CHINA IN AFRICA, AGRICULTURAL DEVELOPMENT ASSISTANCE AND FOOD SECURITY

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Master thesis written in fulfillment of the
Master of Arts (M.A.) in International Relations
Specializing in the field of Global Political Economy

Leiden University
July 2nd, 2019

Thesis supervision: Dr. Jonathan London

Word count: 14.290

ABSTRACT

This thesis engages with the contested social phenomenon of China in Africa. The phenomenon is a subject of intense debate especially since November 2006 when the first Forum on China-Africa Cooperation (FOCAC) Summit was held in Beijing. Controversy continues to persist especially about the motives inciting China to deepen its cooperative relations as well as with regard to the effects of Chinese investment and aid, allegedly benefitting the socio-economic development of China and Africa alike. China's activities in Africa's agricultural sector in particular are a subject of interest, as the mainland actor's activities bring to the fore perception on both Chinese expertise and know-how in agriculture and development on one hand and Chinese state businesses' self-interested and controversial practices on the other. How should we understand China's enhanced presence in Africa's agriculture? A review of the literature on the topic reveals both useful hints and gaps. By investigating the impact of China's agricultural development package on food security this thesis engages with this debate. In doing so, this thesis not only highlights the complex relationship between agricultural development and food security, a matter of urgent practical concern but also contributes to the growing literature published on Southern development partners, in particular, China. The findings of this thesis indicate that China's agricultural development package holds significant potential to develop Africa's agriculture as well as to enhance food security. In theory and on first sight, China's enhanced presence in Africa's agriculture thus seems to be a positive development. Nevertheless, this research also evidences vested interests and significant implementation problems that might reverse this positive first assessment in the long-run. Consequently, this thesis outlines areas for further research, in particular field studies that are essential to comprehensively understand this subject matter.

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ACRONYMS AND ABBREVIATIONS

AGRA	Alliance for Green Revolution in Africa
AIBO	Academy for International Business Officials
ATDC	Agriculture Technology Demonstration Centre
ATVET	Agricultural Technical Vocational Education and Training
AU	African Union
CAADP	Comprehensive Africa Agricultural Development Program
CADF	China-Africa Development Fund
CARI	China-Africa Research Initiative
CIDCA	China International Development Cooperation Agency
CSR	Corporate Social Responsibility
DAC	Development Assistance Committee
FAO	Food and Agricultural Organization of the United Nations
FDI	Foreign Direct Investment
FOCAC	Forum on China-Africa Cooperation
FTC	Farmer Training Centers
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IMF	International Monetary Fund
MOA	Ministry of Agriculture
MOFCOM	Ministry of Commerce of the People's Republic of China
ODA	Official Development Aid
OECD	Organization for Economic Co-Operation and Development
PRC	People's Republic of China
R&D	Research and Development
SAE	State-owned Agricultural Enterprise
SAP	Structural Adjustment Program
SDGs	Sustainable Development Goals
SSC	South-South Cooperation
SSDC	South-South Development Cooperation
SWA	Sector Wide Approach
UNDP	United Nations Development Program
UNICEF	United Nations International Children's Emergency Fund
WB	World Bank
WFP	World Food Program
WHO	World Health Organization

CHAPTER 1: CHINA-AFRICA, A SURVEY

China's enhanced presence in Africa is a subject of intense debate. Especially journalists of the popular business press as well as academic scholars of the discipline of International Relations continue to observe the country's progressing internationalization. Opinions among experts examining this phenomenon differ in particular about the motives inciting China to increase its cooperative relations as well as with respect to whether and what extent China's activities can sustain the socio-economic development of African states. Among the fields where Chinese presence in Africa can be observed, the country's engagement in agriculture is of particular interest, as it strikes at the heart of such concerns. This is in line with the Chinese state claiming that its development support is highly effective in sustaining African countries to develop their agricultural sectors as well as to help them "ensure food security, eradicate poverty and improve people's livelihoods in Africa" (FOCAC, 2004). When examining the scholarly literature, this positive perception, however, finds more limited support. But then again, rarely does the literature surrounding the topic systematically examine the complexities of the issue. Addressing this gap, this thesis engages with China in Africa as a highly contested social phenomenon by exploring the research question: Does China's agricultural development package contribute to food security in Africa?

To come to a conclusive answer in response to this question, this thesis conducts an impact assessment study of China's three bi-lateral development models central to its agricultural development package on food security. China's agricultural development package comprises the (technology-centered) traditional agricultural aid model, the innovative agro-aid model and the agribusiness model. These three models are described and analyzed in great detail throughout this work. To confirm or disprove that China's agricultural development support contributes to food security in Africa, this thesis more specifically investigates whether and how China's agricultural development models take action in the four key areas of finance, technology, infrastructure and know-how that are outlined in the African Union's (AU) Comprehensive Africa Agricultural Development Program (CAADP) for agricultural productivity on the continent to be improved and hence food security to be enhanced.

While all approaches to agricultural development contribute to food security to some extent, the argument of this thesis is built on the presupposition that supporting large-scale commercial farms and large agribusinesses (such as e.g. seed companies or agrochemical enterprises) is unlikely going to improve food security for the average African. As is stated by, among other international development programs, the Alliance for Green Revolution in Africa (AGRA) program, this is due to the fact that globalized "food systems can be highly productive, but they are capital intensive and create little employment" (AGRA, 2017: 10). While the expansion and production of such actors on the African continent might benefit the global food system, increased food output for export is highly unlikely going to compensate for the loss in means of subsistence of the continent's 51 million small-scale farms of an average size of around 5 hectares or less (*ibid*.). What Africa needs in order to become more food secure is to become more self-sustaining. Hence it is crucial that the continent's agricultural smallholders and Small and Medium Enterprises (SMEs) are supported - in order for them to produce more agricultural goods for local and regional markets as well as to provide the continent with more human inclusive growth opportunities. Investigating whether China in its agricultural development assistance to Africa supports such national actors and hence sustains African countries in their efforts to alleviate poverty, develop their rural areas as well as to achieve food security consequently will take center stage of this thesis in the following.

While, as mentioned, China's enhanced presence in Africa has generated a great deal of literature and thus the work of this thesis might seem to constitute yet another piece among many, this work's approach is novel insofar as the majority of the literature published on the topic so far remains merely descriptive. Furthermore, it is also against the observation that China's development cooperation approach often is being depreciated solely on the ground for being 'categorically different' (Schoeman, 2011: 36). Empirically evaluating the impact of China's agricultural development package on food security, however, is a decisive task, not only as it provides for a more evidence-based understanding of the phenomenon and presents African countries with an overview of the main opportunities and risks China's agricultural aid and economic relations entail, but also as it generates an important argument against which the highly ideologically influenced debate can be weighted.

Following a four-step approach, this thesis is structured as follows: Chapter two will revisit the literature surrounding China in Africa, presenting the perceptions of three broad groups of scholars making sense of the country's enhanced presence on the continent. The presentation of their explanations not only provides for an overview over the mainstream controversies and hopes associated with the phenomenon, but also exemplifies why the topic is in urgent need of more objective and empirical research. In order to be able to analyze whether and how China's agricultural development package contributes to food security in Africa, the concept of food security as well as the three development models central to China's agricultural development package will be highlighted in the chapter following thereafter. On a more general level, this chapter also illustrates how this paper's analysis will be carried out and hence provides an overview of the methodology and structure used. Before concluding with a discussion and final conclusion chapter, analyzing China's agricultural development package in respect to food security in Africa will be the main research topic of chapter four.

Chapter 2: Framing China-Africa Aid and Economic Cooperation

China in Africa is a social phenomenon of intense debate especially since November 2006 when the first Forum on China-Africa Cooperation (FOCAC) Summit was held in Beijing. Following a series of FOCAC ministerial conferences organized on a triennial basis since the turn of the new millennium, the so-called Beijing Summit generated widespread attention insofar as it proclaimed to work towards the creation of a new strategic partnership for sustainable development and the PRC announced for its aid and economic relations with the continent to be significantly enlarged (Jintao, 2006). While China's aid and investment pledges were received positively by the majority of the 35 African Heads of States present, China's commitment launched a multi-faceted debate persisting to this day. Opinions continue to differ especially about the motives inciting China to deepen its development commitment as well as with respect to the accuracy of the PRC's claim that its investment and aid activities are beneficial for the continent's development as well as wellbeing of its people. "Seeking to explain why, and on what basis, the country is investing in Africa", the phenomenon has generated numerous hypotheses, predominantly critical, describing China in its engagement with Africa to be primarily opportunistic (Abdoulakre and Zhan, 2013: 41). In order to be able to make sense of the complex picture the topic provides, this chapter presents the explanations of three broad groups of scholars making sense of the country's enhanced presence on the continent. While the first two explanatory approaches voice the conventional pessimism that also continues to circulate in the media and in which China's entry into Africa is portrayed "as part of a protracted effort to oust Western and African control over land and politics" (Buckley, 2013: 43), the third explanation counters this pessimistic view by identifying China's development packages to constitute a favorable alternative to the conditionality-informed aid relationships Northern donor countries provide (Madwsley, 2011: 257).

