in the context of innovation systems is often performed by specialized government or private agents, then termed innovation intermediaries or innovation brokers (KLERKX & LEEUEWIS 2009). However, it is also possible, that these services are provided by actors, without being an integral part of the actor's role or identity (HOWELLS 2006) or actors even being aware of their intermediary function (KIVIMAA ET AL. 2019). Accordingly, organizations or actors that originally serve other purposes, often (temporarily) assume intermediary roles or functions without being designated innovation intermediaries (KIVIMAA ET AL. 2019).

2.4 The Role of Local Government in Innovation Systems

Now that the theoretical groundwork has been established, we focus on our unit of analysis: employees of local administrations. It is the aim of this section to conceptualize the role of local authorities and their relation to innovation processes.

Traditionally, local governments are viewed with limited agency in transition and innovation processes²¹ (FISCHER & NEWIG 2016). While the role of institutions in general is often strongly highlighted, local authorities and their representatives²² generally play marginal parts in innovation system analyses. Mainly, they are viewed as enactors of the formal institutional framework, providing highly specialized, bureaucratic services, fully bound to their instructions and often constrained in their financial and human resources (RICHTER 2012).

Recent conceptualizations of local governments indicate a more nuanced and active role of administrations with regard to the management of interaction, networking and mediation processes²³ (RICHTER 2012; WALTER 2017). Local government actors form relationships with other actors and actor groups, engage in networks and perform various “micro-level activities”, thereby potentially influencing TIS performance (JACOBSSON & JACOBSSON 2014). Borremans et al., for example, found local authorities to have an impact on the functions legitimation as well as influence on the direction of search and resource mobilization (2018). Due to their close ties with local farmers, authorities can also influence knowledge development and diffusion (BORREMANS ET AL. 2018). Also, as interpretation of the rules might differ across the districts and regions, there may be variation in how rules are implemented (KÖNIG ET AL. 2018). Several authors also see a potentially important role for government in intermediation processes as coordinators, mediators, organizers, and transformers (HEARN & ROONEY 2002), facilitators of networks (NOOTEBOOM 1999) or creators of space for interaction and learning (BRAUN 2003).

2.5 Integrated Conceptual Framework

To conclude this chapter, theories and concepts discussed in previous sections are integrated into a conceptual framework that will be used to investigate the role played by employees of

²¹ This is also true for most other actors types, which highlights the importance of interaction in networks for developing agency (FISCHER & NEWIG 2016).

²² Throughout the thesis I will use the terms employees and representatives of public administration interchangeably.

²³ See the debate around „New Public Management”, describing a change from a bureaucratic to a managerialist paradigm in public administration (KOZICA ET AL. 2013; NASCHOLD & BOGUMIL 2000)

local administrations in the innovation processes associated with the development of agroforestry in Brandenburg, which is the overall aim of this thesis.

As outlined in section 2.1, agroforestry is an agricultural technological innovation, whose development faces several barriers, among which knowledge requirements and administrative hurdles associated with the existing regulatory framework are considered especially powerful. As postulated in section 2.2, the TIS perspective provides us with a useful framework to analyze the interdependence between our unit of analysis (employees of local administrations) and the two aforementioned barriers. From this perspective, an emerging agroforestry innovation system (AFIS) can be characterized by the interplay of its structural elements (actors, networks, institutions) and a set of core functions (cf. section 2.2). In line with delineation reflections of sub-section 2.2.4, we do not consider our unit of analysis (employees of local administrations) to be part of the AFIS, but rather to formally enact the dominant agricultural regime's institutional framework, which is external to the AFIS. The analytical focus of this research is therefore directed to the peripheral context of the AFIS and, most particularly, directed to the interactions between the AFIS and the dominant regime. These interactions are assumed to influence structures and functions of the AFIS.

In line with the research focus on knowledge and institutional change, the two functions of knowledge creation and diffusion and legitimation are given central importance. As the TIS framework is considered a meso-level framework, they have been operationalized through additional concepts. Different types of knowledge (know-what, know-how, know who) are conceived to be shared through a variety of learning processes (sub-section 2.3.1). On the other hand, legitimation is thought to be achieved through processes of institutional work, which depend on actor's agency (sub-section 2.3.2). Intermediation processes can contribute to both functions (sub-section 2.3.3).

Figure 5 provides a graphical representation of the conceptual framework.

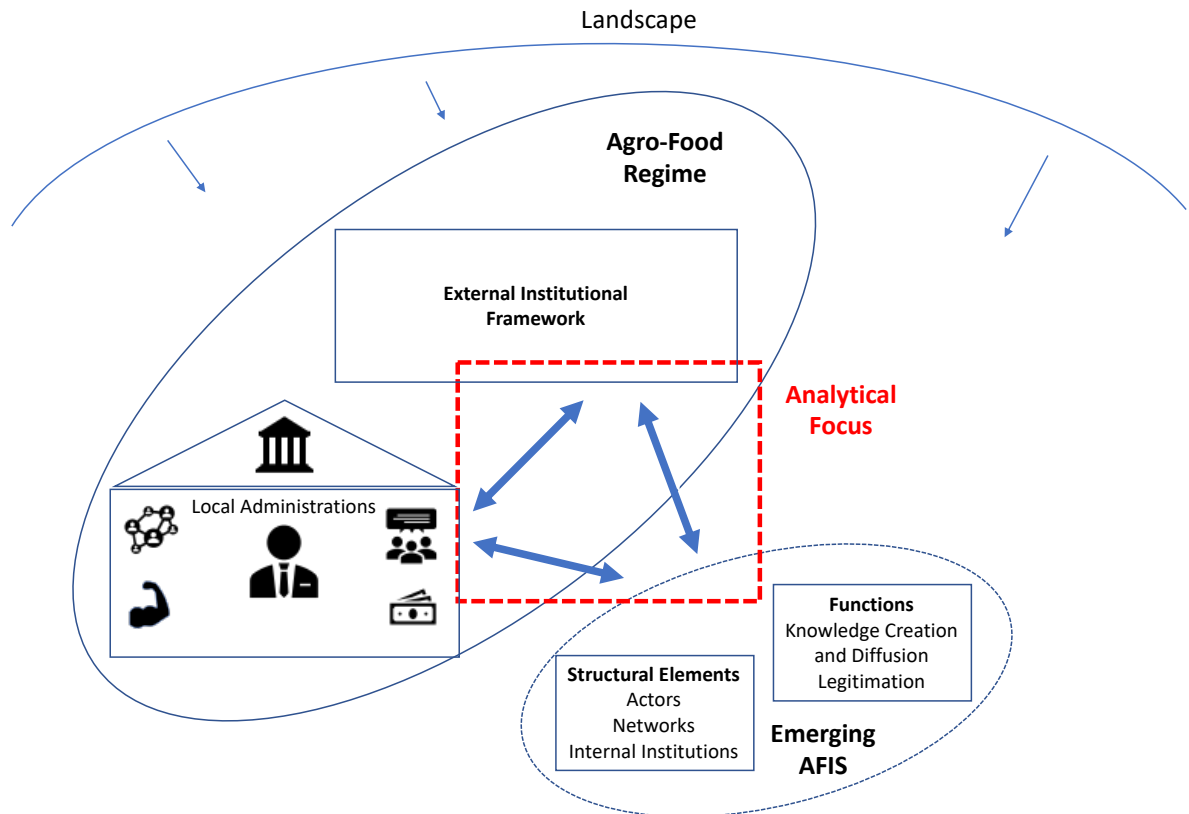


Figure 5: Integrated Conceptual and Analytical Framework (adapted from MARKARD & TRUFFER 2008, p. 6)

In this chapter, the theoretical groundwork for the thesis was laid down. The following chapter will outline the methodology employed to conduct the analysis. The latter will be elaborated in the subsequent chapters, with two aims in mind. Firstly, to investigate how agricultural departments influence knowledge related processes, focusing on what they know about innovations such as agroforestry, how they learn about them and how they influence learning by others. Secondly, to investigate their influence on the external institutional framework and their contribution to legitimation processes by other AFIS actors.

3 Methods of Data Collection and Analysis

This chapter is organized as follows. Firstly, I will provide account and justification of the methodological approach used in this thesis (section 3.1). Secondly, the regional focus and selection of interview partners will be elaborated (section 3.2). Consequently, the research object will be described in more detail (section 3.3) Lastly, the procedures of encoding the interviews and analysis will be explained (sections 3.4 and 3.5).

3.1 Methodological Approach

An important step in every empirical research project is the choice of the best-suited method(s) for comprehensive data collection, as well as a systematic and structured analysis, aimed at providing coherent results. The appropriate choice of methods depends on the nature of the planned research, the research objectives, the extent of existing knowledge, the applied theoretical framework, as well as available resources. When gathering empirical data in a social context, it is generally distinguished between deductive vs. inductive types of research and qualitative vs. quantitative methodological approaches or paradigms (DÖRING & BORTZ 2016)²⁴. These approaches differ with regard to the extent to which they aim to determine causal relationships or causal mechanism (GLÄSER & LAUDEL 2009).

When employing deductive research, the researcher uses fixed categories of analysis that are derived from existing theory and then applies them to specific sets of empirical data to validate given assumptions and hypotheses. To achieve this goal, often quantitative research methods are employed, where large samples of standardized numerical data are collected and then subjected to statistical analysis. This approach focuses on the detection of correlations and causal relationships, without providing deeper insight into the nature and inner workings of the latter. Also, it requires substantial pre-existing knowledge (BOGNER & MENZ 2002). Inductive research, on the other hand, aims at detecting causal mechanisms by gathering and analyzing empirical data in a more open way, often with the intent of detecting patterns and

²⁴ It should be noted, that this quasi-puristic classification is contested, as empirical research design often shows less clear distinction and blurred lines (GLÄSER & LAUDEL 2009). Also a third strategy can be distinguished, the mixed method approach, which combines qualitative and quantitative methods (DÖRING & BORTZ 2016).

formulating new hypotheses or theory. This type of research is more closely associated with qualitative research methods, and usually focuses on social interactions, experiences and perceptions, generating limited amounts of non-standardized data (GLÄSER & LAUDEL 2009).

Both agroforestry research and application of AFS in Germany are still in a formative stage. Moreover, analysis of the agricultural innovation systems with a focus on the role of local administrations has – to the author’s knowledge – not yet been attempted. Lastly, this research analyzes **how** local administrations influence the innovation process, thus its aim is to understand causal mechanisms, not only to identify causal relations. For these reasons, a qualitative and inductive approach and an explorative research design were adopted.

Expert interviews represent a suitable method to reconstruct a specific social context, which has not been thoroughly researched previously. Experts are persons, characterized by their specialized knowledge about specific social contexts and practices (GLÄSER & LAUDEL 2009). The objective of such interviews is to gain access to, and insights from, their expertise. Interviews generally are distinguishable by type (narrative, receptive), structure (non-structured, semi-structured, structured) and amount of interviewees (individual or group) (DÖRING & BORTZ 2016; LAMNEK 2006). For this research, the form of semi-structured interviews was chosen, as they reduce the risk of digression from the aim of the data collection, while still allowing the researcher sufficient flexibility to adapt to the interview situation at hand (FLICK ET AL. 2012).

Integral part of this research method is the creation of interview guidelines, which serve to operationalize one’s research questions into more concrete interview questions (FLICK 2007). The questions employed in the guidelines were formulated in simple language and as openly as possible to allow respondents to answer freely. The interview guidelines are attached to this work as appendix 2.

