A Review of Organic Growth in China's Agricultural and Food Systems

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ABSTRACT

China is a very large country with a long farming history. In this paper I focus on the growth of organic agriculture in the context of the Chinese agriculture and food systems. In the early 1990s strong market-oriented, large-scale conventional supply chain agriculture was established to meet food security. Due to several food safety and environmental concerns, during the 1990s various approaches to develop organic agriculture were undertaken by both the government and civil society, NGO's and activists included. Chinese consumers are mostly buying organic in response to food safety concerns, rather than from environmental concerns. In this review a clear picture is presented of the complicated developments that took and take place in China. Constraints for the farmers to develop the organic farming are less policy support from government, lack of substantial and practical techniques to support farmers with substantial technologies for pest, disease and weed control, and soil fertile maintenance, and high costs of certification. It is observed that the 'top-down' government initiatives and the 'bottom-up' civil society movements to a large extent diverge. However, there are clues for the view that these developments intersect. To make sure that organic agriculture is effective in view of the basic ancient Chinese values of food security, I conclude that it is essential that the bottle-necks are solved and that the organic sector show increased production and productivity. In order for the organic sector to be a serious party to contribute to the basic Chinese food security, I find it necessary to switch to ecological intensification. I even want to claim that transformation of ecological intensification towards conventional agriculture could be another clue for the view that the seemingly contrasting developments of organic and conventional agriculture grow towards each other.

Key words: Organic and Conventional Agriculture, Food safety, Certification, Ecological Agriculture

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INTRODUCTION

During the last fifty years, the Chinese agricultural and food system has undergone tumultuous transformations to achieve the policy goal of national food security and rural poverty alleviation. We saw a transformation from a collectivization of agriculture, via de-collectivization, modernization, intensification, quantitative goals of production tied to a number of food safety and environmental challenges, towards quantitative and qualitative dual goals, where organic agriculture is one of the alternative approaches. This article examines developments in the Chinese agricultural and food system in general, and in the organic farming sector in particular.

China is a very large country with a long farming history. Agriculture remains a very important sector. In 2018 rural population relying on farming accounted for 40,3 % of the total population (FAOSTAT, 2018). China's agriculture was and still is characterized by a huge number of smallholder farmers with extremely small farms of just 0.6 ha, working in very diverse contexts. After shortages of food, China started a policy reform and opening in 1978 and an agricultural modernization program in the early nineties. This resulted in intensification of the agricultural processes, a strong market oriented, large-scale, supply chain agriculture to meet food security and consumers' demands. The input of agrochemicals (fertilizers and pesticides), agricultural machinery, and fossil fuel has increased unprecedentedly (Zhang *et al.*, 2007), and threaten the sustainability of agriculture. The rapid agricultural intensification with heavy use of pesticides undermined ecosystem services sustained by traditional farming, putting both food safety and biodiversity at risk. Several studies have mentioned the negative effect of pesticides on biodiversity: Geiger *et al.*, 2010); Kremer, 2018; Kumar *et al.*, 2020). Due to several food safety concerns various approaches to develop organic agriculture were undertaken, both by the government as well as by civil society-based initiatives. Next to modernization, the government has chosen a 'top-down' ecological strategy as a reaction to the effects of the negative environment and food safety/ health problems, and for a strategy to conserve small-scale agriculture. Civil society based initiatives by Non-Governmental Organizations (NGO's), experts, scholars and farmers attempted to develop ecological agriculture with strongly reduced external inputs. Scott *et al.* (2018) typify these

initiatives as 'bottom-up'. The switch to organic agriculture was effective with regard to its growth. In 2019 China ranked, with 2,216 million hectares, seventh as the country with the largest area of organic farmland and fourth as the country with the largest markets for organic food (Willer *et al.*, 2021)

In recent years, organic products have gained popularity among Chinese consumers. The development of the Chinese organic sector is a long and complex story. In this review article, I can only give a survey of the main points of this development. The purpose of this article is to provide a general view of the past, present and possible future of the organic sector in China, in relation to the development of the agricultural and food sector and the rural areas. I have listed a number of issues that need to be addressed to ensure that the current high-growth organic sector in China remains a thriving sector in the future. The COVID-19 pandemic created big challenges for China's economy and created a significant change in people's lifestyle in 2020. E-commerce, especially live-streaming, played an important role in stimulating the economy. COVID-19 raised the issue of healthy food consumption, making the organic agricultural sector to become a hotspot for investment (Zhang *et al.*, 2020).

