

SUSADICA - Structured doctoral programme on Sustainable Agricultural Development in Central Asia: Overview of research areas

Note: This overview outlines a study plan for the PhD research to be conducted within the structured doctoral programme. Depending on selected candidates and their individual interests, modifications are possible and in fact likely.

Research area 1: Farm restructuring & labour relations

Supervisors: Martin Petrick, Ibragim Ganiev

Farm restructuring in response to rising real wages

For half a century, it has been a widely accepted notion among scholars of agricultural development that small farms generate higher yields per arable land than large farms. While small farmers may not have access to credit and land titles, they may use labour more efficiently, suggesting that redistributive land reforms contribute to both equity and efficiency (Lipton 2009). However, emphasising the rapid growth of urban wages in Asia, Otsuka et al. (2016) argue that emerging factor price ratios stimulate the mechanisation of farming operations and the outflow of farm workers, so that large farms would become the more productive and, in light of food security concerns, the more desirable form of agricultural production. Whether agriculture should be organised in large or small farms also matters a lot for Central Asia. Specifically Kyrgyzstan stands out for its early and thorough land reform that started already in 1991 (Lerman and Sedik 2009). Small-scale individual farms emerged slowly also in Kazakhstan, Tajikistan, and Uzbekistan. However, despite strong GDP growth, the processes of structural transformation of small scale agriculture appear to have not commenced in Central Asia yet. A key objective of this study is to monitor this transformation and better understand the conditions under which it may or may not take place. Based on survey data, we analyse the effects of real wage rises and changing factor price relations on farm structures. The study engages in a comprehensive analysis of the interplay of land, labour and output markets that are hypothesised to enable or inhibit the structural transformation of agriculture and its long-term economic, social and environmental impact.

Evolution of labour contracts & individual entrepreneurship

The relation between people as the “working class” and the means of production was a cornerstone of Marxist ideology, which implied that the Soviets treated agricultural labour hardly differently than industrial workers in other sectors of the economy. This had far-reaching consequences for the wage dependence of people employed in agriculture, for the internal organisation of farms, and for the self-image of the rural population. The collapse of Soviet-style agriculture called into question the validity of this approach to labour organisation, but national independence in Central Asia had little success in creating a new class of farmers, agricultural entrepreneurs or managers, at least initially. Only slowly did new forms of entrepreneurship and capital-labour relations emerge (Djanibekov et al. 2013). This PhD study pays specific attention to the

people working in agriculture and their formal and informal relationships with each other. It will identify the past and present drivers of labour arrangements, including political imperatives, market requirements, and determinants rooting in the natural and technical environment. Based on survey data and case study work in the focus regions of the School, it analyses the challenges of agency in hierarchical labour organisation, incentive problems in labour effort and contractual implications, and the role of residual claimancy. Moreover, it explores the perception and dynamics of entrepreneurship, both formal (as independent farm managers) and informal (e.g., within hierarchic organisations).

Research area 2: Agricultural innovations & technology

Supervisors: Nodir Djanibekov, Golib Sanaev

Adopting innovations for sustainable agriculture

The recent export boom in Central Asian agriculture has underlined the importance of innovations, as commercial agriculture is technology-intensive and associated with increased use of costly inputs and equipment. At the same time, concerns for environmental sustainability in irrigated and degraded areas prone to water shortage, call for the adoption of modern irrigation equipment, crop diversification, intercropping and crop rotation. However, despite the efforts of state authorities, donors and NGOs to promote innovation adoption, there is a relative dearth of research on farmers' adoption decisions in Central Asia (see especially Hornidge et al. 2016 on qualitative studies). Many existing studies on innovations in Central Asia lack economic intuition in accounting for the concepts of farm size, land ownership and tenure system commonly assumed to be relevant (cf. Sunding and Zilberman 2001). Science-based evidence can contribute to policy discussions on options for improved farmers' economic performance and ecosystem stability. The main objective of this PhD study is thus to quantitatively investigate the factors affecting farmers' adoption decisions in irrigated areas of Central Asia. The menu of innovations includes new seed varieties, diversified crop portfolio, low-tillage practices, water-saving technologies and cotton harvesters. We aim at a comparative study across countries that captures the influences of farm-level determinants along with political, economic, social, and environmental conditions.

Technology transfer in agricultural value chains

Agricultural value chains in Central Asia have been undergoing a rapid process of development. This implies not only the introduction of new processing equipment, but also new procurement standards and types of contracts. As technology markets for farmers are often absent, the main source for accessing new technologies is farmers' integration into value chains. Along with the spread of contract farming and new procurement standards, this process can result in vertical spillovers and adoption of new technologies at farm level (Kuijpers and Swinnen 2016). Despite its importance, the relationships between value chain development and technology transfer in agriculture has been ignored not only in studies on technology adoption at farm level, but also by policymakers and donor communities. No study on Central Asia so far discusses how vertical coordination and participation in value chains stimulates farm-level technology investments. By using farm-level data, the study will investigate how contract farming affects technology adoption processes. For doing so, prominent examples of fast

developing value chains, such as dairy and fruits & vegetables, and their characteristics across different macro-institutional settings of Central Asian countries will be identified.

Research area 3: Agricultural policy for sustainable development

Supervisors: Thomas Herzfeld, Shavkat Hasanov

Agricultural policy choices: sectoral support vs. public goods

Political interventions can have different aims ranging from creating local public goods (e.g. agricultural extension, professional training and education, rural infrastructure) up to the creation of rents for private benefit. Recent agricultural policy reform in Kazakhstan is a case in point (Petrick et al. 2017). A broad literature provides theoretical and empirical insights into the formation of policies from the perspective of politicians and administration. However, the extent to which policy instruments tend more toward the sectoral or the public part depends not only on politicians' preferences but also on how well politicians and administration can assess the performance of firms in order to "picking winners" (Hevia et al. 2017). Research within this PhD study aims at explaining determinants of public expenditures for local public goods across the Central Asian countries. Following the methodology suggested by Lopez and Galinato (2007) expenditures will be classified according to their public or private good character. Natural as well as socio-economic characteristics of the region and constitutional factors of the respective countries will be tested as determinants of the regional expenditure pattern.