2.1. China, a Neo-Imperial Power

The most conventional way of thinking about China's enhanced presence in Africa is that the country is a neo-imperial power (Abdoulakre and Zhan, 2013: 41). Following the neo-realist perception of how states operate, the mainland actor's presence in Africa is interpreted as a rational choice for China as an attempt to secure its access to the continent's abundant natural resources (Buckley, 2013: 43). While Africa's oil and mineral deposits commonly are identified for China to be particularly inciting, the continent's vast areas of uncultivated land (around 60% of the region's share) as well as agricultural products more frequently also are being noted (Bräutigam, 2014). Expressing this belief quite bluntly, Dambisa Moyo, a Zambian born international economist in her 2012 book *Winner Take All: China's Race for Resources - And What it Means for the World* states, that China is "on a global shopping spree" and that the country's "voracious commodity appetite unlikely is to abate" (Moyo, 2012: 3).

As the neo-imperial argument goes, China's is interested in Africa's natural resources, especially due to Beijing's increasingly complex geopolitical task of having to sustain its fast-paced growth as well as to guarantee its 20% share of the world's population sufficient amounts of safe and nutritious food (Rubinstein, 2009: 2). The situation is complicated especially by China's rising living standards, its population's changing consumption patterns as well as the country's "shrinking and deteriorating arable land resources" (Li et al., 2012: 245). Adding one and one together, the answer to the question why China operates in Africa provided for by this first explanatory approach hence is clear: the country does so out of self-interest, concerned with the task to sustain its own national development. As a consequence and in an attempt to alert African countries not to believe in China's mutually beneficial claims, Hillary Clinton in her position as State Secretary in 2011 cautioned: "Be wary of donors who are more interested in extracting your resources than in building your capacity" (De Hart, 2012: 1360).

Addressing the claim that access to land and natural resources count among the most prominent objectives for China to engage in Africa, Deborah Bräutigam (2009), founding director of the China-Africa Research Initiative (CARI) at John Hopkins University's School of Advanced International Studies (SAIS), reasons, that if this was the case, the country's motivation, however, would be no different to most other countries present on the continent (such as the United States, Europe and Japan). This is due to the fact that natural resources and largely unprocessed commodities are what the majority of African states have to offer. As Bräutigam (2009) goes on to note, China thus cannot be blamed for having created this situation, while there is no doubt that the relationship plays out in its favor.

Accusing China to be a neo-imperial power moreover can be pointed out to constitute a rather generalized point of view, overlooking not only deeper levels to the relationship, but also denying Africans agency. Indeed, as the neo-imperial explanatory approach explicitly implies: Africans first were exploited by Europe, and now are subject to the Chinese. What can be noted conclusively hence is that this narrative neither does Africa, nor China any justice; largely neglecting the question whether African countries consciously decide to cooperate with China as well as whether they derive any benefit from it.

2.2. A Relationship Based On Political And Economic Pragmatism

Building on the first hypothesized explanation making sense of the country's enhanced presence on the continent, the second tells the story of a partnership based on political and economic pragmatism. In line with what the country is assumed to ultimately seek to achieve – "diminish and contain the influence of hegemonic powers and carve out a rightful place in the world" (Tan-Mullins et al., 2010: 866) – China's presence in Africa is portrayed as part of the country's quest for enhanced political and economic power (Buckley, 2013: 45). Against the backdrop of globalization and competitive pressures, China's engagement in Africa more specifically is made sense of as a strategic choice for the country to enlarge its global market shares, seize investment opportunities as well as foster diplomatic relations (Bräutigam, 2014). These are important foreign policy goals for Beijing not only in order to be able to increase its political leverage but also in respect of its particular task of having “to manage the upgrading of its increasingly ‘mature’ domestic industries and to build up multinational companies” (Bräutigam, 2009: 11).

Partnering with African states in this endeavor is said to make sense not only due to the sheer number of countries the continent is home to, but also the continent’s continuously growing markets, expected to reach a cumulative GDP of 2.6 trillion in 2020, while also providing for a vast range of investment opportunities (Schoeman, 2011: 34). Especially the fact that China is Africa’s single largest trading partner since 2009 (Shinn, 2015) as well as the observation that the country, through various initiatives, such as e.g. the ‘Going Out’ strategy initiated in 2001 or the China-Africa Development Fund (CADF) established in 2007, progressively facilitates its national companies’ entry into Africa, support the claim that China proceeds in this quest (Scoones et al., 2016: 4-5). Partnering with African states in agriculture is said to be beneficial in particular for China’s mechanical and genetic engineering companies as well as biotechnology enterprises, which among other industries are supported in selling their goods and services in high-end areas such as hybrid seed technology (Rubinstein, 2009; Bräutigam, 2009).

While in comparison to the first narratives surrounding the phenomenon, this second relativizes the claim that China cooperates with Africa primarily in order to get access to oil, mineral deposits, land and other natural resources; scholars engaging with China’s state-led quest for more global political and economic reach generally do not consider the relationship to be any more beneficial for African states than supporters of the first explanation do. This is in line with the arguments of a broad range of critical scholars who consider the Global South as a space to remain highly hierarchical as well as South-South development cooperation “to produce new forms of unequal exchange” (Carmody, 2013; De Hart, 2012; Najam and Thrasher, 2012). In particular, the high levels of debts many African countries tend to end up with in their cooperation with China (Xiaobing et al., 2014: 52) as well as China’s overseas companies’ profit-oriented nature (Gonzalez-Vicente, 2012), are frequently brought forwards examples to make a case for this claim.

While African states thus might hope for closer relations between emerging and developing countries of the ‘Global South’ to create a new space devoid of power inequalities (Gonzalez-Vicente, 2017: 882), proponents of this second explanatory approach doubt that this vision can be achieved. In support of the first, the main insight this second narrative thus provides is that China’s interest in Africa is very real, while the benefits of the relationship for African states are less apparent and not necessarily guaranteed.

2.3. A Mutually Beneficial Partnership

In contrast to the first two hypothesized explanations, China’s enhanced presence in Africa, by some, however, also is perceived as a positive development. This is the perception of mostly African and Chinese state officials who consider the conditionality-informed North-South aid relationships African countries have experience with to represent “merely the latest in decades of humiliating experiences at the hands of former colonial powers and the United States” (Alden, 2006: 14). In line with this view, China’s enhanced presence on the continent is celebrated for challenging the dominant position in the world of a few, while also appreciated as an act of solidarity among the less advantaged (Buckley, 2013: 43).

With regard to its aid and economic relations, China is portrayed as a valuable development partner, not only due to the fact that the country itself can look back on an impressive growth trajectory, but also because it had to cope with similar factor endowments and development obstacles and hence today is able to share valuable lessons learned (Kumar, 2008; Bräutigam, 2015; Bergamaschi and Ticker, 2017). In this vein, China also is said to be able to draw on its many years' experience with foreign aid (provided for by especially Japan), so that the country's development packages, in comparison to the programs of the North, are more effective, offered at better loan conditions and address fundamental development areas traditionally ignored (Bräutigam, 2010). This is the case especially for infrastructure projects (see e.g. Bergamaschi and Ticker (2017) for more information on the Western fear of creating 'white elephants'), but also for agriculture, a development area heavily underfinanced by the North. Due to China's own experiences with agricultural development, the country's cutting-edge technologies as well as comparatively cheap agricultural inputs, the country's development support in this area is said to be particularly beneficial, supporting African countries in their objectives to alleviate poverty, develop their rural areas as well as enhance food security (FOCAC, 2004).

Contrary to the two previously outlined narratives, this last one thus provides the insight that while China in its engagement with Africa is driven by a pragmatic mix of self-interest and solidarity, the country nevertheless is a valuable development partner for Africa, tailoring its development assistance to the real needs of African countries (Buckley, 2013: 43).

2.4. Fitting The Pieces Together

Taking a step back and looking at the complex picture China's presence in Africa provides, one is presented with a puzzle full of apparent contradictions. As the overview over the three primary narratives surrounding the phenomenon has shown, the questions – why China engages in Africa as well as whether African countries derive benefit from it – remain hotly debated. While all explanatory approaches converge around the fact that China's engagement in Africa is motivated by at least some degree of self-interest, perceptions of the relationship's benefits for Africa are hardly compatible. The compliance of the three narratives in respect to the former aspect can be explained by the fact that "all bilateral aid serves a range of objectives, from strategic foreign policy goals to domestic commercial interests" (Bräutigam, 1998: 10) and that consequently China's motives for engaging with Africa are neither unique, nor surprising. China's claims of 'mutual benefit', however, remains contested for a number of reasons.

As Deborah Bräutigam (2009) argues, this is because China enjoys the status of a major emerging power, engages in a geographic area historically dominated by Europe and in its engagement as a development partner continuously rejects to follow the norms and rules of the international aid regime.[1] The last point is particularly important as the standards of 'Official Development Aid' (ODA) have come to constitute the international benchmark against which aid effectiveness is weighted (Bräutigam, 2015: 7).[2] By providing 'categorically different' aid, China's approach and its proclaimed development benefits in the mainstream literature, however, continue to be perceived critically and remain contested (Schoeman, 2011: 36). In addition to aforementioned reasons, this is especially also because China provides development assistance on an individual project basis instead of integrating into Sector Wide Approach (SWA) measures with other donor countries (Davies et al., 2008; Glosny, 2006), opposes the requirement for African countries to fulfill conditions, frequently secures its loans with natural resources, as well as more generally blurs its aid with foreign direct investment (see Jiang, 2016: 14-19 for more information on these differences).