3.2 Determination of Research Focus

As specified in section 1.2, the focus of this research has been narrowed on the state of Brandenburg in Germany. This choice was motivated by a number of reasons. Brandenburg is amongst the driest regions of Germany, with annual precipitation ranging mostly between

550mm and 600 mm²⁵ (DWD 2019), while average soil quality of agricultural areas is poor (BUNDESANSTALT FÜR GEOWISSENSCHAFTEN 2013). Like other regions of the former GDR, it is characterized by large field sizes, often accompanied by the absence of structural elements, thus rendering those fields especially susceptible to wind erosion (BAESSLER & KLOTZ 2006; BUG ET AL. 2015). Altogether, these factors make Brandenburg especially vulnerable to projected climate change impacts and increase urgency for successful implementation of adaptive measures. In addition, and partially resulting from those factors, Brandenburg is already a hot spot of agroforestry research, with several experimental fields existing, especially in the southeast.

Amongst those research projects, the AUFWERTEN project headed by Christian Böhm of the Technical University of Brandenburg in Cottbus represents the most recent. The five-year project conducts state-of-the-art research on arable agroforestry in Germany and is mainly focused on experimental areas in the south of Brandenburg. Having participated in the final presentation of that project in Berlin in March 2019, I decided it would be fruitful to build on existing structures, networks and knowledge in this region²⁶. Two telephone interviews with Christian Böhm in the structuring phase of this research helped him to define the setting of the research and narrowing its focus. Furthermore, they provided a starting point for the interviews, as Christian Böhm highlighted several district administrations as having already some degree of experience with AFS²⁷.

3.3 Description of Research Object: Agricultural Administration in Brandenburg

The § 5-8 Landesorganisationsgesetz Brandenburg (LOG BB 2014) divides the tasks and responsibilities of agricultural administration in Brandenburg between the two lower levels

²⁵ The average precipitation in Germany amounts to roughly 790 mm per annum (LANDESAMT FÜR UMWELT 2018).

²⁶ For more information on the project, see: <https://agroforst-info.de>, last accessed 30.08.2020

²⁷ This procedure represents a form of snowballing, where the researcher follows expert's and interview partner's suggestions for further potential interviewees (MISOCH 2015).

of the state's administrative hierarchy, which comprises four in total²⁸. In Brandenburg, the State Ministry for Agriculture, Environment and Climate Protection (MLUK) is located on the third level, together with its two subordinated State Agency for Regional Development, Agriculture and Land Consolidation (LELF) and State Agency for Environment (LfU). The administrative units at the base of the pyramid are local district-level authorities. The state area is organized in a total of 14²⁹ separate districts, as shown in Figure 6. Each features a division responsible for agricultural administration, either organized as a dedicated



Figure 6: Administrative Divisions in Brandenburg (WIKIPEDIA n.d.)

²⁸ State-wide decisions and room for maneuver are subjected to the federal ministry of food and agriculture (BMEL) being the second-highest level and the EU Agricultural Commission as the most superior administrative body (LORENZ ET AL. 2016)

²⁹ In other policy fields, four additional urban communal districts exist: Cottbus, Frankfurt (Oder), Potsdam, Brandenburg. Regarding agriculture, they are serviced by their neighboring rural district (LAND BRANDENBURG n.d.)

agricultural agency³⁰ (“Landwirtschaftsamt”) or as a specialized department (“Sachbereich für Landwirtschaft”) within a larger agency.

Following the reunification in Germany, an ideological turn to managerialist and business-oriented organizational practices such as lean administration³¹ lead to extensive reform and restructuring of many districts. This has not only resulted in some heterogeneity with regard to district-specific organizational structure and terminological usage, but also to processes of rationalization and a subsequent decrease in personnel over the last years (BLPB n.d.). These processes have been additionally exacerbated by the financial crisis of 2008 and the resulting financial strains on the communal level (IBID).

Another part of the aftermath of reunification constitutes the privatization of agricultural extension in Brandenburg. Unlike in former West Germany, the states of the former GDR are not allowed to provide formal extension but rely on private organizations to offer consultancy services. According to Labarthe and Laurent (2013), farms, and especially small scale farms, in Brandenburg lack access to advisory services. This is confirmed by Knierim and Thomas (2017), who found that farm managers often expect state authorities to fill that gap.

3.4 Implementation of Interviews and Transcription

Between October and December 2019, the agricultural administration offices of all 14 districts were contacted via email to request for an interview (see appendix 3). Of the 14 interview requests, four districts accepted the interview request, one district declined, nine did not respond. Another interview request directed at the Deutsche Vernetzungsstelle Ländliche Räume³², was also declined. Ultimately, five telephone interviews were conducted

³⁰ The Anglo-American term agency is used equivalently to the German “Behörde” or “Amt” and should not be equated with the term “Agentur” (BACH 2018)

³¹ The ongoing reform of the public administrative sphere is usually referred to as “new public management” or in the specific case of Germany also as “Neues Steuerungsmodell” (e.g. JANN 2018; SCHRÖTER 2019).

³² The Deutsche Vernetzungsstelle Ländliche Räume organizes knowledge transfer and ELER harmonization between the Laender and was expected to possibly provide some context with regard to comparability to other states. For more information, view <https://netzwerk-laendlicher-raum.de/die-dvs/>, last accessed 04.09.2020

between October 2019 and January 2020, whereby two interviews were conducted with employees in the same department (IN3, IN4). One of these interviews was very short (IN4), as it was held spontaneously after the main interview (IN3) to clarify one specific aspect. The other interviews ranged in length between 40 and 62 minutes, resulting in a total average length of 41 minutes. Two of the interviewed department are located in Southern Brandenburg, the other two in Northern Brandenburg.

Interview Partner	Agency	Location	Interview Duration
IN1	A1	South	41:29
IN2	A2	South	39:50
IN3	A3	North	53:33
IN4	A3	North	6:26
IN5	A4	North	62:35
Total			03:23:53
Average			40:47

Table 1: Pseudonyms and Interview Metrics

The interviews were recorded with the interviewee's consent (see appendix 4) and then transcribed with the analysis software MAXQDA. Applicable transcription systems vary in rigor and detail, depending on the analytical objectives. As the analytical focus of this research represents a content evaluation, simple transcription rules were deemed sufficient (RÄDIKER & KUCKARTZ 2019). Generally, the interviews were transcribed word-for-word. Pauses, laughter and slips of tongue, however, were not noted. Incomplete or strongly convoluted sentences as well as grammatical errors and dialects were smoothed and, where necessary, paraphrased into a comprehensible written form. The transcripts were then sent to interviewees for approval.

Before analysis, the transcript data were made anonymous. All sensitive information, such as names of districts, people, places or the exact size of the department were substituted by general signifiers. Subsequently, the interviews will be referred to as IN1 – IN5, the pseudonym numbers are based on chronological order the interviews were held in. Likewise, the respective agencies or departments they represent will be named A1-A4 (see Table 1).

The representative of A4 additionally provided written notes, she³³ had prepared in advance of our interview (IN5). These will be referred to as N1.

3.5 Coding and Analysis

When analyzing qualitative data, several different methods can be distinguished (FLICK ET AL. 2012; SCHREIER 2014). For this research, structuring content analysis via coding was employed, which aims at systematically interpreting data by matching text passages with a category or code system that has been developed based on theory (deductively), empirically (inductively) or both (MAYRING 2010, 2016, 2000; SCHREIER 2014). In this case, a mixed deductive-inductive approach was applied, allowing for some initial thematic structuration, while simultaneously accounting for unanticipated matters and thus minimizing risk of missing critical topics (GLÄSER & LAUDEL 2009, 2013).

First, an initial set of main categories was deduced from the research questions and the literature as reviewed in chapter 2. Consequently, this set was complemented with sub-categories, derived inductively from repeated critical readings of the interview transcripts. Additional purely data-based main and subcategories were generated. The final code system is attached as appendix 5. All interview transcripts were then coded with this code system using also MAXQDA. The results from the analysis will be presented in the next chapter.

³³ Throughout this thesis, consistently female personal pronouns will be used without reference to the actual gender of the interviewee. This shall on the one hand allow for the fact, that roughly two thirds of all employees in the local authorities are female (UNGER 2019) and secondly address existing asymmetries with regard to predominance of the generic masculinum in academic writing (REISIGL ET AL. 2017).

4 Empirical findings

This chapter aims at presenting the statements given by the interviewees, structured in alignment with the research questions (cf. section 1.2). First, basic information collected on the agricultural departments will be presented (section 4.1). Then, existing knowledge and processes of learning (section 4.2) and department influence on external learning are reviewed (section 4.3). Lastly, relevant institutions are identified (section 4.4.) and the departments' influence on these institutions portrayed (section 4.5). The data will be then analyzed in light of the theoretical framework in chapter 5.

4.1 General Information on Agricultural Departments

Due to a lack of academic research on agricultural administration in Germany, the researcher had a very limited initial understanding of existing structures and processes. Accordingly, some general questions paved the way for a deeper comprehension of the potential involvement of departments with regard to the research objectives.

4.1.1 Size and Structure of Agricultural Departments

The interviewed employees represent administrative divisions that differ quite substantially in their size. While the smallest department features 10 employees (IN2), the largest one employs nearly 50 (IN3, IN4). The other two departments have between 15 and 20 employees (IN1, IN5). These variations reflect a heterogeneity in the structural setup of the different administrative departments, which, according to the head of A1, has emerged over the past ten years (IN1). While the smaller departments are exclusively dedicated to agriculture (IN1, IN2, IN5), the agricultural department in the largest agency also incorporates environmental services (IN3, IN4). This is accompanied by the use of different terminologies. In two cases, the administrative units dedicated to agriculture are specialized thematic divisions within larger governmental departments (IN2, IN5). In the other cases the entire unit is a dedicated agricultural agency (IN1, IN3, IN4). In the following, the terms agency and department will be used interchangeably. When utmost precision is deemed necessary, the respective German terms “Sachbereich” for a smaller specialized division and “Landwirtschaftsamt” for an agricultural agency will be used.

4.1.2 Tasks and Responsibilities

Accordingly, the tasks and responsibilities of the department also differ. In all cases, the agricultural departments are responsible for administering the processes connected to the application for agricultural grants under the two pillars of the CAP (IN1, IN2, IN3, IN4, IN5). This includes mainly the processing of subsidy applications, grants, rejections and sanctions. Additionally, the agencies provide support for the use of the relevant forms and software and inform farmers about changes in the regulative framework (N1). Simultaneously, the departments have a variety of other tasks, such as the overseeing of property sales and leases, support to land consolidation measures (“Flurbereinigung”) conducted by the central ministry, control of adherence to the fertilizing ordinance (“Düngerechtsverordnung”) and statistical reporting (IN3, IN5, N5)³⁴. The fertilizing ordinance is an important topic for the departments, as it grants them authority to inspect farmers. Other monitoring responsibilities have long been delegated to the central state agency (LELF): *“We have stopped conducting inspections in the year 2004. Back then, the central technical monitoring service was instituted. The only area, where we still have the authority for monitoring locally regards fertilization.”* (IN2)

An area that is managed inconsistently is the improvement of agricultural and economic structure and regional development. The “Landwirtschaftsamt” representatives explicitly mentioned that they can autonomously exert influence in this regard and implement measures for example in regional marketing (IN1) or regional development (IN3). According to one head official however, several districts in Brandenburg have delegated this topic to the department of general economic development (IN1). Although she mentioned that this does work well in some cases, she also highlighted the occurrence of problems of prioritization, when other areas of the economy are deemed more important. In case of the largest agency A3, the responsibilities extend beyond agriculture to fishery and hunting, as well as to environmental protection, water regulation and waste management (IN3).

³⁴ Not all interviewees responded in great depth and length on these topics. Accordingly, publicly available information from the agency websites was used to complement this section.

4.1.3 Responsibility Level of Interviewees

The interviewees represented different hierarchical levels within their districts. Regarding the two Landwirtschaftsämter, I was able to interview the respective heads of department (IN1, IN3) and additionally one clerk (IN4). In case of the Sachbereiche, I spoke with one head of division (IN2) and one clerk (IN5). An overview is presented in Table 2.