Agricultural development in China

Situations in China are not easy to understand without looking at historic developments (Shi-ming and Sauerborn, 2006). All forms of agriculture in China are based on 4000 years of traditional practices - such as crop rotation, compost application with matter recycling - and traditional ecological applications (Qiao, 2011). This enabled maintenance of soil fertility and healthy environments through thousands of years of cultivation without modern inputs. Scott *et al.* (2018) pay attention to the developments of the agrofood system in China during the last century, which were very tumultuous. Parts of China suffered from major famines, like those in North China in 1920-1921, in the Yellow River region in 1935-1936 and in Henan in 1942-1943 (Li, 1982). The most notorious famine was the Chinese Great Leap Famine of 1959-1961 (Gráda, 2008) (Wemheuer, 2010). The collectivization of agriculture in the People's Republic of China led in the 1970's to shortages of food and stagnation of China's agricultural output. The Household Responsibility System (HRS), which was a process of de-collectivization, allocated rural land to households. Since 1978 China has carried out step by

step the policy of reform and opening. The communes were broken up in favour of small, family-run plots with profit incentives tied to production and market-determined prices. This led to rapid growth of agricultural productivity in the eighties. Note that in China the farmers do not own land. They have the right to cultivate and manage the land designated to them. Since the 1990s' they are allowed to lend their land to other people but not selling. This small-scale agricultural household-based production system was pushed aside when the Chinese government started an agricultural modernization program in the early nineties. This modernization of agriculture was motivated by the fear of famine. The modernization strategy of the central government aims at technology based intensification and increased farm size to improve both land and labour productivity. The purpose of the program was to grow to market-oriented, large-scale, supply chain, specialized production of higher value goods with a view to food security. After joining the World Trade Organization (WTO) in December 2001, China, as a country with limited arable land and a large rural labour force, has played a greater role in world agricultural trade. In general, China tends to have a comparative advantage in the production of labour intensive crops, such as fruits and vegetables, and a disadvantage in the production of land intensive crops, such as grains and oilseeds. And actually, China fruit and vegetable industries show large growth both in production and export sectors (Azam and Shafique, 2018). The most important imports, however, are soybeans and cotton products, and not grain. Indeed, China has made the choice to maintain its independence in cereals at the expense of other grains, such as soybeans (Jamet and Chaumet, 2016). Here, we must remember that grain security still is at the centre of government policy.

China's food policy is centred on national food security. It is quite important to understand the Chinese political structure, which means that the Secretary of the Communist Party of China (CPC) is the real policy maker, the number one leader of the provinces and cities. To secure the supply of grain, cotton, cooking oil, sugar, and meat, the system of provincial governors assuming responsibility for food security and city mayors for the supply of non-staple food will be implemented (NDRC, 2021). Ensuring the supply of grain and other major agricultural products is reflected by various policies: farmland preservation, food reserve and circulation governance, and agricultural policy support.

The vertical integration and agro-industrialization process, mainly executed by large enterprises and farmer's cooperatives, led to increased production, but also to different challenges. Chinese government tried to ensure food production by encouraging the chemical input and controlling the grain planting area. Intensive use of modern inputs, use of fertilizer, increase of herbicides, fungicides and pesticides, and agricultural plastic characterized the unambiguous embrace of productivity drive (Wossink *et al.,* 1998; Wu *et al.,* 2019). From the National Bureau of Statistics of the People's Republic of China (2018) it appears that China even became the world's largest consumer of chemical fertilizers and pesticides. We can understand this food security driven form of industrial agriculture when we go back to China's historic and social background. The relationship between food security and the moral authority of leadership is the basis of Chinese philosophy for over 2000 years, as Mencius already demonstrated in his 'Mandate of Heaven' (Chan, 2002). Securing the food supply, protecting against famine and maintaining harmony are therefore essential for the state to maintain political legitimacy. We can also understand the use of chemical fertilizers and pesticides to increase agricultural production because in China the area of farmland per capita is much lower than the average farmland per capita in the world. Compared with the average agricultural land per capita in the world of 6950 m2 in 2010, the agricultural farmland per capita in China amounts to 3946 m2 per inhabitant (calculated from https://www.statista.com/statistics/263765/total-population-of-china/ and https://data.worldbank.org/indicator/AG.LND.AGRI.K2), while for a healthy diet, with reduced animal protein consumption, the required land use is 5280 m2 per capita, using nature and environmentally friendly production methods. A vegetarian diet requires 4992 m2 per inhabitant (Donkers, 2020). This means that in China there is far too little agricultural land available for a healthy diet now and also in the future, when the population will have increased even further and the surface area of farmland is already under pressure.