China providing 'categorically different' aid, however, neither provides sufficient evidence to be able to effectively argue that the country's presence on the continent is a 'threat', nor that its aid and investment relations are not beneficial. Indeed, as Tan-Mullins et al. (2010) write, generically depreciating the value of China's development packages solely on the ground for what they are not, without relying on independent research, needs be understood as a highly effective means to draw a negative image of China; a trend prevalent in the literature and mainstream media that essentially only "serves to bolster Western interests" (864).

Consequently, and in consideration of the fact that "the actual development role and impact of Chinese investment [and aid] often is misunderstood or misinterpreted" (Gu, 2009: 584), the debate surrounding China's enhanced presence in Africa and engagement as a major investor and donor to the continent is in urgent need of more objective and empirical research (Abdoulkadre and Zhan, 2013; Xiaobing et al., 2014; Jiang, 2016). While field research would be the most effective means to unravel the puzzle – what exactly the Chinese are doing in Africa – as well as to judge whether the country keeps its mutual development promises, especially in varying national contexts and diverse engagement sectors; this thesis hereafter contributes to this task by empirically evaluating the impact of China's agricultural development package on food security in Africa.

[1] Which developed around the Development Assistance Committee of the Organization for Economic Co-Operation and Development throughout the second half of the 20th century (short also referred to as OECD-DAC).
[2] According to the definition provided for by the OECD-DAC, aid flows qualify as 'Official Development Aid' if they meet the following three criteria: "(i) provided for by official agencies, including state and local governments, or by their executing agencies; (ii) administered with the promotion of the economic development and welfare of developing countries as its main objective; and (iii) are concessional in character". FMI see: https://www.oecd.org/dac/stats/officialdevelopmentassistancedefinitionandcoverage.htm

Chapter 3: Way Forward

As stated previously, this thesis engages with the puzzle of how to understand China's enhanced presence in Africa and enriches the debate surrounding the phenomenon with an impact assessment study of China's three bi-lateral development models central to its agricultural development package on food security. The choice to investigate how the relationship plays out in agriculture was made based on the observation that "despite the growing research on China's cooperation in Africa, its involvement in agriculture is still under-discussed, with the extractive sector drawing the most scholarly attention" (Jinyan and Wenping, 2014: 5). As the literature review has shown, China's activities in Africa's agriculture, however, also are worth investigating, as the mainland actor's activities bring to the fore perceptions on both Chinese expertise and know-how in agriculture and development on one hand and state businesses' self-interested and controversial practices on the other hand. Especially also in consideration of the country's shrinking and deteriorating arable land resources as well as the need for more agricultural products to feed its own people (Li et al., 2012: 245; Buckley, 2013: 45), China's activities in Africa's agricultural sector raise the question whether the PRC's agricultural aid and economic cooperation measures really benefit the continent – in the sense that they live up to their development promises for Africa – including, among other outcomes, food security. Next to elucidating how this concept is to be understood, this chapter also explains how this thesis is going to determine whether and how this outcome in China's agricultural development assistance to Africa is ensured.

3.1. Understanding Food Security

As the Rome Declaration on World Food Security (1996) states, "Food Security is achieved when all peoples, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". While up to date this definition remains widely accepted, policymakers continue to diverge in their perceptions on how best to achieve this outcome, trying to target in their food security approaches the phenomenon's various multi-level dimensions of availability, access, utilization and stability (Burchi and de Muro, 2016: 10).

Following the FAO (2018) definitions of the concept's individual dimensions, food availability is determined by the fact of whether food actually is present in sufficient amounts in a given area (159). Measured by crop yields (which refer to the number of agricultural goods produced per unit of land) and imports, food availability depends on factors such as domestic agricultural productivity, effective transport and storage facilities as well as on trade and agricultural policies (OECD, 2015: 23).

Sufficient availability of food alone, however, does not ensure individual's and household's access to it (Pinstrup-Andersen, 2009: 5). Indeed, as the Organization for Economic Co-Operation and Development (OECD) writes, food security cannot be guaranteed if individuals or households do not possess "adequate resources or entitlements to acquire appropriate food for a nutritious diet" (OECD, 2015: 19). From an economic point of view, high food prices and insufficient income thus need to be addressed for access to food to be enhanced; which both on a farm and non-farm household level might be achieved by means of income diversification or the taking out of insurances as common examples of market risk management tools.

Governments, in light of their objective to create a 'stable food security environment', ideally should complement such individual measures by means of developing and expanding social safety nets, including the transfer of cash and food aid to selected target groups in need (OECD, 2015: 22-23). To ensure sufficient intake of adequate nutrition and energy supplies, governments, however, also should intervene in household practices. This might take the form of education or direct nutritional intervention programs which can be beneficial for "good care and feeding practices" among the population to be conveyed as well as equal intra-household distribution of food to be ensured (FAO et al., 2018: 159).

Once food availability, access and adequate utilization practices are guaranteed, stability as the concept's fourth dimension needs to be upheld – also for progress in all other three dimensions to be safeguarded (OECD, 2015: 18). As the FAO jointly with IFAD, UNICEF, WFP and WHO states (2018), "climatic, economic, social and political factors all can be sources of instability" (FAO et al., 2018: 159). When occurring in form of short-term shocks these factors might bring about a situation of acute food shortage, while if remaining significant for an extended period of time, they most likely will result in a state of chronic food insecurity (*ibid.*).

Today, in most rural parts of Africa, the latter situation is the reality. As Deborah Bräutigam (2009) writes: "Africa has been a net food importer since 1973. Most of the continent's poor live in rural areas, many as subsistence farmers using 'slash and burn' cultivation methods. With very little irrigation and irregular rainfall, rural Africa experiences chronic food insecurity. Agriculture needs to be done more intensively, with better water control" for this situation to be resolved (235).

3.2. INVESTIGATING THE IMPACT OF CHINA'S AGRICULTURAL DEVELOPMENT PACKAGE ON FOOD SECURITY

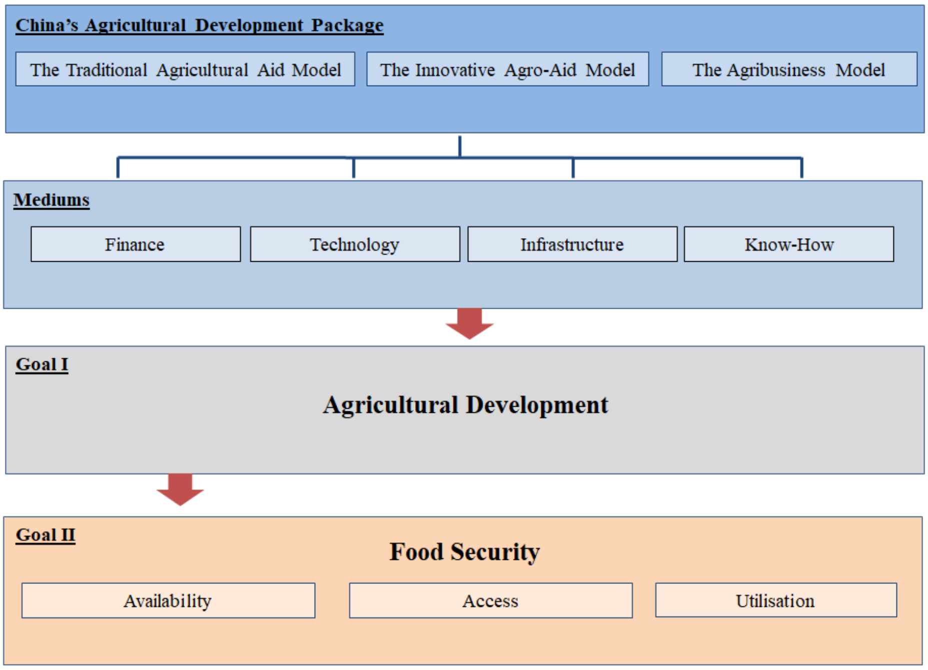
To determine whether and how food security as an outcome in China's agricultural development assistance to Africa is ensured, this thesis builds on the work of Lu Jiang (2016), an International Relations researcher, who in fulfilment of her PhD at The London School of Economics (LSE) researched China's 'development package model' approach. By investigating how this package model plays out in agriculture, Jiang (2016) found that China engages in Africa's agriculture primarily by means of three bi-lateral development models: the (technology-centered) traditional agricultural aid model, the innovative agro-aid model and the agribusiness model (52). As she establishes, these three models evolved over the course of more than 50 years of Sino-African agricultural aid and economic exchange and since the turn of the millennium are promoted under the FOCAC umbrella, "the main institutional vehicle for shaping and managing China's cooperation with Africa across a range of technical, economic and political platforms" (Jalata, 2014: 5; Jiang, 2016: 20-21).