Interview Partner	Agency	Agency type	Responsibility Level
IN1	A1	Amt / agricultural agency	Amtsleiter*in / head of department
IN2	A2	Sachbereich / specialized division	Sachgebietsleiter*in / head of division
IN3	A3	Amt / agricultural agency	Amtsleiter*in / head of department
IN4	A3	Amt / agricultural agency	Sachbearbeiter*in Agrarförderung / clerk
IN5	A4	Sachbereich / specialized division	Sachbearbeiter*in Agrarförderung / clerk

Table 2: Agency type and responsibility level of the interviewee

According to one head of department, significant hierarchical differences exist between being head of department and head of division, mainly regarding autonomy of decision making and degree of mobility. Whereas the former may freely decide to participate in a central meeting at the ministry or to visit a colleague in the neighboring district, the latter are restricted by the priority setting of their superiors. Furthermore, the interviewee perceived this difference in hierarchical status to negatively impact cooperation between districts (IN1).

4.2 Knowledge about Agroforestry and Agroforestry Development in Brandenburg

This section focuses on the state of knowledge that the departments' representatives possess about agroforestry and important recent developments as described in chapter 2.1.3.

The interviewees conveyed varying degrees of understanding of, and experience with, agroforestry. All had heard the term before and possessed a general idea of the concept (IN1, IN2, IN3, IN4, IN5). The head of department of A1 discussed some concepts, benefits and barriers associated with AF and mentioned that the latter is a recurring topic of exchange when visiting network events. She did not report any practical experience however and was unsure of the exact current legal framework (IN1). The representatives of A2 and A4, on the other hand, had dealt with farmers implementing agroforestry in their district (IN2, IN5). They also showed a deeper, practically informed understanding of the concept and its

hindrances. The head of division of A2 was especially knowledgeable, as two farmers in her district participate in the AECM project (see sub-section 2.1.22.1.3). She mentioned the concept's legal challenges and its current restriction to the form of short rotation coppice as *“the only way to integrate it into the agricultural support framework”* (IN2). Similarly, the clerk of A4 could more precisely describe AFS and knew about existing legal and administrative challenges: *“So to me, agroforestry means cultivating beneath trees, either arable farming or vegetable gardening. (...). There is always the problem of reaching the minimum parcel size of 0,3 ha.”* (IN5)

This, on the other hand, was not the case for A3. The head of department was not aware of a difference between AFS and short rotation coppice and did not know that the concept includes grazed orchards (IN3). Also, although one of the farmers in their district actually practices agroforestry, both were not aware of that (IN3, IN4). According to the clerk, the farmer had apparently not applied for subsidies for the area in question. In this context, she stated explicitly the incompatibility of trees with agricultural aid programs, as they would belong to the responsibility of forestry (IN4).

Similarly, the interviewees were unevenly informed about the development of the AECM project. Again, the head of A2 was well informed due to the participation of two of their farmers and reported an active involvement of the agency in the development of definitions for the project (IN2). The other agency representatives were not aware of this project. This also applies to the recent foundation of the agroforestry lobbying network DeFAF (see chapter 2.1.3).

4.3 How Employees of Agricultural Departments Learn

I now turn to the question of how agencies and their representatives a) learn about AF specifically and b) come to know about technological developments and innovative practices in agriculture more generally.

4.3.1 Learning about Agroforestry Specifically

The interviewees stated different sources for their knowledge about AF. The head of department of A1 reported that AFS have been a topic at informational events she had

attended. She also mentioned it as an existing, albeit rare, topic of discussion between her and farmers during informal meetings. In this context she referred to her large network as a result of some 20 years of professional experience in the private agricultural sector: *“It’s a topic that arises in discussions I have alongside events. It also comes up in discussions, when someone comes to the agency for some other reason and then drops in my office for a cup of tea, because I have known several farmers professionally for quite some time now. This is not happening often, though. Once it was presented during an information event in Neuseddin.” (IN1)*

IN2 and IN5 similarly reported their knowledge and understanding to stem from the interaction and exchange with farmers: *“Our applicant approached us with this topic. We had a lot of questions, as the system does not fit the conventional support guidelines. So, he tried to explain it to us. It is rather unusual, however. I don’t know of any other farmer in our district practicing it.” (IN5)*

Additionally, two interviewees stated, that they had come across the topic through general television and press media (IN3, IN5).

4.3.2 Learning about Agricultural Innovation in General

More generally, the interviewees reported several pathways for learning about innovative practices. The main source of information regarding changes in the regulative framework and agricultural support guidelines (“Förderrichtlinien”) and thus impacts on their work routines is provided by the hierarchical superiors, i.e. the state ministry (MLUK) or the connected executive state agency (LELF) (IN1, IN3, IN5). Regular meetings between the heads of department and division (“Amtsleitersitzungen”) are held in Potsdam, posing opportunity for discussion, exchange and harmonization across districts. Furthermore, the ministry organizes information events (“Dienstbesprechungen”) also for clerk-level employees. The interviewees expressed different opinions on the effectiveness and scope of these meetings. While the head of A1 mentioned them to be working well in the context of the topic of changes to the fertilizing ordinance (IN1), the head of A3 criticized the decline of frequency of these meetings: *“On top of that, we now have – and I want to explicitly criticize this - a maximum of two annual meetings at the ministry. In earlier days, that used to be different, then we had 6 to 8. So, this means, you hardly get to see your colleagues from other districts*

anymore. And the opportunity for exchange beyond these meetings are also limited, as the day to day operations just claim all your time. So, this exchange is definitely improvable” (IN3). Additionally, the representative of A4 stated, that in between these events, the ministry regularly informs them via email (N1).

When encountering unusual applications or requests, not covered by existing knowledge and routines, the departments usually contact the ministry or the state agency (LELF). The superior hierarchical levels are expected to provide the specific knowledge and guidance, which the local authorities can then communicate further to the farmers:

“So, if there are specific questions, we forward these to the ministry. Mostly, we receive a written statement, that we can forward. That is the normal way. The ministry is the relevant agency, that we can address, if we have legal questions” (IN5).

“We know our guidelines. If there is something, that is not in these guidelines, we usually ask the ministry. Either they know or they ask the federal ministry. If the federal ministry doesn't know, they ask the EU. That is the way it goes.” (IN3)

Both agency representatives reported these processes to be time consuming and rather slow (IN3, IN5).

Another source of information are administrative professionals from other districts. Contacts between the districts exist on the superior level as well as on the basic clerk level (IN5). This interaction was stated by IN2 to be more strongly between neighboring districts, as the likelihood of similar regional conditions and challenges is higher. Most interactions between districts seem to be directed at the exchange of information related to property sales and leases (IN2, IN5, N1). The head of A2 also reported the occasional exchange between districts regarding approval processes (IN2). Furthermore, several interviewees referred to the existence of cross-district working groups collaborating on the topic of the fertilizing ordinance (IN1, IN3). Beyond this topic, no systematic processes of collaboration were mentioned.

Likewise, the learning potential between different federal states seems to be limited. Although, there is some interaction, mainly again regarding information related to property

sales and leases, the differences between states were perceived too strong to yield relevant input. According to the head of A1, looking at other state departments *“is not very meaningful, as ultimately the state ministry has to approve. It is of little help to say: „But in Bavaria they do it this way.“ Then the ministry’s answer will be: “what do we care, how they manage this in Bavaria”.* (...) *Also, from a legal perspective it’s not exactly the same everywhere. (...) The differences between the states are larger, than one might think.”* (IN1).

When questioned about learning about general developments in agriculture and new practices and technologies, the interviewees reported several channels of information. One pathway is input from pioneering farmers, approaching the agency with requests, as already described in the previous section. Another opportunity for staying up to date are informational events, organized by industrial actors, such as seed companies. Attendance of these events seems to be not guaranteed, however, as the required time is not always available (IN3). Two agency representatives reported also to have occasional knowledge gains from informal exchange with other actors, such as agricultural consultants or representatives of local farmer association (IN3, IN5, N1).

Lastly, the representative of A4 mentioned, that they have access to several press media, such as *“Bauernzeitung”*, which helps them stay informed on current events and developments (IN5). She seemed to perceive their level of learning as somewhat restricted to the regulative changes when she stated: *“Well, regarding Innovation (...). Practical applications are only of interest to us when they regard our regulative framework. We are usually the last to know things, if I may say so”* (IN5). This was similarly reflected by the head of A3: *“But on top of that, if you are asking about innovation in agriculture more generally, we usually learn about that in the press or sometimes if we are invited to informational events...”*. (IN3)

4.4 Influence on Learning by Other Actors

This section provides an overview of the ways that agency representatives influence learning processes by actors outside of the agency.

4.4.1 Informational Events Organized by the Agency

Several agency representatives mentioned that they regularly hold informational events ahead of the main annual application phases for direct aids and KULAP support (IN2, IN3, IN5). These events are mainly used to communicate regulative and technical changes to the subsidy application procedures (IN3, IN5). The main focus, however, is clearly on issues related to subsidies: *“Well, we do provide more general information as well, but mainly it is about the support claims. (...) Provision of agricultural subsidies is simply our job” (IN 5).* Two interviewees reported that they regularly extend the content of these events to include one (IN2) or several (IN3) more general topics of current interest. These comprised for example plant and tree protection or other topics related to the environment, as well as information on changes in the fertilization ordinance or perspectives from the veterinary department. Additionally, the clerk of A4 stated that they provide results and lessons learned from previous monitoring activities to help farmers avoid similar mistakes in the future (IN5). The share of farmers reached with these events is estimated similarly by two representatives to be close to 50 % (IN2, IN3).

Interestingly, the head of the largest agency A3 additionally reported to have held other informational events in the past: *“We have also already organized events independently. Currently we are planning a large event (...) regarding red zones and fertilization. We ourselves initiated and planned it; it was not ordered by our superiors.” (IN3).*

4.4.2 Influence on Education and Training Measures

Vocational (“Berufsausbildung”) and continuous (“Weiterbildung”) trainings are important opportunities for farmers to gain basic qualification and learn and update their knowledge on new practices and innovative technologies. Concerning vocational training as the basic qualification for working in the agricultural sector, only A3 was mentioned to still feature an educational facility (“Oberstufenzentrum”) in their district, which also serves neighboring districts (IN3). According to the representative of A4, their district used to have their own school, but after it had been closed, aspiring farmers now must travel to the neighboring district for schooling (IN5). The head of A2 mentioned that education in the South of Brandenburg is organized by the central agricultural state agency (LELF), which runs

respective outposts (IN2). She also stated that she personally sits on the board of examiners for animal husbandry and accordingly regularly participates in qualification examinations.

Regarding continuous training (“Weiterbildung”), the interviewees reported a variety of different offers in their districts, which are usually conducted during winter (“Winterschulungen”). They cover a variety of topics, such as legal seminars or plant protection and provide an *“important opportunity for exchange”* (IN5). A2 and A4 representatives mentioned the state academy for agriculture (BLAk) as an important address for these trainings (IN2, IN5). They did not, however, report a close relationship or any possible influence on their programs. According to representative of A4 this was generally not possible (IN5).