Regional drivers of agricultural development

The agricultural sector's development within the five Central Asian countries depends on natural conditions, factor endowments as well as national agricultural as well as other economic policies. These policies range from rather liberal in some countries and areas (e.g. Kyrgyz trade policy) to state-managed in others (e.g. cotton policy in Uzbekistan). Macroeconomic, sectoral (i.e. agricultural) and regional policies could have coherent or completely contradictory effects. But sorting out such partial policy incidence for agricultural development is challenging. Using advanced econometric decomposition techniques (Fortin et al. 2011) allows to identify the direction and to quantify the relative impact of the various external conditions on agricultural development at the level of regions within the five Central Asian countries. The analysis will exploit regional-level panel data which allows differentiating between time invariant (e.g. distances to major markets) and time varying (e.g. prices, policies) variables.

Research area 4: Environmental change & agriculture

Supervisors: Daniel Müller, Farhad Ahrorov

Crop production & climate change

Expected climatic changes will likely exert overall negative effects on crop production in much of Central Asia because changing precipitation patterns, both in terms of overall quantity and annual distribution, and increasing summer temperatures will pose additional stress in this already water-scarce region (Ibatullin et al. 2009). Developing a thorough scientific basis for better understanding the impacts of climate change on agricultural production is paramount because it will allow outlining efficient and

effective measures that help to adapt to the changes. In this PhD study, we aim to contribute to such understanding by examining relationships between crop yield time series and weather patterns and by analyzing the expected impacts of future scenarios of climate change scenarios on production outcomes. To associate weather with yields, we will rely either on crop growth modeling or on regressions analysis, depending on the qualifications of the candidate. Overall, this study will contribute to the design of appropriate and spatially targeted policy measures that aim to adapt crop production to future climate conditions. Moreover, the dissertation project is expected to generate valuable insights for the region at large that will likely be marred by similar challenges associated with future climate change.

Causes of land degradation

Land degradation, mainly due to soil salinization, rangeland degradation, and soil erosion, seriously threatens agricultural production in Central Asia. However, knowledge about spatial extent, patterns, and severity of land degradation is patchy and largely stems from purposively selected case studies or coarse-scale analyses (Dubovyk et al. 2013). The proximate causes of land degradation pertain to three thematic categories (Mirzabaev et al. 2016), which are a) changes in agricultural activities, including grazing, irrigation, input applications, and biomass extractions; b) off-site influences, such as changes in water flows due to upstream water policy; and c) changes in precipitation and temperature. Unfortunately, the importance of each of these proximate causes is elusive. Moreover, these causes often intermingle and vary over time and space. This PhD study will aim to map land degradation for at least one Central Asian country using statistical analysis of medium-resolution satellite imagery. The resulting maps will then be associated with hypothesized proximate causes of land degradation using, e.g., regression analysis. The attribution of the extent of land degradation to the different categories of proximate causes is paramount for place-based planning and management, and therefore assists decision makers in developing effective and efficient measurements to mitigate land degradation.

Research area 5: Water governance

Supervisors: Insa Theesfeld, Iskandar Abdullaev

Nested and multi-level analysis of water governance

Although water governance has received considerable attention in Central Asia, recently, the primary focus has been on basin-, national- and water user association (WUA)-level reforms. The provincial and district irrigation water management departments, although delegated with important responsibilities are the missing link between national- and local-level reforms. Poor integration of this intermediate level of governance has been recently stated as being responsible for ineffective implementation of basin management plans as well as WUAs. The core idea is to study the role of information, knowledge and capacity for successful multi-level governance and decentralization procedures in the agricultural water sector. Gaps will be identified using principal-agent models, supported by e.g. administrative transaction-cost analysis in a cross-country comparison. A sub-question will be: what requirements does the existing (inherited from the socialist era) agricultural water infrastructure impose on these medium-level governance administrative bodies? The Adaptive Water Resource Management Framework (Pahl-Wostl 2009) with its focus on adaptive capacity of

society and learning, as well as the Principal-Agent Theory (e.g. Stiglitz 2008), will help to structure the research. CAREC will be instrumental in providing access to meso- and local-level water administrations within this research area.

Linking patterns of property rights in land and water

In post-socialist countries, we observe a high discrepancy between formally assigned property rights and informal rules of daily routines, which result in a legal pluralism. Such rights and claims may contradict as well as reinforce one another (Meinzen-Dick, 2014). De-facto property rights functioning on the ground could be made up of combinations of both formal secured rights and customary claims. In order for a governance change to be effective, we need to address this plurality. The PhD study will aim to analyse the changes in land- and water-related rights at the local level in order to identify barriers and opportunities for coherence in agricultural development. The study will disentangle the formal and de-facto property rights to make incongruities transparent. We also address the question what requirements the existing (inherited from the socialist period) local level agricultural water infrastructure imposes on property rights related to land and water. The Legal Pluralism Concept (Meinzen-Dick 2014) and theories of institutional change (North 1990) will provide conceptual guidance. Standardized surveys among farmers in contrasting regions will provide data on the access, withdrawal, management, exclusion and alienation right held and the perceived power of that right. Using this “measurement” of property rights, the study will investigate relations to other socio-economic characteristics and agricultural development.

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