Together referred to as China's agricultural development package, these three models are the central units of analysis of this thesis in the following; each attributed a sub-section in the next chapter. Following a two-level process, the model's individual measures, objectives and target groups first are presented and evaluated on a theoretical level, before they are reviewed on an individual country basis; based on evaluation reports of the PRC as well as peer-reviewed field studies, examining how they take place in practice. Owing to data availability, Ethiopia, Mozambique and Madagascar have been chosen as the three African countries in which China's bi-lateral development models are investigated. While development outcomes undoubtedly vary depending on national socio-political circumstances, and thus these three case studies by no means are representative of how China's development models concretely work out in other countries, they nevertheless highlight some opportunities and risks China's agricultural aid and economic relations entail and hence allow for an initial assessment of their development outcomes; while most importantly also providing direction for further research.

To confirm or disprove that China's agricultural development package contributes to food security in Africa, this thesis more specifically investigates whether and how China's agricultural aid and economic cooperation measures featuring the country's three bi-lateral development models take action in four key areas. As outlined in the African Union's (AU) Comprehensive Africa Agricultural Development Program (CAADP) (hereafter referred to as AU's-CAADP), the continent is in critical need of more finance, innovative agricultural technologies, infrastructure and know-how for agricultural productivity to be improved and hence food security to be enhanced (Cheru and Modi, 2013; Shinn, 2015). Action in these four areas is urgent, considering especially the facts that African governments rarely spend more than 5% of their national budgets on agriculture (AGRA, 2017: 8), that around 65% of all agricultural activities still rely on human muscle, that some 20% share of the continent's harvests rot in poor storage as well as the observation that "few African countries have the critical mass of basic engineering and technical skills necessary to support a move up the value chain into even basic milling and food processing" (Bräutigam, 2015: 27).

Box.1 illustrates how this thesis's analysis is structured, referring to the four key areas in which action needs to be taken as mediums for agricultural development on the continent to be advanced and hence food security to be ensured.

Box 1. Graphic illustration of the analytical framework of this thesis



(Source: Own representation of the author)

By investigating if action is taken in the afore-outlined four medium-areas, this thesis consequently determines China's contribution to food security in Africa primarily by means of aggregate food supply and hence as a matter of availability on a macro-economic level. While a primary focus on food availability is sometimes critiqued for being "too concentrated on one single economic sector" and, as mentioned, does not automatically ensure access (Burchi and De Muro, 2016: 11), it nevertheless allows for an assessment of whether China's three bi-lateral development models sustain African countries in developing their agricultural sectors and thus makes sense as an approach by this thesis to be employed. This concentration also is a rational choice, however, given the complex methodological procedures needed to measure the concept's access and utilization dimensions (requiring among other task the conduction of extensive household surveys), the analytical difficulty to establish a causal link between these two dimension's indicators and China's development models as well as this work's limited scope and constraint of sufficient amounts of Chinese public policy and evaluations reports available.

Based on the presupposition that the continent's state of food insecurity only can be improved in the long run if agricultural smallholders and SMEs are supported, this thesis complements this investigation with an insight into whether China's three bi-lateral development models primarily sustain such actors, in order for them to be able to supply local and regional markets with more food. Conceição et al. (2016) get to the heart of the importance of this point by noting that sustaining such national actors not only generates employment and income along strengthened value chains but also "enhances the poor's command over food staple prices". Gains made in turn "can be invested in improved infrastructure, services, research and social protection, all of which can contribute to further advance agricultural productivity, food security and human development” (2). Given the fact that this determinant moreover compensates this work’s macro-economic concentration on food availability to some extent, it is an important factor to consider in order to determine whether one can say that China’s enhanced presence in Africa’s agriculture is a positive development, as well as whether the country’s agricultural development package holds the potential to support African countries improve their food security situations in the long run.

Following this approach, this thesis essentially is qualitative in nature. It does not aim to arrive at an abstract or universally applicable theory, but rather to explain a highly contested social phenomenon in greater detail.

CHAPTER 4: CHINA'S AGRICULTURAL DEVELOPMENT PACKAGE & FOOD SECURITY IN AFRICA

As stated previously, agriculture in Africa remains of low productivity and efficiency. Despite the continent's favorable framework conditions, in theory providing the necessary means "to produce another 100 million tons of grain each year" (AGRA, 2017: 5), the continent's average yield rates are about three times lower than those of comparable agro-ecological zones (Bräutigam, 2009: 235). 'Green revolution' measures, similar to the ones introduced in many parts of Latin America and Asia during the 1960s and 1970s, did not have long-lasting effects on the continent, as investment in agricultural research and development (R&D), among other facilitating areas, was cut back when Structural Adjustment Programs (SAPs) were introduced in most of the continent's countries at the beginning of the 1980s (Bräutigam, 2015: 6). As regards Africa's current trend of positive agricultural growth (maintaining a cross-country average of 7% p.a. since 2005) it needs to be mentioned that this increase was spurred by the 2007/08 agricultural commodity price boom and hence primarily is due to an external push factor, "rather than improvements in underlying fundamentals" (AGRA, 2017: 5). Whether China's three bi-lateral development models take action to improve these fundamentals, previously referred to as media, will be the examined more closely in the following; starting with an analysis of China's agricultural cooperation measures included in what Jiang (2016) refers to as China's (technology-centered) traditional agricultural aid-model.

4.1. THE (TECHNOLOGY-CENTERED) TRADITIONAL AGRICULTURAL AID-MODEL

Grant-financed (technology-centered) technical agricultural aid measures to promote capacity development and the formation of agricultural extension systems always have been central to China's agricultural development support to Africa and hence are referred to by Jiang (2016) as traditional (52). From the beginning of the 1970s to the 1990s they were part of the country's favored 'complete project' approach, resulting in the construction and temporary operation of around 100 state-owned farming structures and agro-technology demonstration centers, located in a variety of 25 African countries (Jiang, 2016: 52; Zhang et al., 2016: 4).

While the Chinese government since the turn of the millennium has deviated from this approach – see sub-section 4.2. for an explanation for why this was the case as well as the country's current 'innovative agro-aid model' in the realm of which agro-technology demonstration centers continue to exist, albeit in a slightly different and innovative form – the diffusion of technical agricultural aid measures continues to constitute an important cornerstone of China's current agricultural aid engagement in Africa (Jiang, 2016: 52). In practice, this development model translates into four concrete measures.

The deployment of Chinese senior agricultural experts to Africa is the first concrete measure translating this aid model into action. The approach is part of the country's development engagement on the continent since 2006, when the PRC first pledged to provide the continent with 100 senior experts, specializing in diverse agriculture-related areas (FOCAC, 2006). As explained by the Ministry of Agriculture (MOA) of the PRC (2010a), the posting of agricultural experts is an important aid measure as Chinese experts can help African countries to increase their agricultural productivity by supporting them to better exercise macro-management control over their agricultural sectors. More specifically, this is said to be achieved by Chinese senior experts providing African host countries with specific technical agriculture aid-related consultancy services, such as the elaboration of national agricultural development plans or the planning of country-wide agricultural extension systems to diffuse agriculture-related knowledge among farmers more efficiently (MOA of the PRC, 2010a).

Alongside the dispatch of experts to Africa, the MOA further provides exchange and short-term training programs as a means for capacity development (Jiang, 2016: 53). A system to provide such training at home, targeting technicians, students and officials from other countries of the 'Global South' was officially established in 1998. The country's current international training structures, however, only fully developed in the 21st century, expanding to what has come to be one of the world's most extensive training systems (Tugendhat, 2014: 2). Courses on average last from one week to three months and are implemented by the country's Academy for International Business Officials (AIBO) or outsourced to certified training centers, including research institutes and universities (*ibid*.). According to Tugendhat's (2014) translation of the program's purpose from Chinese in to English, as outlined in the country's Ministry of Commerce's (MOFCOM) handbook for training institutions, the country's exchange and short-term training courses are designed "to complement China's comprehensive foreign policy needs, help train the human capital of other developing countries and drive forward friendly relations and trade cooperation" (3).

Out of the more than 500 training units offered by the Chinese government on a yearly basis, 15% specifically target Africa's agriculture (Tugendhat, 2014: 2). According to official figures published by the MOA of the PRC (2010b), "more than 4,200 African agricultural management officials & technical professionals" consequently were able to benefit from this aid measure in practice between 2004 and 2010, acquiring knowledge in diverse technical, managerial and policy areas. This number includes people participating in training programs in Africa, where the country helps setting up and expanding ATVET systems, helping African countries to make education in agriculture more accessible (Alemu et al., 2015; Davies et al., 2010).

Lastly, China's traditional agricultural aid model, however, also comes to the fore in diverse multilateral cooperation frameworks, such as the FAO's South-South Cooperation (SSC) Program, one of the UN's Supporting Food Security Programs (Jiang, 2016: 53). The mainland actor's engagement in this program frequently is being praised for its high level of commitment not only by other donor organizations but also by developing host country governments. This is due to the fact that the PRC was one of the first financial and technical donors of the program, in 2006 committed itself to set up a 30 million USD trust fund to finance future operations and since its cooperation with the program in 1996 has "dispatched over 1,507 experts and technicians to 37 countries" in the world (FAO, 2019). Ethiopia, Liberia, Malawi, Namibia, Nigeria, Sierra Leone and Uganda are the seven African countries that have benefitted from support of this program, hosting over 700 Chinese experts and technicians provided for by the country under this framework over the course of the past 20 years (Bräutigam and Tang, 2012: 6).