This differed slightly with respect to training offered by the local farmer associations which was mentioned also by representatives of A2 and A4 (IN2, IN5). While the clerk of A4 acknowledged that the possibility of closer collaboration exists in principle, she argued that due to the limited reach of the association, their agency did not pursue this possibility (IN5). The representative of A2, on the other hand, described an active influence on these events: *“Additionally, I collaborate with the farmer association. If I identify a certain demand on the side of the farmers – e.g. with regard to plant protection – then I contact the association and they gladly use these topics for their training. These trainings are very well accepted by the farmers and we also participate as guests sometimes, if we have the need to communicate certain aspects that are in demand.”* (IN2)

An active involvement was also mentioned by the head of A3, who was again the only³⁵ interviewee to report having a dedicated training facility (“Zentrum für Erwachsenenbildung”) in her district (IN3). She described a close relationship with the school: *“Here, our agency can – if we have specific topics that are important to us – also exert influence and to organize with the school include them in their program. (...) A lot of interactions exist, and they also need input regarding topics. After all, the school has to prove*

³⁵ The district of A1 also features an agricultural school dedicated to farmer training. The agency employs one clerk explicitly responsible for coordination of the school’s program, so it can be deduced, that a large degree of influence on program and covered contents exists. However, this topic was not covered in the interview.

its right to exist (...). I don't have anything to do with organizational or financial aspects, but regarding content and topics, they gladly take our suggestions" (IN3). When specifically asked whether this could also incorporate information on agroforestry, she answered: "Yes" (IN3). The agency representatives of districts without own training facilities expressed their regret towards this lack of local opportunity (IN2, IN5).

Another provider of wintertime training are private actors of the agricultural sector, such as agricultural machinery suppliers or vendors of seed and plant protection products. In contrast to the more general topics offered by the previously mentioned actors, these trainings focus on specific knowledge regarding the application of specific products complemented with contextual information (IN5).

Finally, A3 and A4 representatives both mentioned evening schools ("Volkshochschulen") as a place where they actively offer classes. These classes, however, focus mainly on technical procedures when applying for grants and the usage of the relevant software (IN3, IN5, N1). The head of A3 reported this to be as somewhat of a grey area, as the agencies are "not permitted to provide formal extension" and mentions the dangers of liability claims in case the application doesn't work. (IN3).

4.4.3 Agricultural Extension and Consultancy

The supply of private extension services (cf. chapter 3.2) was perceived as insufficient by the head of A3: „*And then there is this other deficit in Brandenburg: we don't have an adequate provision of consultancy here. It is lacking all over the place. In our district we have the LAB³⁶, which covers all of Brandenburg but beyond that we don't have any consultants in this district directly. Think about it, in relation to 127.000 hectares, that is nothing! So many farmers are just muddling along. And well, we see the results of that...*" (IN3). She further stated, that this lack has been communicated by her and a variety of other districts in the regular meetings at the ministry (see sub-section 4.3.2). She perceived this lack to result of the generational change and the lack of appreciation for agricultural consultants. To her, the

³⁶ The interviewee refers to LAB GmbH, an agricultural consultancy firm founded and owned by the local and state farming associations. For more information, consult their website "lab-agrarberatung.de".

ministry should invest in measures, to place this profession higher on university agendas and to increase attractiveness amongst graduates entering the job market (IN3).

The representative of A4 additionally remarked how especially smaller farmers with limited financial capacities hesitate to hire consultants and instead try to get the relevant information from the agency (IN3). She described their general willingness to provide such services, but also a limitation of their competences, usually restricting consultancy to aspects directly related to the support guidelines (“Förderrichtlinien”) (IN5). Similar limitations were described by the head of A3 about cross compliance: *“Normally, there are professional consultancies for this, which are registered on a list at LELF. This is where farmers are supposed to go. But we can take responsibility for certain things and we will always answer if there are questions”* (IN3). To her that has direct impact on her workload, as increased skills on the side of farmers lead to fewer problems with inspections and thus less sanctions she has to monitor (IN3).

The head of A3 mentioned one area, where their competence of providing consultancy is more extensive. This again is the area of fertilization, where they hired a professional technician: *“We have for example created one new job in the area of fertilization as of January 1 – that was quite a fight, to be able to create a job at all. It’s a technician position, so quite a high qualification. We created that job to be able to provide certain extension services but also to increase pressure from inspections.”* (IN3)

The interaction between agencies and consultants was described as rather “lose” by the head of department and apart from the consultant’s participation at A3’s informational events (IN3), neither her nor the other interviewees offered any indication for stronger cooperation or organized influence on the provision of extension services.

4.4.4 Knowledge Intermediation

Several agency representatives reported to frequently play the role of intermediaries, connecting farmer’s demand for knowledge with the respective supply. This often involves referring farmers to agricultural consultants and the ministry when asked for advice on topics going beyond the realm of subsidies (IN3, IN5), informing them about the range of winter trainings available in their district (IN3), or about finance and investment possibilities (IN5).

Interestingly, IN2 explained how her position on the board of examiners resulted in her having contact with the state agency's employed training personnel and how this benefits farmers: *“These are different contacts for the respective professions, which I am in contact with, due to my participation on the board of examiners (...). This network allows me to further connect the farms with the educational institutions if there is the need”*. (IN2)

4.4.5 Influence on Local Politics

The representative of A4 noted, that together with the department for environment, their department regularly reports to the agricultural and environmental committee (“Landwirtschafts- und Umweltausschuss”) of the district council (“Kreistag”) (N1). This was not mentioned by any other interviewee.

4.4.6 Means of Communication

The departments used different communication channels. In general, face to face interaction seems to be restricted to the informational events connected to the two application phases each year (IN5). The head of A1 appeared to be an exception to the rule, provided that she reported to have farmers visit her regularly, something she attributed to her large personal network and her professional work experience in the private sector before (IN1). The other departments reported to be communicating mainly via telephone (IN2, IN5) and mail (IN5) or email (IN3). The representative of A4 also described using the press for informing farmers (IN5). The head of A2 stated, that they try to upload all relevant information on their website to ensure all farmers have access to them (IN2).

4.5 Institutions of Relevance to Agroforestry

I will now turn away from the area of knowledge and learning to institutional aspects, beginning with a review of institutions mentioned as relevant to agroforestry and its development.

4.5.1 Legal Barriers

The interviewees differently perceived the legal barriers facing the development of AF, seemingly in relation with the level of practical exposure they previously had to this topic.

IN1 and IN3, which did not report any farmer activity in AF in their districts, both showed limited understanding of the legal barriers. The head of A3 equated agroforestry simply with short rotation coppice plantations and thus did not see substantial problems with their implementation (IN3). The head of A1 had a closer understanding of the concept, but did not see much conflict with the support regulation either: *“So if (...) a farm with a total of 2.500 hectares plants wind breaks or trees on 100 hectares, they only lose a fraction of their productive area, and would presumably still receive subsidies for it”* (IN1).

The employees of A2 and A4, on the other hand, building on their previous practical encounters, demonstrated that they were aware of several problems. The head of A2, when asked whether the farm in their district also opted for the hybrid solution of planting short rotation coppice in lines instead of in plantation form, replied: *“Yes, that was the only way, to integrate it with the agricultural support regulation: in the form of short rotation coppice”* (IN2). The clerk of A4 repeatedly stated the difficulty of *“meeting the necessary parcel size of 0,3 hectares”* as well as the necessity to stay below 100 trees per hectare (IN5, N1).

4.5.2 Fragmented Parcels, Lease and Land Ownership

A recurring topic during the interviews were land ownership conditions in Brandenburg and how they hinder the implementation of AFS. Many larger fields spread across a number of smaller parcels, owned by a variety of landlords. Accordingly, planting trees across such fields leads to high costs, due to the number of people involved (N1). This view was expressed by several agency representatives, who in addition perceived this to be mainly a problem of the larger agricultural holdings as they generally have lower ownership rates and lease large shares of their agricultural area (IN2, IN3, IN5, N1). Consequently, they perceived AF to be better suited for smaller farms: *“The system seems to be interesting mainly for smaller farms. The larger companies, that mainly operate on leased fields, spreading out across several parcels, surely have bigger problems with plantings and permanent crops. This quickly affects many different proprietors. For small farms mainly operating on property it could be easier to implement, as they only have to decide for themselves.”* (IN5). This led the head of A1 to conclude, that *“agroforestry systems, although per se a fine thing, are very hard to implement in Eastern Germany, because of the land ownership conditions (...)”* (IN1).

According to the head of A1, two solutions to this problem were conceivable, formal land consolidation procedures and voluntary parcel exchange (IN1). Several representatives described land consolidation as a highly complicated and long-term process, however:

“If you know how long land consolidation measures typically take in Germany – an average of about 15 years – then you know, what kind of time frame we are talking about (...) We are talking about 2.500 hectares here, sometimes about 1.000 and sometimes 500. Until you have consolidated an entire district, you probably need a century” (IN1)

“Yes, these consolidation measures are really slow, taking many years to finish. And in the meantime, you have had changes of ownership due to succession again. So, it’s really fragmented” (IN5)

Voluntary parcel exchange, according to IN1, might principally be simpler and faster, but as it also entails certain transaction costs, e.g. for land survey and the notary, she perceived a need for financial incentives to get people to participate (IN1).

4.5.3 Cognitive Barriers to Adopting Agroforestry

The problem of fragmentation of agricultural area is additionally exacerbated, if it coincides with landowners having negative perceptions toward trees on agricultural fields. The head of A1 stated to know several farmers in her district, that had a generally positive attitude towards agroforestry measures, but were restricted by their lease contracts: *“I can imagine that farms, having problems with wind erosion for example, would be very open to this - also the larger ones. (...) So, I do not believe that the problem is the lack of willingness of the farm managers. Or more precisely, it is not a matter of belief. I actually know of farm managers that say: it is not the lack of our willingness. It is the lack of willingness of the landlords to have such measures implemented” (IN1)*. The reason for these objections, according to her, was the widespread conception of trees as negatively impacting land value: *“If you plant trees on leased areas, you will get problems with your land lord because they will say: “you are damaging my property” (IN1)*. This fear of property value loss was, in her view, exacerbated by a general trend of shorter lease duration and higher uncertainty about prolonging the lease (IN1). She also provided an additional factor contributing to negative perceptions of landlords: *„On top of that, you should not forget, during the times of the GDR, many*

windbreak hedgerows were planted on the fields of people without their consent. Agronomically and also environmentally sound, no doubt - but there exists a distinct feeling of powerlessness here, that this has happened once before. So that's where the high emotional resistance comes from“ (IN1).

4.6 Employee's Perceived Influence on Institutions

Based on these varying conceptions of the difficulties, the interviewees also reported differing views, ideas and experiences with regard to previous attempts and perceived possibilities of influencing them.

4.6.1 Change of the Regulative Framework for Direct Payments (Pillar I)

According to several interviewees, alteration of the support guidelines for direct payments is generally a difficult and time-consuming process, as neither the local agency nor the state ministry have that authority, but rely on the federal ministry and the EU to effect these changes: *“Such specific issues [regarding eligibility for subsidies] are the responsibility of the [state] ministry, they are the first in line for clarification. As a matter of fact, though, if they want to include something specific in the support guidelines, they have to also get approval by the EU. They really have to go through the federal ministry, all the way to Brussels” (IN2).* The head of A3 explained, that the districts can rarely contribute and even if they are able to voice their opinion on necessary changes, this is not adequately taken into account: *“Well there should be focus groups on the specific topics at the ministry. We have something like this already for InVeKoS.³⁷ For many years we have had an InVeKoS working group, where one district participated to represent the districts and local authorities. A lot of things the districts brought up, however, were never really put into practice. Still, we should have at least that for other topics as well” (IN3).* And the representative of A4 remarked, that there is little room for discussing more fundamental aspects of the guidelines on the department's part: *“This is a complicated process and only possible for the applicant himself. If he is convinced, that there is something wrong with the guidelines and the way we*

³⁷ Integriertes Verwaltungs- und Kontrollsystem (InVeKoS) is the central monitoring and administration tool for the CAP.

process the application, we give the advice to raise a formal objection. We can then unfortunately only repeat what we have already written in our first review of the application. But then when push comes to shove, they can initiate a lawsuit. In a lawsuit, all relevant aspects will be considered and possibly a new position can be found, or not. That in my view is the only way to change legal aspects fundamentally” (IN5) According to her, this similarly applies for the state ministry: *“No, our state ministry also can’t do much. I think, that this is the responsibility of the federal ministry, as they much rather have the ability to mediate with the EU. I always have the impression, that our ministry, the MLUK, also fears the EU audit and accordingly acts rather careful” (IN5)*

A demonstrative example in this regard are changes to the list of applicable land use codes. This list determines the forms of cultivation eligible for receiving direct support, as each area that is being applied for has to be connected to a specific land use code. The list, according to one interviewee, is provided by the state ministry, which also guarantees that the codes are available in the software used in the application process (IN2). When asked whether the districts have any room for autonomous decisions, the head of agricultural support of A3 replied: *“No, the districts definitely not. If, at all, the state of Brandenburg – the ministry” (IN4)*. She further described what happens, when a particular system does not fully fit the codes: *“There are these codes, termed “all others” for cultivars not mentioned in the list. The farmer then has to explain, what form of cultivation she employs. Then it will be decided, if it works that way (...). This is then documented with an administrative protocol” (IN4)*. When asked about how this was being audited, she explained: *“Well, we never decide this without conferring with the ministry first. It’s not for the individual districts to accept it or not” (IN4)*. She also reported that the state ministry is likewise bound by instructions from the federal ministry, resulting in a more or less consistent use across the Länder: *“There are sometimes differences, as to one or several of these codes not being used. But additional codes do not exist” (IN4)*.