As was the case in western countries (Donkers, 2015), the boosting production has serious consequences and has resulted in huge environmental challenges: long-term unsustainability, overuse of chemical fertilizers and pesticides, land and water pollution and soil erosion, loss of nutrient and organic matter, heavy metal contamination of soil. Moreover,

the 'modernization' led to several foods safety scandals (Zhang *et al.,* 2015; Yan, 2012). Due to these food safety scandals growing public anxiety arose around food safety. Among the food scandals there were food hygiene problems, unsafe foods, associated with the use of fertilizers and pesticides and poisonous foods. An infamous example of contamination of milk powder started in 2008. To reduce cost, intermediaries diluted milk with water and melamine, an industrial waste, which can cause a misleadingly high protein reading. The numerical value of the protein content did not pass quality inspections (Lu, 2011). According to WHO (2008) 40 000 infants sought medical treatment. Scott *et al.* (2018) indicate that processors and producers to boost profits intentionally contaminate poisonous food. Food scandals occur with the knowledge of government officials and are perpetuated by the existence of a 'helix' of industry, government and university relations (Cheng, 2012, p. 257). Before 1966 senior government officials above a certain level received safe food as a successor of Mao's 'special supply of food' designated for government officials and intellectuals. This kind of food is publically not served, but may be available for a small number of people. Most people have never been provided with special foods. Since 2012, the anti-corruption movement has also prevented this. The food scandals resulted in generalized distrust that still continues, despite various measures. Scott *et al.* (2018) observed that in China among consumers there is mainly growing public anxiety around food safety and less about environmental conservation and social justice. Though, currently there are growing environmental concerns especially among higher educated consumers.

Since the last century I observe two important developments: measures in the area of conventional agriculture and the emergence of ecological agriculture. In the area of conventional agriculture food production has successfully achieved a number of years of continuous growth. The Chinese government has recognized the seriousness of the overuse of fertilizer. In recent years, the Chinese government has put forward the decision of reducing the amount of fertilizers and increasing the efficiency on the premise of stable food production growth and adequate protection of food security. In 2015, the Chinese government promulgated the Action Plan for the Zero Increase of Fertilizer Use. Other measures in the area of conventional agriculture relate to more attention for smallholder

farmers. During modernization most Chinese farms remain very small and the work remains highly labour-intensive and difficult. Currently, China has about 200 million farm households with an average land allocation of just 0.6 ha in 2010 (Huang *et al*, 2012). Social challenges for small-scale agriculture arise: a decline of the agricultural labour force and damaging rural communities, adulteration of processed foods, crisis of confidence in safe food. The exodus of labour is disastrous for rural households because they need their land as a social safety net. This urged the government to develop an alternative strategy focusing on the conservation of small-scale agriculture (Wang, 2017).

The emergence of ecological agriculture led to government activities and civil society-based initiatives to cultivate agricultural products in an ecological way. China started off as large producer and exporter of organic products and later has developed sizeable internal organic markets. The various approaches of organic agriculture from the 'top-down' and 'bottom-up' initiatives resulted in the fact that China worldwide is now one of the top 4 markets for organic food, after United States of America, Germany and France. In 2019 China ranked, with 2,216 million hectares, seventh as the country with the largest area of organic farmland, after Australia, Argentina, Spain, USA, India and France. This is 0.92 ha less than in 2018, when China ranked third, after Australia and Argentina (Willer *et al.*, 2020, 2021). That decrease from 2018 to 2019 was mainly the result of the withdrawal of a large area of certified organic pasture lands, as was the case in 2004 and 2005. The certification of a large area of pasture in the previous year did not bring real benefit to the farmers as consumers all know that the pasture lands are already organic even without certification. That's why the farmers of the pasture did not apply for certification the following year. Usually, the local governments in the first year promoted this with subsidies on certification and then with no subsidies in the next year. This fact indicates that the Chinese organic sector is still not in its mature stage. In table 1 selected key crop groups and crops area (in ha) in organic agriculture in China are presented.

Table 1. Selected key crop groups and crops area (in ha) in organic agriculture in China)*

Crop	2016	2017	2018	2019
Cereals	811,839 (1)	905,000 (1)	968,000 (1)	810,000 (1)
Citrus fruit	14,403 (2)	4,100 (4)	11,963 (3)	11,812 (4)
Dry pulses	-	330,000 (1)	59,000 (3)	70,000 (3)
Temperate fruit	97,880 (1)	22,400 (3)	51,022 (1)	116,000 (1)
Tropical and subtropical fruit	28,403 (2)	-	-	34,000 (1)
Grapes	20,025 (4)	24,500 (4)	19,888 (4)	14,000 (6)
Oil seeds	393,500 (1)	167,000 (1)	478,000 (1)	466,000 (1)
Vegetables	63,334 (3)	279,300 (1)	43,602 (3)	55,363 (3)

**) Between brackets the ranking number in the countries with the largest organic area is mentioned*

Source: FiBL surveys 2018-2021 (Willer and Lernoud, 2018, 2019, and Willer et al.*, 2020, 2021)*

Among others it appears that during the whole period China has the largest area of organic cereals and oilseeds. China reported a large increase of its organic dry pulses area in 2017 compared to 2016. In 2017 as compared to 2016 organic oil seed area dropped substantially. This was mainly due to more imports from the USA.