Evaluating China's four technical agricultural aid measures on a theoretical level based on whether they take action in the four critical medium-areas that are outlined in the AU's-CAADP for agricultural productivity on the continent to be improved and hence food security to be enhanced, it appears that they are clearly oriented towards transferring agriculture-related knowledge to Africa and aim to enhance the independent capacity of African countries to develop their agricultural sectors. At first sight, China's aid measures included in its (technology-centered) traditional agricultural aid model thus can be identified to have been set up with the explicit intention to develop Africa's agriculture, targeting the continent's knowledge-gap that continues to constrain African countries to effectively develop their agricultural sectors' productivity. In some cases, infrastructure measures and technology are provided for by China alongside these technical aid measures. However, these two medium-areas are not the primary ones this first development model addresses. How China's four technical agricultural aid measures featuring its (technology-centered) traditional agricultural aid model turn out in practice and whether empirical studies confirm that knowledge in agriculture-related areas in Africa is generated and promoted in the context of this first aid model will show the case of Ethiopia.

4.1.1. China & Ethiopia, Technical Agricultural Aid Measures In Practice

China and Ethiopia formally established diplomatic ties on December 1st, 1970 (Bräutigam and Tang, 2012: 4). Since then, the two countries enjoy friendly relations, to the satisfaction of both countries, so that in 2014 the two countries' Ministers of Foreign Affairs expressed their countries' commitment to each other and stated that their relationship over the past 50 years had come to constitute an "excellent model for South-South Cooperation" (Ministry of Foreign Affairs of the PRC, 2014). While agriculture did not form part of the two countries' traditional areas of cooperation, the number of programs targeting this sector is continuously increasing (Bräutigam and Tang, 2012: 6). Consequently, all four aid measures featuring the country's (technology-centered) traditional agricultural aid-model can be observed in Ethiopia, implemented within the country roughly since the turn of the millennium.

Out of the 100 senior experts the Chinese government pledged to dispatch to Africa in 2006, Ethiopia received two, deployed in the country for one year between 2009 and 2010 (Bräutigam and Tang, 2012: 8). Based on later commitments, a further eight were attributed to the country for a period of two years in 2011 (Alemu et al., 2015: 7). The majority of the two batches of experts were hosted by the country's MOA, while the rest by the Ethiopian Institute of Agricultural Research (EIAR) (*ibid.*). While the deployment of senior experts to Africa comes with the promise to increase the continent's countries agricultural productivity through knowledge-transfer, first evaluations of this aid measure in practice, however, find mixed results for this to be the case. Citing an interview with a Chinese expert, Bräutigam and Tang (2012) write that the "visit of the two experts [employed in the country between 2009 and 2010] was not very successful because it focused on the policy and planning level, whereas Ethiopia has ample expertise at this level and requires practical expertise" (8). Focusing on implementation procedures, Alemu et al. (2015) moreover find, that despite the experts having been dispatched at the request of the Ethiopian government, "the process of attaching the experts with relevant organizations was not well designed before the expert's arrival" (7). Consequently, the Chinese professionals deployed only were able to work effectively half of their time in Ethiopia (*ibid.*). What preliminary insights thus show is that while in theory, the dispatch of experts seems to constitute an effective means for agriculture-related knowledge to be conveyed, the knowledge transferred sometimes does not match the African host country's needs *per se*. Managerial implementation problems also might hinder African countries to make full use of the experts at their disposal; while this aid measure in practice further raises the question whether and how it achieves for knowledge on a governmental level transferred among the wider population to be diffused.

Similarly mixed results are found and questions arise for when it comes to China's exchange and short-term training programs. While partly set up to enhance Africa's human capital, Tugendhat (2014) finds that there is a problem with the transferability of the courses' content to Africa and that consequently, only a few African professionals were able to apply the knowledge acquired in their home countries directly (4). According to interviewees, this was either "because of a lack of funding and resources at home […] or because the lessons learned simply were not relevant for them in the first place" (*ibid.*). Consequently, Tugendhat (2014) concludes that "despite knowledge and technology transfer ostensibly being the main focus of the courses; it actually appears to be the weakest area of success among the courses' stated aims" (5). As he finds, they mostly benefit China's state institutions, which, in the context of the courses, are able to "promote a positive image of China and build strong relations with African governments" (*ibid.*). Insofar that this aid measure thus can be identified as an important public diplomacy tool, the PRC's exchange and short-term training programs most probably are more beneficial to China, despite, nevertheless, transferring some agriculture-related knowledge to participating African officials.

On the contrary, first studies on China's support to Ethiopia in establishing and expanding an ATVET system predominantly evaluate this aid measure's impact on knowledge dissemination positively. Since the creation of the system in 2001, China sustains Ethiopia's 25 Farmer Training Centers (FTC) with an average of 20 agricultural professionals on a yearly basis as well as provides the centers with some technical demonstration equipment (Bräutigam and Tang, 2012: 7). While prior to 2001, Ethiopian farmers only were able to receive a degree in general agriculture by following university studies, the country's ATVET system has allowed the country to disseminate agriculture-related knowledge more effectively and on a much broader scale (Alemu et al., 2015: 4). Despite a general lack of required teaching materials and basic infrastructure as well as frequent problems due to language barriers, China's practical training support to the country's ATVET system as well as its 'training of trainers' module is recognized by the Ethiopian government as a valuable contribution to the country's overall agricultural growth (Bräutigam and Tang, 2012: 7). China's "attempts to introduce new varieties of crops and agricultural technologies [as well as] its preparation of practical manuals" moreover are areas in which the PRC is acknowledged to add crucial value (Alemu et al., 2015: 6). Overall the "hardworking and disciplined attitude" of Chinese professionals is said to support the country's achievements in this context, reportedly inspiring students and Ethiopian instructors to work harder and more efficiently (*ibid.*).

The impact of the FAO-China South-South Cooperation Program is met with similar positive resonance. Ethiopia was one of the earliest participants in the program, with Chinese technicians arriving in Ethiopia in 1998 to work in the area of small-scale irrigation. Since then, the tri-party contract stipulating this engagement has been continuously renewed and its scope of engagement broadened. Today, the SSC team in Ethiopia further engages in, among other agriculture-related areas, horticulture production, agro-processing, animal husbandry and extension service improvement (Alemu et al., 2015: 8). On a general level, cooperation in these areas has helped to significantly increase the country's yields and due to its contribution to food availability has caught the interest of a variety of bi- and multilateral donor organizations wanting to cooperate with China in the implementation of further operations (Bräutigam and Tang, 2012).

What these first insights from Ethiopia thus confirm, is that China's technical agricultural aid measures translating the country's (technology-centered) traditional agricultural aid model into action transfer important agriculture-related knowledge to Africa. While some measures are more successful than others, they target the continent's knowledge gap that continues to constrain African countries to make full use of their potential in agriculture. Consequently, China's technical agricultural aid measures can be identified to make an important initial contribution for productivity in agriculture on the continent to be improved and hence food security to be enhanced.

4.2. The Innovative Agro-Aid Model

The second model through which China operates in Africa's agriculture is the innovative agro-aid model. Jiang (2016) describes this bi-lateral development model as innovative as she identifies the aid measure through which this model is implemented to be of 'inherently dualistic nature' (54). As she explains, China's Agriculture Technology Demonstration Centers (ATDCs) resemble the country's state-owned farming structures and agro-technology demonstration centers established on the continent between 1970 and 1990. However, contrary to previously established centers, China's 21st-century ATDCs are operated under a sort of Public-Private Partnership (PPP) arrangement and hence further were developed to incorporate and translate into action an innovative mechanism design (*ibid.*).

The decision to partner with private actors to further the use of agro-technology in Africa was made by the PRC after internally evaluating its aid performance in the early 1990s; reflecting and taking into account the sustainability problem scholars had identified its traditional agro-aid projects with (Bräutigam, 2009: 55; 247-248). The country's decades-long engagement in Africa's agricultural sector indeed portrayed the pattern that while the PRC's agro-aid projects brought about quick development results, their impact generally was not long lasting, with the country's aid projects falling apart once China's technical and managerial experts had left and the projects were handed over (Jiang, 2016: 58). In order to tackle this problem and to infuse its projects with more vitality, the PRC thus started to experiment with innovative forms of cooperation, such as PPPs, in the early years of the new millennium.

ATDCs incorporating PPP elements first were proposed by former Chinese President Hu Jintao in the context of the 2006 Beijing Summit (FOCAC, 2006). While the construction of an initial 10 centers was announced during discussions, the number of ATDCs to be built increased to 14 immediately after the Summit had concluded, due to the high number of African states interested. Benin, Cameroon, Congo, Ethiopia, Liberia, Mozambique, Rwanda, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia and Zimbabwe were the first countries in which an ATDC was constructed (Jinyan and Wenping, 2014: 16). By 2016, the number of centers in practice had increased to 23, "with the first batch of 14 centers having finished construction and been transferred to the host country governments" (Jiang, 2016: 54). According to the three-level operation logic the centers are based on, the first ATDCs constructed thus currently are in the third of the following stages: the project construction stage, the technical cooperation stage and the commercial stage (*ibid.* 62).