Despite these apparently unfavorable bureaucratic and hierarchical conditions, several districts have reported to have contributed to changes of the list land use codes. The head of A2 mentioned the inclusion of line seed and dye plant and hunting lanes in corn as examples, where they were involved in the process (IN2). The head of agricultural support of A3, on the other hand, referred to the energy crop cup-plants as an example (IN4). They did not,

however, reconstruct the change processes in detail. On top of that, A2 was actively involved in early discussions with the AUFWERTEN innovation group as to what conditions had to be met for an integration of AFS in the land use code system: *“Regarding agroforestry systems, we had appointments with the University of Cottbus and the agricultural enterprise that is active in this matter. Together we have worked out, which requirements had to be met for such a program and a land use code, so that the EU eligibility conditions would be met – for example necessary feasibility of control and minimum parcel size. So, we provide our support (...)”* (IN2). She also stated, however, that since then, the further developments have left her sphere of influence: *“This process is currently running outside the districts. The farmer association is supporting this and also politicians of the state and feral ministry are involved. (...) There have been no further requests directed at us. Neither from the EU, nor from the ministry”* (IN2).

4.6.2 Development of the Kulturlandschaftsprogramm (Pillar II)

Likewise, A2 was reported to have provided input to the reform changes aiming at including agroforestry as an AECM in the KULAP of Brandenburg, which were also initiated by the AUFWERTEN group. As the quote above accentuated, the department representatives helped the project develop suitable definitions and processes with their expertise on the current program and the EU guidelines but has not been involved in the process since (IN2).

A second example indicating a very low degree of district influence on changes in the KULAP, is related to the inclusion of wildflower strips into the program. Contrary to other German states, which have been supporting them since the beginning of this funding period in 2015, they have only recently been added in Brandenburg³⁸ (IN2). When asked, whether the department had participated in the program development, she replied: *“No. We just have, for a long time, tried to communicate the long existent need for this so-called wildflower strip program, together with others, to our state. The demand has been existing for a long time*

³⁸ For more information, please see consult the program description on the ministry website

[“mluk.brandenburg.de/mluk/de/start/service/foerderung/landwirtschaft/foerderung-naturbetonter-strukturelemente-im-ackerbau/”](http://mluk.brandenburg.de/mluk/de/start/service/foerderung/landwirtschaft/foerderung-naturbetonter-strukturelemente-im-ackerbau/)

and we are among the last states, to address this need (...)” (IN2). She continued to contextualize: *“Ultimately, this need has been recognized and has been addressed in form of a formal program, which by the way needs to be approved by Brussels. The state of Brandenburg can’t decide autonomously but needs Brussel’s approval, as they provide the funds.”*(IN2). According to her, it was unclear why Brandenburg had lagged behind in implementing something that other states have been doing for such a long time, but could not *“provide any insights, as they had not been invited for participation”* (IN2). She also did not know, whether other districts had provided any input in this regard.

When asked whether they were generally able to influence the program, the representative of A4 stated: *“No, unfortunately not”*, but continued *“Regarding this KULAP guideline, the first version that was already signed (...) was still looking rather raw. So, when we - and others - had questions regarding the exact meaning and implementation, the guidelines were adapted and remarks for the implementation were added.”* (IN5). Accordingly, minor degrees of influence seem to exist, but apparently restricted to interpretation and implementation of the program, not to its fundamental composition.

4.6.3 Change of Parcel Ownership

While the departments collect and provide information on ownership and the buying and selling of land and thus support land consolidation, the actual land consolidation process is centrally organized at the state agency (LELF), beyond the district’s authority (IN2, IN3). Accordingly, no department reported to have any influence on these processes. Likewise, the departments do not seem to be in the position to influence voluntary parcel exchange. Even if the process could be incentivized, e.g. through financial support for land survey, this was not a decision that could be readily made within the authority of the agency: *“God no, I can’t do this. That’s just a proposal of one head of agency. In the end the secretary of finance would have to decide that, and I have my doubts about that.”* (IN1)

4.6.4 Special Case: Fertilization

Similar to the area of knowledge and learning, a somewhat different situation exists when it comes to the fertilization ordinance. Here, several districts have actively engaged in cooperation and initiated a working group to close regulative gaps considered inadequately

addressed by the ministry: *“Currently, we have instituted a panel on clerk level, not on the head of department level. Ten districts participate in that. This is a sort of loose working group on the subject of fertilization. This issue has really boiled up in the past 2 to 3 years and we have not felt to have been provided adequate guidance by the ministry. So, they are currently working on a position paper to send to the ministry, as the ministry does not have the resources to process everything that is coming their way at the moment”* (IN3). However, according to the head of A1, this was a special case and not general policy: *“To answer your question: in consequence of a more or less systematic cross-district cooperation, a first version has been drafted in Potsdam and then by chance this draft passed by the districts again, which normally isn’t the case.”* (IN1). She agreed with the head of A3, however, that general district participation on such decision processes, while bringing more workload, could be beneficial and therefore would be desirable (IN1).

4.6.5 Institutional Intermediation

In the institutional realm, as it was the case for knowledge, the interviewees described their intermediary role between the institutional landscape and the farmers. On the one hand, they have to communicate and explain regulative particularities and decisions to the farmers (IN1, IN5). In this regard, the head of A2 perceived a certain degree of misunderstanding between those two worlds: *“You see, the ministry used to employ a lot of people that had an agricultural background. Now, there are many people that have never practically encountered agriculture in their professional career. So, many decisions in Potsdam – and the same goes for Berlin, for the federal ministry for agriculture – are principally well intended but have not been scrutinized with regard to their practical applicability. There is no one ensuring that these things can actually be implemented. The closer you are to the object of regulation the better you understand the details. But if you don’t have these people in the higher hierarchies anymore, then you have to at least have them regularly interact with the people that still have that understanding. And well, that would be the districts.”* (IN1) She also expressed her regret that this regular interaction, which used to be common practice, does not take place anymore, something she attributes to the ministry’s unwillingness to engage in such technical discussion and exchange (IN1). The representative of A4 likewise remarked, that they get feedback in this sense from the farmers themselves: *“they also say that they notice that we still have a direct relation to the practical problems*

of the farmers and understand what they are talking about” (IN5). On the other hand, the department officials may also facilitate communication between agricultural entrepreneurs and the ministry in the other direction: *“So, the managing director gives me a call and asks me to advocate for him at the ministry. (...). That is principally a role of moderation” (IN1).*

4.7 Summary

To conclude this chapter, I want to briefly summarize the findings.

It was found, that knowledge of agroforestry and its recent developments in Brandenburg was unevenly present among interviewees. Generally, those departments who had previously dealt with practical enquiries by farmers in their district, were better informed regarding the concept of agroforestry and its current legal framework. While this bottom-up pathway of learning is apparently important, other sources for information about agroforestry existed, such as external events and general media.

Regarding innovation more generally, regulative novelties and unusual applications are usually contextualized and clarified in a top-down fashion by the state ministry and its corresponding state agency as the superior hierarchical level, either in regularly held meetings, newsletters or in the form of bilateral communication. Exchange with other districts and, rarely, other states may be an additional source of information, while especially the latter seems to relate mostly to property sales and ownership information. Lastly, occasional exchange with professionals from the agricultural sector, such as consultants or industry representatives as well as following specialized press media provide yet another source for information.

As regards the interviewee’s role in other actor’s learning processes, a variety of points of influence could be identified. Regulative changes are communicated frequently in annual information events and sometimes additionally via email or the website. These events are also used to communicate other topics of interest. Furthermore, agencies seem to be able, with strongly varying degree however, to influence the different offers of education and training in their districts. This seemed to depend on the personal involvement of the interviewee and also whether there still existed training facilities in the district. Agricultural extension and consultancy seem to be provided by agencies to a very small degree and only

informally, as these services are privatized in Brandenburg. On the other hand, a more frequent role as knowledge intermediaries was reported. Lastly, a potential influence as informants to local politics was also described.

Institutional barriers were referred to in varying degrees. While those agency representatives with practical exposure to agroforestry mentioned existing difficulties, such as bureaucratic obstacles, other interviewees focused more on unfavorable land ownership and lease conditions coupled with a general unwillingness by landowners to allow trees on agricultural land.

Most interviewees perceived their own role in the possible change of such institutional barriers as highly limited. Most of the legal framework regarding direct payments is perceived to be decided upon higher in the hierarchy, beyond even the state or national level. On the other hand, examples were given, where land use codes were also influenced by the district level agency. In the case of agroforestry, through cooperation with a private actor group, one department contributed to the development of a formal definition of agroforestry, which might potentially influence and change the legal framework in the future. The Kulturlandschaftsprogramm as the second pillar of the CAP in Brandenburg, albeit much closer to the regional decision-making structures, is equally perceived as out of reach by the interviewees. Somewhat more pronounced might be a potential role as bridging the gap between the institutional and the practical world, as local administrative employees seem to possess a more integrated perspective of both than higher hierarchical levels.

5 Discussion

This chapter aims at providing a comprehensive answer to the overall research question spelled out in chapter 1. For this purpose, the findings of the interviews reported in chapter 4 are analyzed through the lens of the conceptual framework developed in chapter 2. The chapter will close with a reflection on shortcomings and limitations of the methodological approach as described in chapter 3.

5.1 Addressing the Research Subquestions

This thesis started by raising the question of **how employees of the local agricultural administration influence the development of innovation such as agroforestry**. To answer that question, several subquestions were formulated:

A Knowledge and learning

- 1) What do employees of local agricultural departments know about agroforestry and agroforestry-related current developments?
- 2) Where and how do they obtain their knowledge regarding agroforestry specifically and innovation in agriculture more generally?
- 3) How do they influence processes of knowledge dissemination and learning of other actors?

B Institutions and their Change

- 4) How do employees of local agricultural departments engage in processes of institutional change, related to the emergence of agroforestry and more generally?
- 5) What factors enable and restrain them in their ability to perform these functions?

In the following, these questions will be answered to the extent possible.

5.1.1 Subquestion 1 – Knowledge about Agroforestry and Related Current Developments

Building on the typology of knowledge introduced in chapter 2.3.1, several types of knowledge may be distinguished in the context of this study.

The first type is related to the scientific side of agroforestry and can be called *basic AF know-what*. This entails the concept of agroforestry itself, its definitions and its varied forms as depicted in scientific literature or manuals. As the interview data has shown, the interviewed employees of local administrations have varying degrees of *basic AF know-what*. The availability and accuracy of this knowledge depends on the extent to which they have come into contact with farmers wanting to implement or already implementing AFS.