In practice, these three stages translate into the following order of events: Following a one to two year construction phase, which includes the equipment of the ATDCs with agro-technology as well as teaching and demonstration materials, the centers officially become property of the respective African host country government; despite still being covered for by China's aid budget as well as managed by a Chinese company. This marks the transition from the construction to the technical cooperation phase, which on average lasts three years, but may be extended up to five (Jiang, 2016: 61; Zhang et al., 2016: 4).

During this phase, the centers primarily are responsible for carrying out two tasks: perform public-interest functions – "i.e. agro-technology research, demonstration and extension, training and display" – and test how to become sustainable (Jiang, 2016: 58). The latter task is especially important given the fact that the private company under the agreement is expected to finance the centers' operations independently once the technical cooperation phase ends and government support phases out. For this purpose, the company in the short run might rely on commercial activities such as selling agricultural goods produced by the center on its agricultural demonstration fields, capitalizing the agro-technology of affiliated partners, or providing local services such as advising farmers and organizations on yield-enhancing cultivation practices (Lixia et al., 2015: 5). Through clustering production factors, the company in the long run, however, ideally should secure its income by establishing and overseeing market-oriented agribusiness value chains (Jiang, 2016: 61; 63). Next to guaranteeing that a minimum of 120 people benefit from the center's public-interest functions on a yearly basis (Lixia et al., 2015: 4), the private company in light of having to become self-financing in this second phase thus also has to try to establish connections with other companies to cooperate with at a later stage. Most case studies show that this primarily includes facilitating the entry of partner companies from China into Africa (Bräutigam and Tang, 2012: 2; Jiang, 2016: 72).

While, when studying this course of action, it might be assumed that the public-interest functions of China's ATDCs will stop once government support phases out, the centers are, however, expected to continue offering such measures by the Chinese government, financed for by the profit generated out of commercial activities. Given the fact that the first ATDCs constructed are currently only in this third stage, there exists thus far little empirical evidence on whether and how the center's operating companies manage to achieve this goal. Evaluations of day-to-day operations of various centers, however, already today show that the requirement to fulfil two tasks at once lead to much confusion (see e.g. Lixia et al. (2015) for a detailed account on how aid and business in ATDCs is blurred as well as how the centers' staff struggles to perform its dual roles). While continuous research on this aid measure is thus required, the unique set-up of China's ATDCs allows for first theoretical conclusions with respect to their development outcomes for Africa to be drawn.

Similar to the country's aid measures translating its (technology-centered) traditional agricultural aid model into action, China's ATDCs can be identified to have been set-up with the clear intention to enhance the productivity of African countries' agricultural sectors. While also representing a central platform for Chinese companies to enter African markets, the centers' explicit development purpose is visible in the centers task of having to guarantee non-commercial public-interest functions, such as agro-technology research, demonstration and extension as well as training and display. Following these tasks, the centers are set-up in a way to directly address the continent's low levels of technology and knowledge in agriculture-related areas and hence – on first sight and in theory – appear to constitute a valuable aid measure that holds the potential to help African countries develop their agricultural sectors as well as to sustain them to solve their food security issues. Especially through their technical demonstration, training and display measures – out of which some are particularly designed to address the skeptical attitude of local farmers towards the introduction and use of new technologies, seeds and other yield-enhancing inputs (Qi et al., 2015: 3) – China's ATDCs hold the potential to achieve these goals. Taking into account that the centers' "buildings, farmland and irrigation facilities, as well as roads" become property of the respective African host country governments over the course of this aid measure's implementation, China's ATDCs moreover can be identified to support the continent's countries with crucial infrastructure; an important general framework condition that allows for the clustering of production factors; which is an important precondition for the development of growth-enhancing local and regional value chains (CIDCA and UNDP, 2018: 26). Whether and how these development outcomes confirm themselves in China's ATDC in Mozambique will show the next sub-section.

4.2.1. INSIGHT INTO THE PRACTICE OF CHINA'S ATDC IN MOZAMBIQUE

China's ATDC in Mozambique, locally also known as the *Centro de Investigação e Transferencia de Tecnologia Agrárias do Umbelùzi* (CITTAU), was one of the first 14 centers the mainland actor constructed. After expressing interest to be among the first host countries in which this aid measure would be tested, the construction of the center officially was confirmed to Mozambique during a state visit of Hu Jintao in the early months of 2007 (Jiang, 2016: 23). A feasibility study confirmed the center's location to be the district of Boane a few months later, preparing for the construction of the center starting in 2009. In 2012 the center officially became an asset of the Republic of Mozambique, while the center's every-day activities started to be managed by *Lianfeng Overseas Agricultural Development Co. Ltd.*, a subsidiary of China's state-owned company *Hubei State Farm Agribusiness Corporation* (Jinyan and Wenping, 2016: 16).

Next to reportedly being quite successful in generating profit to finance its operations (see Jiang (2016: 70-71) for an overview of the commercial activities in which the center engages), as well as helping Chinese companies to enter Africa's agricultural markets (CIDCA and UNDP, 2018: 25), first studies also confirm that the center's training and display measures have had positive effects on Mozambique's overall agricultural growth (Chichava and Fingermann, 2015: 4). Financially supported by the Chinese government for the first three years, Mozambique's ATDC started to provide training and display sessions for local producers, technicians and officials only a few months after starting operations. Based on the believe that the country's agricultural development path most effectively is supported and sustained by educating smallholder farmers in Chinese agro-technology as well as sharing best-practice approaches, the center's managing company started to concentrate its efforts on this target group; resulting in that the center in its first four years of existence provided an annual average of around 6 to 7 training courses for local producers, in contrast to 3 for technicians and 1 for officials (Jiang, 2016: 66). While up to date, there exists no formal follow-up mechanism evaluating this aid measure in practice, basic feedback from beneficiaries of training sessions indicated "that they found the techniques they learned to be useful for their production increase" (*ibid.*). A recent study by China's International Development Cooperation Agency (CIDCA) and the United Nations Development Program (UNDP) on innovative agro-aid practices by the PRC (2018), also confirmed that the training sessions provided for by this center have had a positive impact on the country's overall agricultural output, with rice cultivation in the country showing "impressive yield increases, jumping from the before-training average or less than 2 tons per hectare of paddy to 7-9.7 tons after training" (26).

First studies on the center's agro-technology research measures, on the contrary, are less positive with the Chinese engagement in this area having caused tension (Jiang, 2016: 68). While the two sides, taking into account local ecological conditions as well as consumption patterns, had agreed that the center would conduct research on improved staple crop seeds, including rice and maize as well as test whether a number of vegetables and animal species could be adapted to Mozambique's local environmental conditions (Chichava and Fingermann, 2015: 4), the center's research activities became a source of discontent after stakeholders from Mozambique became aware of the fact that the center was testing more seeds imported from China than experimenting with how to improve local varieties (Jiang, 2016: 68). Despite the center contributing to there being more seeds on a local level in Mozambique available as well as to increase the country's overall yields (*ibid.* 79), Mozambique's Agricultural Minister, in an interview with the newspaper *Jornal Domingo* in 2013 stated: "I am not happy with the production. When I visited [the center] for the first time in 2012, we recommended that the center bid on more local varieties of vegetables, but I can see that this objective has not been followed" (Chichava and Fingermann, 2015: 4).

What first research attempting to grasp the development impact of China's ATDC in Mozambique thus shows is that from a general point of view, the CITTAU center lives up to the expectation of China's ATDCs to represent an important aid measure that can help African countries to develop their agricultural sectors as well as to help solve food insecurity. This is especially given the fact that the center prioritizes the capacity development of smallholder farmers and diffuses yield-enhancing technologies on a local scale. By prioritizing the latest and most yield-increasing seed varieties from China, however, Mozambique's CITTAU center also raises important development questions, including to whose benefit the center was constructed as well as whether and to what extent local farmers become dependent on China's improved seeds – questions whose answers might jeopardize the PRC's image within the country and hence the center's sustainability in the long-run. If research further was to confirm that the center indeed was to create dependency and hence primarily to sustain Chinese agribusinesses to expand their market position, the center's development potential for Africa would decrease significantly and hence would have to be re-evaluated. For this reason, continuous and profound research on this aid measure in the medium- to long-term is required.

4.3. The Agribusiness Model

The third model by means of which China engages in Africa's agriculture is the agribusiness model. As the name indicates, this model describes China's state-owned agricultural enterprises (SAEs) as well as other types of private agro-enterprises investing in Africa's agriculture (Jiang, 2016: 56). Agribusiness investment by Chinese companies dates back to the 1980s and initially was concentrated on a limited number of West African countries, in particular, Senegal and Guinea-Bissau (*ibid.* 76). While Chinese Foreign Direct Investment (FDI) flows targeting Africa's agricultural sector, as compared to other industrial sectors, remain low and only started to expand from fishery as the first investment area to grain crops around 30 years ago, the sector is prioritized as a strategic investment category under the FOCAC umbrella especially since 2006 (Bräutigam, 2009: 5; Buckley, 2013: 10).

Insofar as the PRC, under the FOCAC umbrella and through its 'Agriculture Going Out' strategy, a prominent branch of its 'Going Out' strategy initiated in 2001, actively supports Chinese companies to engage in agribusiness abroad, Chinese agro-companies engaging in Africa's agricultural sector can be considered part of a major state-led policy initiative (Jiang, 2016: 97). While, in contrast to the innovative agro-aid model described in section 4.2., China's MOA and MOFCOM do not have a direct say in an individual company's management or implementation strategies, they nevertheless steer Chinese agribusiness investments in certain agriculture-related areas, primarily by publishing action and investment plans as well as offering coordinative support (*ibid.* 87). Financially, Chinese companies are sustained to conduct agribusiness abroad especially by China's Export and Import Bank (EXIM Bank), the China Development Bank and China's Export & Credit Insurance Corporation (SINOSURE) (Bräutigam and Tang, 2012: 2). If considered together, what becomes visible hence is that an increasing number of state institutions and affiliated agencies – "through a diversity of methods from policy encouragement, financial support, tax and insurance measures as well as diplomatic backup" – actively work to drive forward Sino-African agriculture business cooperation (Jiang, 2016: 86).

While the concrete number of Chinese agribusinesses in Africa and the exact amount of Chinese agricultural FDI remain a source of much confusion, Jiang (2016) derives from China's MOFCOM online database that by 2014, 186 Chinese companies engaged in agriculture-related activities in Africa (84). Out of this number "101 companies focused on crop farming, while around 41 on fishery, 33 on forestry and 11 on animal husbandry" (*ibid.*). Focusing on the ones concentrating on crop farming, she finds that the majority of Chinese farms present on the continent today are located in East Africa and primarily engage in food crop production, with only 25% of the actors cultivating cash crops, such as cotton, rubber, sugarcane and palm oil. As she goes on to note, the official data available shows that the majority of "Chinese agro-investment projects in Africa are medium to small-scale" and that these projects by no means display the pattern of engaging in systematic 'land grabs' to counteract China's progressing resource constraint (*ibid.*). This is in line with the findings of an increasing number of recent studies attempting to track Chinese agro-investments in Africa, suggesting that in general "the scale of investments are much smaller than claimed, and further that where agriculture investments do exist, most production currently is not exported" but sold on local markets (Buckley, 2013; Bräutigam, 2009; Chatelard and Chu, 2015; Jiang, 2016).

As mentioned, China's government publishes action and investment plans as well as offers coordinative support to implement policy objectives inherent to its 'Agriculture Going Out' strategy (Jiang, 2016: 87). Three catalogs providing country-specific directives for FDI first were published by the MOA and MOFCOM in 2004 (Bräutigam, 2015: 62). While the catalogs are still only available in Chinese, they target five broad industrial sectors – including agriculture – and outline both specific sectors of interest to host country governments as well as China. Companies that follow the investment suggestions outlined in the catalogs "are more likely to be given priority access to Chinese benefits, including finance, foreign exchange, tax exemption, custom and immigration assistance" (*ibid.*). In respect to the key area of crop farming – that allegedly is of interest to China in order to guarantee its population sufficient amounts of safe and nutritious food (Rubinstein, 2009: 2) – five African countries, namely Cameroon, Ethiopia, Zambia, Guinea-Bissau, the DRC and Benin, are outlined as favored investment destinations (Bräutigam, 2015: 63). Given the fact, however, that for none of these countries rice, as the major staple crop consumed in China, is highlighted, Bräutigam (2015) concludes, that the PRC “is not encouraging Chinese firms to grow grains in Africa to feed its people” (63). This finding is supported by Jiang (2016), who reasons that “because of China’s high policy priority given to grain crops at home”, the country in its engagement on the continent is not interested in producing such in Africa (80).

In respect to this development model’s effects on the state of food security in Africa, the development benefits of Chinese FDI flows to the continent are far less obvious compared to those of previously examined aid measures. This is due to the fact that corporate actors do not have to comply with state-defined development objectives, unless they are part of legislation, and in general, are more flexible and unique in their motivations and capabilities. First and foremost, however, this is due to the tendency of private actors primarily being interested in capital accumulation to secure their own survival as well as to finance their expansion rather than to guarantee public-interest functions (Chatelard and Chu, 2015: 5). While this indicates that it is unlikely for agribusiness investments ever to result in positive development outcomes, there is widespread consensus today that FDI can be an important catalyst for growth in recipient countries, especially if embedded in national development plans and steered by host country governments (Cheru and Modi, 2013: 1). This claim remains disputed, but following the FDI-growth logic, Chinese agribusiness engagement in Africa in theory thus can sustain the continent’s countries in modernizing their agricultural sectors in two ways. On one hand, technology and knowledge transfer might be an unintentional development outcome for Africa brought about by the spill-over effect of Chinese agribusiness corporations engaging on the continent. On the other hand, Chinese companies, however, also might engage in corporate social responsibility (CSR) action and hence intentionally help African countries enhance their food security situations (Jiang, 2016: 54). In both cases, the private company provides the African country it engages in with much-needed capital and in most cases further leads to the construction and maintenance of critical infrastructure measures, such as roads and electricity grids. Whether empirical studies confirm that Chinese agribusiness investment flows foster technology and knowledge spill-overs in practice and hence drive forward agricultural development as one means to enhance food security in Madagascar will show the next sub-chapter.

4.3.1. FDI IN MADAGASCAR’S AGRICULTURAL SECTOR

Madagascar is rich in natural resources as well as arable land and due to its low labor costs and geographic location makes for an attractive destination for agricultural FDI (Chen and Landry, 2016: 2). While the 2009 political crisis temporarily stalled the country’s national growth and contributed to important international donor programs being suspended, the island country in recent years has returned to being politically stable and is considered to be investor-friendly (LIPortal, 2019). While Sino-Malagasy diplomatic relations are ongoing since the late 1970s, trade and investment relations between the two countries are continuously increasing; insofar that China today counts among the top 10 countries from where the island is receiving investment (Veek and Diop, 2012: 410). Madagascar’s mining industry is the sector that is injected with most of Chinese capital, while less than 3% of investments end up in agriculture and livestock (Chen and Landry, 2016: 4). Accordingly, and despite the country's large areas of fertile land, only a few Chinese companies engage in agriculture-related activities on the island, primarily concentrating their corporate efforts on the country's key agricultural industries, namely rice, sugar cane, aquaculture, cattle breeding and cotton (*ibid*. 10-11). As first research indicates it to be the case also in other African countries, the majority of Chinese firms in Madagascar's agricultural sector are small to medium-sized and primarily operate as 'traders', which means that they primarily export and import Madagascar's agricultural goods, without processing them on the island.

While Chinese agribusiness FDI flows, in theory, are associated with the promise to transfer crucial agriculture-related knowledge and technology to Africa, first studies evaluating whether this is the case in Madagascar, find that this is not an outcome of deliberate action of the majority of Chinese firms. Indeed, research finds that Chinese agribusiness corporation structures only at rare occasions intersect with Madagascar's national economy, so that backward linkages are only weakly present on the island which represent an important means for technology transfer insofar as they allow Chinese companies to "integrate and upgrade the technology and capacity" of local SMEs by "enforcing higher standards for products, training and direct provision of hardware" (Chen and Landry, 2016: 18). Only in the industrial sectors of cotton production and aquaculture, Chinese FDI flows have started to result in the emergence of small industrial clusters, identifiable by forward and backward linkages with other foreign and national firms and hence the creation of value chains, which also have started to span neighboring island Mauritius (*ibid*.).

In respect to knowledge transfer, an outcome that can be brought about by, among other means, on-job or formal technical training sessions, first research studies indicate that the engagement of Chinese agribusinesses in local skills development rarely exceeds short-term training units that are provided to local employees on an informal basis within their probation time (Chen and Landry, 2016: 16). Exceptions are the regularly organized public demonstration activities in practices such as hybrid rice cultivation by *Hunan Agri*, a Chinese investment company operational on the island since 2007 (*ibid*.). However, while the for-profit organization emphasizes that its corporate social responsibility actions are guided by the vision to help Madagascar improve its food security situation as well as increase local farmer's income, the company's engagement in supplying local farmers with improved hybrid rice seeds, fertilizers and other yield-enhancing inputs, clearly also serves the purpose of boosting its own sales. Whether the company's public training activities hence really are intended to benefit Madagascar's local population as well as whether the company's local development impact is of long last remain important development questions; especially when taking into account the aspects that due to low domestic competition *Hunan Agri* is free to set the prices of its products as well as that its improved seeds and other agriculture-related inputs will only be available to Malagasy farmers until the day the company decides to leave the market.

What can be noted conclusively in respect to the development impact of Chinese FDI, is that while in theory Chinese agribusiness engagement in Africa can be a valuable input for food security on the continent to be enhanced – especially when considering that it provides destination countries with much needed capital and can be a source for smallholder farmers and SMEs to obtain cheap technology, hardware of good quality as well as yield-enhancing seeds – the results of first research studies evaluating whether this is the case in Madagascar suggest that the development outcomes for the local population might be less positive than one would expect. In respect to technology transfer this doubt is sustained by the observation that Chinese agribusinesses only marginally interact with national economic structures; while in respect to knowledge transfer, it is the fact that Chinese agribusinesses primarily employ unskilled labor to cultivate and harvest agricultural goods as well as to guarantee machine operation. This means that Malagasy employees neither are trained in managerial skills, nor taught how to set-up their own businesses. What is hence visible is that Chinese companies only take very little deliberate action to upgrade the capacity of Madagascar's local workforce. Consequently, in the case of Madagascar, the agribusiness model neither can be identified to support the independent capacity of the island country to develop its agricultural sector, nor to solve persistent food security issues. Nevertheless, what needs to be mentioned in respect to this economic cooperation measure is that the benefits of Chinese corporate actors in Africa are highly case dependent and hence that there is the need for further research on how individual Chinese firms, especially medium to large-scale ones, interact and impact actors in their immediate environment.