A second type of knowledge could be labeled *practical AF know-how*. This relates to the practical and often tacit knowledge required to successfully construct and manage AFS on farmland. *Practical AF know-how*, albeit highly important for farmers wanting to implement agroforestry, is largely irrelevant for the interviewees as they are not involved in any consultancy provision but primarily are enactors of the administrative guidelines. Accordingly, *practical AF know-how* has not been much discussed during the interviews.

The next two types of knowledge describe the legal and administrative aspects of implementing AFS. Firstly, *regulative AF know-what* would relate to the regulations and directives constituting the external subsidy framework for farming in Brandenburg and would encompass a fixed and codified definition and clear guidelines as to what forms of AF are eligible for agricultural support. As elaborated in section 2.1.2, agroforestry has not yet been formally defined as part of the subsidy regulations in Germany and Brandenburg. Consequently, this sort of knowledge cannot yet exist within the departments but follows from theoretical deduction. Should agroforestry in the future become formally instituted in the framework, however, it is to be expected, that departments will soon possess this type of knowledge (see also subquestion 2). Secondly, *regulative AF know-how* might describe knowledge related to how agroforestry can be legally implemented. Applying successfully for agricultural aid requires correct interpretation of the guidelines and the regulatory framework, and accordingly *regulative AF know-how*. This knowledge, albeit strongly related to the codified and factual regulative know-what is based on experience and also tacit

to some degree and generally lies at the very heart of the interviewees' expertise. In the specific case of AF, this *regulative know-how* is especially intricate, as AF is not yet formally defined and thus cannot not be easily applied for. Instead, a variety of different regulation guidelines have to be combined and accounted for and only very specific forms of AF are possible (BÖHM ET AL. 2017b). *Regulative AF know-how* again was not equally present with all interviewees and seemed likewise to be directly dependent on previous practical attempts of implementation by farmers in the respective district of the interviewee.

Finally, a last field of knowledge relates to current developments around AF as an emerging technological innovation system. This includes recent developments, such as the emergence of a new actor network (DeFAF) or attempts to change the institutional framework (AFS as an AECM) and can be called *AFIS-specific know-who and know-what*. Again, those departments with practical experience have also had more insights into current developments and built relationships with entrepreneurial actors and accordingly possessed more *AFIS-specific know-who and know-what*.

To summarize, several types of knowledge around agroforestry could be distinguished. Of these, *basic AF know-what*, *regulative AF know-how* and *AFIS-related know-what and know-who* can be considered relevant to the employees of local agricultural departments at this point of time. *Regulative AF know-what* may become more important in the future. All these forms of knowledge seem to be more pronounced in those departments, who previously have had to deal with respective applications by farmers.

5.1.2 Subquestion 2 – How Employees Learn about Agricultural Innovation

As apparent from the previous section, the most important way for the agricultural departments of gaining knowledge about innovation such as agroforestry has thus far been the exchange with farmers. Individual agricultural entrepreneurs have approached the departments with ideas that do not fit the current subsidy regime. By having engaged in a process of discussion, the agencies learned about the new system from the farmer, resulting in processes of negotiation of meaning and updated cognitive perspectives in the agricultural departments. Furthermore, by reviewing possibilities of implementation jointly with the farmer, they collaboratively learned about the current institutional framework and thus acquired *basic AF know-what* and *regulative AF know-how* (DILLENBOURG 1999). This sort

of unstructured bottom-up information was also reported for learning about innovation in general, as well as for AFIS-related developments. External actors approaching the departments, thus act as a learning catalysator (KLIMECKI ET AL. 1999) by forcing employees to step outside their normal routines thus inducing an organizational learning process.

To be considered truly organizational, learning should result in new theories-in-use embedded in organizational routines (ARGYRIS & SCHÖN 1978). This, however, has yet to happen in the case of AF, as the updated frames of thought are restricted to the individual departments that are engaged in immediate exchanges with farmers and therefore directly exposed to these ideas. Due to a strongly hierarchical administrative structure, they are not easily transported to other departments and do not influence the general practices of the larger administrative organization and the higher hierarchies. The compartmentalized perspectives of the departments undermine systems thinking and accordingly hinder organizational learning (SENGE 1990). Consequently, the resulting learning remains superficial and hardly amounts to deeper (double-loop) changes in the overall administrative knowledge base (ARGYRIS & SCHÖN 1978).

Regarding contents (*regulative know-what*) and interpretation (*regulative know-how*) of the subsidy framework, learning by employees of local administrations is first and foremost a top-down process. The main source of knowledge for agricultural departments is the state ministry for agriculture, which holds regular meetings to inform the departments on regulative changes. The ministry is also addressed, if departments are confronted with enquiries and applications that do not fit their current level of experience. However, some horizontal exchange has also been described, when agencies turn to other departments for help. Interestingly, a slightly more autonomous form of collaborative learning can be identified in the case of the fertilization ordinance, where departments have reportedly self-organized to develop a common understanding and address gaps in the regulative framework (VAN MIERLO & BEERS 2020).

On a more hypothetical note, it seems conceivable that the agricultural departments could play an important role in bottom-up administrative learning. Due to their closer interaction with farmers and higher degree of mutual understanding, they could act as intra-administrative intermediaries and broker new knowledge vertically to the higher

hierarchies and horizontally to other departments, closing existing cognitive gaps (KLERKX & LEEUWIS 2009). For that to happen, a change in administrative culture seems necessary, that incorporates reflexive and second-loop oriented practices and structures.

5.1.3 Subquestion 3 - How Employees Influence Learning by Other Actors

Employees of agricultural departments interact with and influence knowledge-related processes in the agricultural sector in a variety of ways. The clearest impact could be found in the area of knowledge associated with the regulative status quo (*regulative know-what and know-how*). Here, department employees actively teach farmers about bureaucratic and technical procedures related to their application for subsidies. To put it in the words of van Mierlo and Beers (2020), they act as educators in a collaborative learning setting. A constraint in this regard is the fact that they do so within the limits of the current regulatory status quo, which does not include agricultural innovations such as AF. Should AF, however, become part of either first or second pillar support under the CAP, it would fall upon them to communicate these changes to the farmers.

Beyond this formal role, the departments regularly organize informational events to convey more general knowledge about topics they deem useful to the farmer, e.g. environmental protection and fertilization. None of the interviewees reported having used these events to talk about AF yet. Again, hypothetically, should AF rise in societal and political esteem, employees of local administrations could act as disseminators (LUKKARINEN ET AL. 2018), including of more basic and practice-oriented agroforestry knowledge, thereby facilitating collaborative learning (VAN MIERLO & BEERS 2020).

This also applies to formal farmer education and training. The interviewees revealed a somewhat heterogeneous picture, but in several instances the influence of the departments on educational and training syllabi have been reported. One head of department is actively involved in farmer education due to her participation on the board of examiners and uses her existing network connections to connect demand and supply of knowledge, thus contributing to closing information gaps (KLERKX & LEEUWIS 2009). Other intermediation activities regarding education, training and advice have also been reported by the departments (KIVIMAA 2014; LUKKARINEN ET AL. 2018). This shows that while departments do not necessarily possess and convey the *practical know how* required by farmers themselves, they

still constitute a point of enquiry as they can refer to a better suited source, such as agricultural consultants.

5.1.4 Subquestion 4 – How Employees Influence Institutions

As has become apparent from the interviews, employees of local administrations are bound by the instructions they receive from superior hierarchical levels and demonstrate little ability and/or willingness to actively deviate from the current institutional framework, nor do they attempt to change it. Instead, through administering application grants, sanctions and objections, they perform tasks which from an institutional sociology perspective could be described as policing and thus a form of maintaining the institutions in place (LAWRENCE & SUDDABY 2006). That said, their power of policing is not very pronounced as substantial activities (e.g. farmer inspection) have been centralized and no longer lie within the responsibility of local agencies. Also, the interviewees clearly indicated that they hardly see room for autonomous decision making, but generally cover their decisions by asking for confirmation by the ministry. Accordingly, they don't engage in more transformative forms of creational institutional work, such as defining rules (DUYGAN ET AL. 2019; LAWRENCE & SUDDABY 2006). This is mainly due to the administrative structure which delegates clearly delineated tasks and responsibilities and also limited amount of authority to the lower administrative levels. This structure is additionally stabilized through a centralized system of audits, controls and sanctions, ensuring a reasonable amount of respect for the rules, but also ensuring a consistent treatment across districts, states and regions. Accordingly, the interviewees perceive their own influence on this framework as very low. The fact that previous attempts at informing the higher hierarchical levels have remained unanswered certainly contributed to this perception. If they do have an impact on regulation, such as the last change to KULAP (cf. sub-section 4.6.2), it does relate to issues regarding interpretation and implementation of the rules, not to more substantial aspects of the program, which again should be considered a form of maintenance of existing institutions, rather than creation (LAWRENCE & SUDDABY 2006). The only more significant contribution to regulatory change has been reported in the case of the fertilization ordinance. Here the interviewees reported a higher degree of autonomy and, consequently, also engaged in cross-district collaboration towards addressing regulative gaps, which can be seen as a defining practice (LAWRENCE & SUDDABY 2006).

Regarding other formal and informal institutions, such as farmer perception or land property distribution, none of the interviewees indicated any possibilities of influence. However, they do seem to fulfil an intermediating role between the institutional logics of respectively the government and the market, insofar as they communicate rules and their interpretation to market actors. This happens exclusively in a top down fashion: they can advise the farmers, but not initiate or facilitate activities themselves. Consequently, the margin of maneuver to influence formal or informal institutions is generally low to non-existent.

To sum up, as the lowest level of the administrative landscape, agricultural departments perceive their own agency, i.e. the ability to influence the institutional framework, as highly restricted. Their main activities consist of maintaining and enacting institutions decided upon elsewhere, which nonetheless constitutes a form of institutional work (LAWRENCE ET AL. 2009a).

5.1.5 Subquestion 5 –Factors Determining Employee’s Degree of Agency

Agency, defined as the ability to perform institutional work, has been theorized to depend on the availability of resources, networks and discursive influence (cf. chapter 2.3.2). While, seen from an external point of view, agricultural departments in local administrations seem to exercise control over substantial amounts of financial resources in form of agricultural subsidies, they lack the politico-judicial resources to make or change rules regulating their distribution (DUYGAN ET AL. 2019). The politico-judicial authority seems to also vary somewhat between departments, depending on the local administrative structure, i.e. whether they constitute their own agricultural agency (“Landwirtschaftsamt”) or a specialized division (“Fachdienst”). The departments’ human capital resources seem to be tailored specifically to performing the outlined bureaucratic task, and thus the maintenance of the status quo. They also seem to be confronted with high workloads. Most department representatives indicated at some time during the interview that their capacities are rather low, compared to the amount of work they have to do. This also influences their ability to participate in external events.

Accordingly, the involvement of district employees in external networks seems to be rather low. The interactions reported by the interviewees occurred mainly on informational events focused on local issues (e.g. district internal informational events). The possibility to network

with other districts also seems low, as several departments do not have the autonomy to visit neighboring districts or are restricted by hierarchical barriers. While the regular meetings with the higher hierarchical levels give that opportunity, they are rare and then mainly used for top down informing on regulative changes and less on bottom up institutional change. The only instance, where some sort of relational network power could be identified was in the area of fertilization, where the lower hierarchies cooperated to fill regulatory gaps, unattended by the ministry. Indirectly, one department might in the end demonstrate a higher degree of relational influence. Through cooperation with the AUFWERTEN network, a change of the KULAP might in the future be achieved. This, however, is an individual case and might be attributed more to the activities of the AUFWERTEN group and a chance of geographical location.

Discursive influence has also not explicitly been detected. While the department representatives engage in regular discussion with farmers, except for one representative, who had a larger network from his previous profession, this seems rather rare.

In summary, the agency depicted by the representatives of agricultural departments varies slightly, depending on formal structure and individual background. In general, it appears to be very low due to a lack of resources, relational networks and discursive influence and restricted to the specific institutional work of maintaining (DUYGAN ET AL. 2019).

5.2 Research Question Synthesis: Evaluating the Results from a Technological Innovation Systems Perspective

This section now discusses the above findings through a TIS lens. First, basic interaction between employees of local administrations and the structural elements identified will be depicted (sub-section 5.2.1). Then, their contribution to the functions of knowledge creation and diffusion (sub-section 5.2.2) and legitimation (sub-section 5.2.3) will be discussed.

5.2.1 Interaction between Agricultural Departments and Structural Elements of the Emerging Agroforestry Innovation System

The AFIS is a newly emerging technological innovation system³⁹ in Germany, which has only recently begun to draw in new actors and develop internal institutions, such as the lobby and information network DeFAF and attempts to change the KULAP (MARKARD & TRUFFER 2008; SUURS 2009). The interviews implicate generally little interaction between the agricultural departments in local administrations and the AFIS actors and networks. At least one department (A2), however, due to its geographic location and local farmer activity, is more actively involved with system actors.

The main institutions touched upon during the interviews have been national and regional equivalents of the regulations and directives constituting the first and second pillar of the CAP framework as they heavily guide and determine the room for maneuver of local administrations. Simultaneously they strongly affect the potential development of the AFIS, as they do not yet account for AF in all its diversity. The institutional framework determines current possibilities of AF development but has developed and is maintained independent of AFIS activity, accordingly it should be regarded as an external institutions from an AFIS perspective (MARKARD & TRUFFER 2008). This similarly applies to other formal institutions as parcel property conditions and informal institutions, such as the varying perceptions of farmers and landowners.

As the tasks and responsibilities of agriculture departments in local administrations build on the regulative framework, they must be primarily viewed as being part of the dominant agricultural regime, formally instructed to enact and maintain the institutional status quo (GEELS 2011). Nonetheless, by interacting with different actors and parts of the system and its context, they can influence internal functions and overall development of the IS and might even more strongly do so in the future, should the AFIS grow more mature (MARKARD 2020).

³⁹ Markard would call it a “nascent TIS” following his TIS life cycle framework (2020).

5.2.2 Knowledge Creation and Diffusion

At the time of writing, the instances of knowledge dissemination identified by the employees of local administrations interviewed have little to do with AF, suggesting that the latter have limited influence on the function of knowledge creation and diffusion within the agroforestry innovation system. The interviewees mainly deal with the regulative knowledge needed for their everyday work. The emerging AFIS is at a stage where the required knowledge revolves around basic farming practices and processes, as opposed to subsidy application procedures. This *practical AF know-how*, however, is not a part of interviewees' expertise, who are not allowed to provide official extension services and are bound to restrict their counseling to bureaucratic matters. As a result, their degree of knowledge varies strongly and is directly dependent on whether they have been approached by local agricultural entrepreneurs and exposed to their ideas. This applies to all types of knowledge distinguished in this research: basic AF know-what, regulative AF know-how and AFIS-related know-what and know who.

As I would argue however, the degree of influence could change in the future, should AF become a formal part of the regulatory landscape. Then, employees of local administrations could be expected to use their existent channels of communication, such as informational events, websites and press to actively inform farmers about changes in regulations and would thus contribute to an increased regulatory knowledge base. If AFS would become a topic of higher demand, this could possibly extend also to basic AF know-what. Agricultural departments in local administrations are connected to the wider agricultural sector through several channels of knowledge exchange, such as their influence on education and training and their role as knowledge intermediators. It seems highly plausible, that due to the department's involvement with different actors and their network function, they would then also contribute to knowledge dissemination.⁴⁰

⁴⁰ It is debatable whether agroforestry could still be considered an innovation once institutionalized. Building on Roger's criterion of "subjective newness" (Quelle), I would argue that as long a substantial number of farmers still require practical and regulatory knowledge about AF, the latter can be considered an innovation. This seems to be in line also with Markards thinking, who explicitly accounts for mature and also declining technologies and innovation (2020).

Apart from these more hypothetical reflections on future developments, one reported instance of knowledge provision demonstrates a direct influence of an agricultural department on the AFIS. By providing their expertise (regulative know-what and know-how) on the regulatory status quo and on requirements regarding legal definitions and inspection procedures to entrepreneurial actors of the AFIS, the interviewees contributed to their deeper understanding of administrative hurdles and other barriers facing the development of AF. This knowledge has then been used by entrepreneurs to inform another innovation system function: legitimation. While it remains to be seen whether their attempt of incorporating AF into the KULAP of Brandenburg will be successful, it seems reasonable to assume that the knowledge provided by the agricultural departments has at least increased the chances of success.

5.2.3 Legitimation through Institutional Work

The interaction described above, as I would argue, can be viewed as a form of institutional work (LAWRENCE ET AL. 2009a). With the AECM project, entrepreneurial actors engage in several forms of creation of institutions, such as advocacy, changing normative assumptions and mimicry (LAWRENCE & SUDDABY 2006). While the department in question has not reported to actively engage in advocating or changing normative assumptions, through collaborating on defining agroforestry based on their regulative expertise they have at least contributed to “defining” (see chapter 2.3.2).

Apart from informing and contributing to legitimation activities by other actors, employees of local administrations themselves mainly engage in processes of institutional work in the form of maintenance (LAWRENCE & SUDDABY 2006). By policing, they enforce the external institutional framework and help uphold the status quo. For more transformative forms of institutional work, they lack respective agency in form of resources, network power and influence on discourses. An exception proves to be the area of fertilization ordinance, where departments themselves engage in defining activities. This, however, is generally not the case for other formal institutions. Regarding informal institutions, such as farmer or landlord perceptions, the interviewees did not indicate much influence. Consequently, their ability to engage in legitimation processes for innovation such as agroforestry is rather low.

5.3 Critical Reflection

I will now conclude the discussion with a critical appraisal of the generated results and the employed theoretical and methodological approach.

5.3.1 Research Focus and Theoretical Approach

The research object has proven to be simultaneously interwoven with various realms of scientific enquiry. While administrative employees are part of a bureaucratic and political structure of society, they are also subject to and engage with specific learning processes. Simultaneously, understanding of development and diffusion of innovation required a sophisticated, systemic approach.

Accordingly, a major challenge has been to determine an adequate theoretical framework for this research. The TIS approach is usually employed to address macro- or meso-level research problems and develop full-system understanding. As such, it has been useful in providing the bigger picture of this research. Ideally, it would have been very helpful to conduct a full-fledged TIS analysis of the agroforestry innovation system in Brandenburg and Germany as a basis for this work.

However, the TIS approach offers only limited analytical guidance in researching micro-level actions and interactions. The researcher has attempted to fill these gaps with complementary concepts such as intermediation, institutional work and, agency. This has resulted in a very extensive theoretical framework, which, compared to the empirical scope of a master thesis might be a bit over-complex. Simultaneously, certain aspects, such as organizational learning in the context of public administration could have been even further theorized and would have resulted in a better understanding of the issues at hand. Some of the employed concepts furthermore require rigorous methodological underpinning, e.g. discourse analysis or social network analysis in the case of agency, to more precisely capture them empirically, (DUYGAN ET AL. 2019). Thus, the uncovered results accordingly might provide only a coarse heuristic starting point for further research.

Based on the experience gathered during this research, it seems adequate to propose an interdisciplinary approach for future research on this topic. Such an approach could include aspects of public administration, organizational learning and knowledge management

(KLIMECKI ET AL. 1999; PROBST ET AL. 2006), other forms of transformational learning (VAN MIERLO & BEERS 2020) and political sciences such as policy learning (KÖHLER ET AL. 2019) to provide a richer theoretical base and sharper lens.

Lastly, it could be fruitful to slightly widen the focus and include other actors from the administrative realm. Due to the focus on the lowest level of administration, it has remained unclear for example, how learning on the district level, informs learning on the higher administrative levels and, ultimately, also policy learning. A finer grained research approach based on organizational learning or knowledge management models (KLIMECKI ET AL. 1999; PROBST ET AL. 2006) and including actors from state and federal ministry, could contribute important insights in this regard.

5.3.2 Methodological Limitations

Given the limited previous knowledge available on agricultural administration, a qualitative and explorative approach was employed. Due to the interview approach, they showed a substantial variation in interview topics, depending on the particular situation in the agency and experiences of the interviewee. Given the limitations dictated by a master thesis' scope, it seems certain, that the point of saturation has not been reached (PRZYBORSKI & WOHLRAB-SAHR 2014). It seems highly likely, that some important aspects remain unidentified. Unfortunately, I was not able to conduct more interviews, also due to a low response rate. This might also be attributed to the timing of the enquiry. The interview requests were sent in late September and early October, and thus shortly before the beginning of the application period for KULAP subsidies. A different timing thus might have provided more positive replies. Then again, judging from interviewee responses regarding personnel and capacities, time constraints in the lower agencies seem to be a constant issue.

Another limitation has been the mode of communication. All interviews have been conducted via telephone. According to Mayring (2016) a researcher employing qualitative research should aim for highest possible proximity to the object of research. Accordingly, potentially interesting additional information, such as field notes, could not be collected and analyzed.

6 Conclusion

Modern forms of agroforestry are an agro-ecological innovation featuring specific ecological and economical characteristics that make it a viable and desirable alternative to traditional agricultural practices in the face of pressing issues such as climate change, soil degradation and resource efficiency. This notwithstanding, several barriers have obstructed their widespread implementation in Germany so far, amongst which the need for an increase and dissemination of knowledge and an alignment with the current institutional framework stand out. The aim of this research has been to investigate how employees of agricultural departments in local administrations in Brandenburg influence these processes.

To provide a satisfactory answer to this research question, the first step that was taken was to devise a theoretical framework for the analysis, building on a Technological Innovation System (TIS) approach. The latter conceptualizes innovation as originating from complex systemic interactions between a number of structural elements and key functions, amongst which are knowledge creation, diffusion, and legitimation (BERGEK ET AL. 2008a). To better account for micro-level processes, additional concepts, such as various forms of learning, institutional work, and intermediation have been integrated.

Following a qualitative research design and exploratory methodological approach, 5 interviews with employees in 4 district-level agricultural departments in Brandenburg have been conducted. The interviewees demonstrated substantial differences in the exposure they have had to agroforestry. Generally, their knowledge has been found to revolve around aspects of regulation and interpretation of the subsidy guidelines, rather than agroforestry as a concept and its practical implementation. Furthermore, they seem to strongly depend on being approached by entrepreneurial farmers experimenting with agroforestry to acquire knowledge about this innovative concept.

Although, employees of local administrations exchange knowledge with the wider agricultural sector in a variety of ways, their role in the advancement of agroforestry seems to have been very limited so far. It is conceivable, however, that their role will become more important in later stages of agroforestry development, due to their regular informational activities, their influence on farmer training and education, as well as their intermediary role

in connecting demand and supply of knowledge. Among the five officials interviewed, one demonstrated a higher degree of influence on the development of agroforestry, insofar as she has actively engaged in sharing her knowledge about existing regulations and procedures with agroforestry entrepreneurs. By so doing, she informed the development of a project which aims at changing the institutional landscape as to the inclusion of agroforestry as an environmental and climate measure (AECM) in the second pillar program (KULAP) of Brandenburg. While the general influence of local administrations on knowledge creation and diffusion of agroforestry is low at this point in time, there are good reasons to expect this influence to increase, should agroforestry generally increase in popularity. In individual cases, more significant influence on knowledge diffusion is also possible, as the AECM project demonstrates.