CHAPTER 5: DISCUSSION

Evaluating the findings of this thesis's analysis against the question – Does China's agricultural development package contribute to food security in Africa? – research results indicate that on a theoretical level all of China's agricultural aid and economic cooperation measures, translating the country's three bi-lateral development models central to its agricultural development package into action, can be identified as valuable insofar as they hold the potential to develop Africa's agriculture and hence help the continent's countries to solve their food security issues. This theoretical claim can be made and justified by the fact that all examined aid and economic cooperation measures take action in at least one of the four key medium areas – i.e. finance, technology, infrastructure and know-how – that are outlined in the AU's-CAADP for agricultural productivity on the continent to be improved and hence food security to be enhanced. On first sight and in theory, the analysis of this thesis thus confirms the assertion of China's government which claims that its engagement in Africa's agriculture is a positive trend, insofar as its agricultural aid and economic cooperation measures represent "effective tools to ensure food security, eradicate poverty and improve people's livelihoods in Africa" (FOCAC, 2004).

However, as was mentioned at various points in this thesis, China's enhanced presence in Africa's agriculture only can be considered truly valuable if the country's agricultural aid and economic cooperation measures sustain agricultural smallholders and SMEs to produce more agricultural goods to be consumed on local and regional markets. This belief is in line with the perception of, among other international development programs, the AGRA Program, that explains its viewpoint as follows: "A large farm, large agribusiness approach would leave millions of small farms and businesses without adequate livelihoods, whereas an inclusive approach would engage more of them in productive employment, create more attractive jobs for young people, help reduce poverty, inequality and food security, and contribute to better nutritious outcomes" (AGRA, 2017: 3). While disagreement prevails with respect to how best to release Africa's latent potential in agriculture, with some scholars advocating for a transformation of the sector by "emphasizing the advancement of industrial agriculture, mechanization and chemical fertilizers" on one hand, and others "seeing great potential in small-scale farms" on the other hand (Cheru and Modi, 2013: xi), this thesis, as stated previously, aligns with the latter understanding, believing in supporting smallholder farmers and SMEs to be the most effective way to guarantee the continent with more human inclusive growth opportunities and hence to ensure food security for the average African in the long-run.

As the analysis of this thesis has shown, supporting agricultural smallholders and SMEs is not a bindingly defined target of the Chinese government. However, as the first insights of this thesis into China's agricultural development package suggest, supporting such actors is attached great importance, as is visible, *inter alia*, in the training and display measures provided for by China's ATDC in Mozambique. The assumption that China's aid and economic cooperation measures in Africa predominantly benefit agricultural smallholder and SMEs, in contrast to large agribusinesses, moreover can be supported by the fact that China's agricultural aid and economic cooperation measures in their majority take action to sustain the development of agricultural extension systems, an important means to disseminate agriculture-related knowledge among ordinary smallholder farmers and SMEs more effectively as well as to provide them with improved seeds, fertilizers, technology and other agricultural inputs. An exemption to this pattern constitute the activities of China's corporate actors in Madagascar, who in their engagement on the island neither seem incentivized to foster backward linkages with local actors to enhance technology and knowledge transfer, nor to develop growth enhancing value chains that could facilitate the integration of the island's SMEs into local and regional markets. Nevertheless, in the grand scheme of things, what can be derived from this thesis's analysis is that China's agricultural aid and economic cooperation measures aim to improve the productivity of smallholder farmers and SMEs on the continent and hence to sustain them to satisfy the increasing demand of local and regional markets. While acknowledging practical implementation problems, the rather localized impact China's agricultural aid and economic cooperation measures are likely to have and there being the need for further and continuous research on the development outcomes of the majority of China's agricultural aid and economic cooperation measures, this thesis consequently determines the potential positive impact of China's agricultural development package on the macro-economic availability of food in Africa as significant.

The positive outcome of this thesis sustains the claim that China is a valuable development partner to Africa. In turn and on first sight, this work's findings substantiate the third explanatory approach that was outlined in this thesis's literature review and which conceives China's enhanced presence on the continent as a positive development. Given the fact that this thesis did not compare the effectiveness of China's agricultural aid and economic cooperation measures to the ones of Western donor countries, however – which would be an important task for further research – this work is not able to confirm the accuracy of this third explanatory approach entirely, as it also claims that China's agricultural aid and economic cooperation measures are more effective in comparison to development tools of 'the North'. What the analysis of this thesis, however, moreover *does* confirm is that China's interest in supporting African countries in developing their agricultural sectors clearly also is motivated by "domestic and foreign policy goals and strategies, including diplomacy, soft power and boosting overseas commercial activities" (Jinyang and Wenping, 2014: 32). Consequently, this thesis also partly confirms the second explanatory approach this thesis outlined and that explains China's enhanced presence on the continent as part of the country's quest for enhanced political and economic power. China's vested interests indeed are visible in all three bi-lateral development models with e.g. the Chinese government providing technical agricultural aid measures out of the interest to improve its public image on the continent as well as to foster diplomatic relations or the country's ATDCs being set-up in a way to facilitate the entry of Chinese companies into African markets. What can be noted conclusively hence is that the findings of this thesis point to the observation that one needs to understand China's enhanced presence in Africa's agriculture as part of a long-term strategy that holds the potential to significantly advance the socio-economic development of both China as well as African partner states.

What is important to note moreover, however, is that by concentrating on enhancing Africa's state of food insecurity primarily by means of "advancing agro-technology, strengthening agro-technology education, research and extension", China's agricultural development support to Africa builds on the country's own development model (Jiang, 2016: 57). Based on the fact that China can look back on an impressive growth trajectory and the mainland actor has managed to guarantee food security for most of its people, China's agricultural development model generally is perceived as a model of success. However, caution needs to prevail when replicating this model, as it "has been achieved at the cost of heavy depletion of water and soil resources, intense fertilizers use with associated high pollution and energy use, and social exclusion of large fractions of society" (Buckley, 2013: 20). While it remains unclear whether China replicates the same socio-environmental costs through its three bi-lateral development models in Africa, African states should be aware of these potential adverse effects and their long-term implications for the continent's development as well as wellbeing of its people. In order to ensure that China's agricultural development package in practice hence also lives up to its development promises, including among other outcomes, food security, it is crucial for African states to actively engage with and continuously monitor Chinese state and corporate actor's presence in their agricultural sectors.

CHAPTER 6: CONCLUSION

By conducting an impact assessment study of China’s three bi-lateral development models central to its agricultural development package on food security, this thesis contributed to the literature surrounding China’s enhanced presence in Africa with an insight into how the relationship plays out in agriculture. In doing so, this thesis added an important piece to the broader puzzle of how one should understand China’s enhanced presence in Africa, which continues to constitute a subject of intense debate especially since 2006 when the first FOCAC Summit was held in Beijing. More thoroughly investigating how the country’s engagement turns out in agriculture was determined an important task, especially considering the fact that the mainland actor’s activities in agriculture strike at the heart of the debate’s main concerns, bringing to the fore perceptions on both Chinese expertise and know-how in agriculture and development on one hand and Chinese state businesses’ self-interested and controversial practices on the other. At the same time, however, this choice also was made based on the ground that China’s activities in Africa’s agricultural sector thus far neither have received much attention, nor been examined systematically.

Addressing this gap, this thesis evaluated the impact of China’s agricultural development package on food security. By following this approach, this thesis diverged from the common trend prevalent in the literature and mainstream media of depreciating the value of China’s development packages solely on the ground for what they are not, without relying on independent research. Consequently, this work’s importance lies in the fact that it did not only provide for a more evidence-based understanding of the phenomenon and presented African countries with an overview of the main opportunities and risks China’s agricultural aid and economic relations entail, but also as it generated an important argument against which the highly ideologically influenced debate can be weighted. Given the fact that this thesis determined the potential of China’s agricultural development package to develop Africa’s agriculture and hence to sustain the continent’s countries to solve their food security issues as significant, this thesis moreover is valuable insofar as it refutes the conventional pessimism the relationship generally is associated with and hence provides ground for further debate.

Nevertheless, this thesis is not devoid of limitations, insofar that this work’s positive outcome essentially needs to be considered as a first and theoretical insight. First and foremost, this is due to the fact that this thesis’s assessments were made based on desk study research and heavily relied on secondary literature examining how China’s three bi-lateral development models play out in practices. The rather limited scope of this this thesis, only allowing for China’s agricultural aid and economic cooperation measures to be evaluated in the country-specific contexts of three African states, furthermore constraints the generality of this thesis’s outcome. In order to be able to make a more general statement in respect to whether one can say that China’s enhanced presence in Africa’s agriculture is positive as well as that the country’s agricultural development package really contributes to food security, more empirical research needs to be conducted, especially long-term field studies covering a broader range of countries.

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