Similar conclusions can be drawn for the influence of employees of local administrations on the institutional framework. In the agricultural sector, due to its high dependence on financial subsidies, the subsidy guidelines determine to a high degree what farmers will or will not consider for cultivation. Accordingly, proponents of innovative practices not currently represented in this framework must aim for respective changes, which in IS terminology is called legitimation. As the analysis of interview data has shown, employees of local administrations mainly enact and reproduce the formal institutional framework in existence through processes of institutional work such as policing. In fact, their ability to foster institutional work aiming at disrupting given institutions or creating new ones is restricted by their limited agency, resulting from an administrative structure delegating little autonomy and resources to the agricultural departments at the district level. While they demonstrated a greater degree of autonomy in some instances (i.e. fertilization), legitimization of innovative practices such as agroforestry generally appears to be beyond their room of maneuver.

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Appendix

Appendix 1: Author's declaration

I hereby declare that the present thesis has not been submitted as a part of any other examination procedure and has been independently written.

All passages, including those from the internet, which were used directly or in modified form, especially those sources using text, graphs, charts or pictures, are indicated as such.

I realize that an infringement of these principles which would amount to either an attempt of deception or deceit will lead to the institution of proceedings against myself.

9.9.2020

Berlin, date

M. Seyffert

Mitja Seyffert

Appendix 2: Interview Guidelines

Fragen für das Interview (German Original)

A) Person, Funktion, Interaktion mit Landwirten

- 1) Bei welcher Behörde/Abteilung arbeiten Sie? Seit wann? Welche Aufgaben/Funktion haben Sie? / Was ist Ihr persönlicher Zuständigkeitsbereich? Wie viele Personen sind bei Ihnen beschäftigt?
- 2) Welches sind die Hauptaufgaben des Landwirtschaftsamtes aus Ihrer Sicht? Welche Rolle spielen - Ihrer Auffassung nach - Behörden für Landwirte?
- 3) Bitte beschreiben Sie Ihre gewöhnlichen (alltäglichen) und ungewöhnlichen (besonderen) Interaktionen mit Landwirten

B) Umgang mit Innovationen, Bildung und Wissen - generell

- 4) Wie gehen Sie mit ungewöhnlichen Anfragen um?
- 5) Wie informieren Sie sich zu Neuerungen/Innovationen in der Landwirtschaft?
- 6) Wie sehen Sie Ihre eigene Rolle bei der Implementierung von neuen Praktiken in Ihrem Landkreis? Wo sehen Sie die Zuständigkeiten und Verantwortung für den Umgang mit Innovation?
- 7) Welche Unterstützung erhalten Sie dabei durch Landes-/-Bundesbehörden?
- 8) Inwiefern stehen Sie diesbezüglich mit Landwirten/Beratern/KBVs/LBV im Austausch?
- 9) Inwiefern stehen Sie im Austausch mit anderen Behörden (andere Landkreise, Bundesländer) oder anderen Fachbereichen (*Forstamt/ Umweltamt -> Klimaschutzkonzept*)?
- 10) Inwiefern stehen Sie Landwirten beratend zur Verfügung (*neben CC*)?
- 11) Inwiefern haben Sie einen Einfluss auf die Aus-/ Weiterbildung von Landwirten (-> *Landwirtschaftsschule*)?
- 12) Inwiefern kooperieren Sie mit den Ministerien/anderen LK/ den BV beim Thema Bildung?

C) Bezug zu Agroforstwirtschaft

- 13) Was wissen Sie über Agroforstwirtschaftliche Systeme (AFS)?
- 14) Inwiefern hatten Sie bereits praktischen Bezug zu AFS?
- 15) Wenn ja, wie sind Sie mit rechtlichen Hürden/Problemen umgegangen?
- 16) Welche Handlungsspielräume sehen Sie bei diesem Thema für sich?
- 17) Welche Schwierigkeiten/Probleme sehen Sie bei diesem Thema?

Interview Questions – English translation

A) Role, Responsibility and Interaction with Farmers

- 1) Which department do you work for and how long? What are your personal responsibilities? How many employees does your department/agency have?
- 2) What are the main tasks and responsibilities of an agricultural agency? What role does it play for farmers?
- 3) Please describe your regular and frequent as well as irregular and rare interactions and encounters with farmers.

B) Innovation, Learning and Education – in general

- 4) How do you treat irregular (innovative) applications?
- 5) How do you keep informed about agricultural innovation?
- 6) How do you describe your role with regard to implementing agricultural innovation in your district? Who do you think is responsible for managing agricultural innovation?
- 7) How are you supported by state and federal agencies and ministries?
- 8) Please describe your exchange regarding innovation with farmers, farmer associations and agricultural consultants?
- 9) To which degree do you exchange knowledge and information with other districts or states and other departments/divisions?
- 10) To what extent do you offer consultancy services to farmers?
- 11) What kind of influence do you have on farmer education and training?
- 12) How do you cooperate with other districts, agencies, the ministry regarding education?

C) Agroforestry

- 13) What do you know about agroforestry systems (AFS)?
- 14) What practical encounters have you had with AFS?
- 15) How have you dealt with legal barriers?
- 16) What room for maneuver do you have with regard to the legal barriers?
- 17) What general difficulties and challenges do you perceive with regard to AFS?



Appendix 3: Contact letter

Anfrage zur Partizipation an meiner Forschungsarbeit

Masterarbeit: Die Rolle der Verwaltung in landwirtschaftlichen Innovationsprozessen –
eine explorative Untersuchung am Beispiel Agroforstwirtschaft

Sehr geehrte Damen und Herren,

ich möchte Sie freundlich bitten, in Form eines Telefoninterviews (etwa 30 - 45 min) an meiner Forschungsarbeit teilzunehmen.

Ich studiere „Integriertes Management natürlicher Ressourcen“ an der landwirtschaftlichen Fakultät der Humboldt Universität Berlin und beschäftige mich in meiner Abschlussarbeit mit Innovationsprozessen in der Landwirtschaft. Genauer geht es darum, inwiefern innovative (nachhaltigere) Formen der Landwirtschaft in Deutschland Verbreitung finden und welche Rolle die landwirtschaftliche Verwaltung in diesem Prozess spielt bzw. spielen kann. Ich fokussiere mich bei meiner Untersuchung auf das Bundesland Brandenburg und beziehe mich konkret auf das Beispiel Agroforstwirtschaft.

Das Interview findet als offenes Gespräch statt und orientiert sich an dem angehängten Leitfaden. Die Inhalte des Gesprächs werden von mir verschriftlicht und im Folgenden anonymisiert und pseudonymisiert ausgewertet. Die Ergebnisse dienen ausschließlich der Erstellung meiner Masterarbeit. Eine entsprechende Datenschutzerklärung und -Vereinbarung würde ich Ihnen gesondert senden.

Ich würde mich sehr freuen, wenn Sie mir weiterhelfen und sich mit mir zwecks Terminabstimmung in Verbindung setzen würden, beziehungsweise mich in Ihrem Haus an die entsprechende Ansprechperson verweisen könnten.

Mit freundlichen Grüßen
Mitja Seyffert



Appendix 4: Participant consent form

Interview-Vereinbarung

Einwilligungserklärung zur Erhebung und Verarbeitung personenbezogener Interviewdaten

Masterarbeit: Die Rolle der Verwaltung in landwirtschaftlichen Innovationsprozessen –
eine explorative Untersuchung am Beispiel Agroforstwirtschaft

Sehr geehrte/r (...),

vielen Dank für Ihre Teilnahme an meiner Befragung im Rahmen meiner Masterarbeit.

Die Daten des Interviews mit Ihnen sind wie folgt:

- Termin: Tag, Datum, Zeit (z.B. 10:00 bis 14:00)

Zu Zwecken der besseren Auswertbarkeit erfolgt eine Aufzeichnung des Gesprächs, womit Sie sich durch Ihre Unterschrift einverstanden erklären. Ihr Einverständnis können Sie jederzeit widerrufen.

Für die wissenschaftliche Auswertung werden die Interviews verschriftlicht (transkribiert), anonymisiert und pseudonomisiert.

Sämtliche Inhalte unseres Gesprächs werden ausschließlich zu Zwecken meiner Forschung im Rahmen der angegebenen Masterarbeit verwendet. Es werden keine persönlichen oder organisationsspezifischen Daten weitergegeben oder veröffentlicht.

Für weitere Informationen stehen Ihnen meine Betreuerin, Frau Dr. Bettina König (koenigbe@hu-berlin.de) und ich (seyfferm@hu-berlin.de; 0151/50535260) gern zur Verfügung.

Name Interviewer

Name Interviewter

Appendix 5: Code System

1 Background Information agency and district	0
1.1 agricultural structure	2
1.2 responsibilities and tasks	16
1.2.1 regional marketing	2
1.2.2 fertilizing ordinance	9
1.3 influence of professional background	1
1.4 responsibility level	11
1.5 Size of department	5
1.6 Self Perception with regard to innovation	1
2 Interaction and Networks	0
2.1 interaction with the ministry (LELF / MLUL)	17
2.2 Interaction with other states	5
2.3 Interaction with other districts	7
2.4 interaction with other departments	7
2.5 Interaction with local politics	1
2.6 interaction with farmers	3
2.6.1 main topics of exchange	2
2.6.2 Frequency and Intervals	3
2.7 interaction with other organizations (BV, DeFaf, LAB)	6
3 Knowledge and learning in the agency / learning	0
3.1 What agencies know about AF	0
3.1.1 Knowledge about AFS	11
3.1.2 Knowledge about AF-development (AUKM, DeFaf)	5
3.2 How agencies learn	0
3.2.1 limits of learning	3
3.2.2 learning in general	9
3.2.2.1 slow processes	3
3.2.3 learning about AFS	3

4 How departments influence external learning / knowledge diffusion	0
4.1 information events (own)	7
4.2 influence on training and education	10
4.3 provision of extension	8
4.4 intermediary function (SL)	9
4.5 other communication (press, digital, postal)	7
5 Institutions / processes of legitimation	0
5.1 AF-relevant institutions	0
5.1.1 external	4
5.1.1.1 regulative framework - subsidy guidelines	7
5.1.1.2 environmental protection issues	1
5.1.1.3 positive perception of farmers	1
5.1.1.4 lease conditions and landlord resistance	6
5.1.1.5 GDR - specific skepticism	1
5.1.2 internal	5
5.2 degree of influence / Institutional Work	0
5.2.1 Change of regulative framework	0
5.2.1.1 direct Support guidelines (Pillar I)	4
5.2.1.1.1 Change of List of Land use codes	6
5.2.1.1.1.1 AFS	1
5.2.1.1.1.2 other examples of change of codes	0
5.2.1.1.1.2.1 energy crops	1
5.2.1.1.1.2.2 hunting lanes in corn	1
5.2.1.1.1.2.3 line seed and dye plants	1
5.2.1.2 Change of KULAP (Pillar II)	4
5.2.1.3 change of parcel ownership	0
5.2.1.3.1 voluntary parcel exchange	1
5.2.1.3.2 land consolidation processes	3
5.2.1.4 other	0

5.2.1.4.1 Insect breeding	1
5.2.1.4.2 changes to fertilizing ordinance	2
5.2.2 Administrative Cooperation	0
5.2.2.1 status quo	4
5.2.2.2 improvement?	2
5.2.3 intermediary function (IW)	9
5.2.4 factors of influence / Agency	18
5.2.4.1 department audit	2
6 Barriers/Failures/Problems	0
6.1 specific conditions due to elections	3
6.2 Interaction failure	0
6.2.1 vertical fragmentation	1
6.3 Capacities / Capabilities	9
6.3.1 Arbeitsbelastung durch Förderanträge	2
7 Miscellaneous	0
7.1 outlook	2
7.2 other innovation	4
7.3 farmer inspections	6
7.3.1 technical problems related to inspections	1
7.4 Environmental Protection vs Agricultural Regulation	1
7.5 Understanding of "Sustainability"	5
7.6 technische Abwicklung Antragstellung	1