Impact of organic products is growing rapidly in China. We see an increase in foreign certification under China organic standards. In 2019 there were 15 international certification bodies that conduct certification business in China (Zhang *et al.*, 2020). More and more organic products are sold in high-end supermarkets and on-line platforms. Zhang *et al.* (2020) mention about the channels of organic food that organic stores is not a good channel in China at present.

Large supermarkets are an important sales channel for organic food. Through family membership some families are provided with periodic organic food delivery. This is a better way to build trust. The fixed consumption and quota of members are relatively high, and the cooperative relationship is stable. Internet has a good development in China. At present,

large online platforms such as Jingdong and Tmall (formerly Taobao Mall, a Chinese online shopping website owned by Alibaba) have sales of organic food. With the rise of the mobile Internet, there are many online platforms dedicated to selling organic food. Many businesses use social media to sell organic products, such as WeChat, Weibo, Douyin, etc. Also Kan and Chen (2019) mention that organic farming in China is benefitting from the online shopping boom. Organic farmers make use of the direct-to-consumer model facilitated by the Internet. E-commerce sites are changing their retail model in ways that compete with organic farmers. The big e-commerce websites are reacting to the opportunity. There are now more than 50,000 traders selling farmed produce on Taobao, with 6,460 of them specializing in organic goods (Kan and Chen, 2019). For small-scale farmers it is too expensive selling on the big e-commerce platforms. They don't produce enough and they are worried that working with those platforms could lose too much of the produce to wastage in the logistics chain.

Government initiatives concerning organic agriculture

Since the eighties of the last century an approach by the government to ecological and organic sector development was set up because the state could not deny the food safety concerns. Central and local governments' policies focus on ecological development and take more interest in promoting organic farming. The Environmental authority from the perspective of rural environmental protection and nature conservation initiated the Chinese organic movement. Later, food safety became people's main concern in promoting organic, due to China's economic development and people's growing awareness of food safety and exploring existing food safety issues. To support ecological agriculture in general, national organic standards and management rules have been implemented. Some local governments have local policies on promoting organic agriculture. Different authorities are currently involved in certification of organic products. See table 2 for an overview of the development of important organic food standards.

Table 2. Development of important organic food standards

Year	Organization	Establishment	Function
1989	Rural Eco-Environment Division	Established by the Nanjing Institute of Environmental Sciences under the National Environmental Protection Agency (NEPA) of China (now the Ministry of Ecology and Environment)	After 10 years of researches and practices the Rural Eco-Environment Division joined IFOAM. First organic organization in China.
1992	China Green Food Development Center (CGFDC)	Established by Ministry of Agriculture	Provision of certification services for green foods. Application of quality certification.
1993	CGFDC		CGFDC became IFOAM member.
1994	Organic Food Development and Certification Center (OFDC)	This was the former Rural Eco-Environment Division	Provision of organic certification services. Publication of its organic standards.
1995	NEPA		NEPA issued the 'Regulation for Management of Organic (Natural) Food Labeling', which is the first sectoral government organic regulation of China.
2001	State Administration of Environmental Protection (SEPA)		SEPA issued the 'Regulation on Management of Organic Food Certification'.
2001	Certification and Accreditation Administration of the People's Republic of China (CNCA)	Established by State Council of China	Authorized to exercise administrative responsibilities of undertaking unified management, supervision and overall coordination of certification and accreditation activities across the country.
2005	CNCA		Introduction of China National Organic Standard of Organic Product and The Rule on Implementation of Organic Products Certification.
2006	Ministry of Environmental Protection		Regulations of NEPA and SEPA were expired and were transferred to CNCA according to the arrangement of the State Council.

2011	CNCA		Revision of the National Organic Standard. A second revision is effective from 2019 Started the 'Establishments of Demonstration Areas for National Organic Products Certification' program, which increased the number of pilot counties.
2018	State Administration for Market Regulation (SAMR)	CNCA merged into the SAMR	Implementation of a policy of 'easier entrance but stricter supervision'.
2019	SAMR and Standard Administration of China (SAC)		A revised national standard for organic products is published (GB/T 19630-2019), that will take effect on January 1, 2020.
2020	SAMR		On September 21st, 2020, SAMR launched the Organic Product Certification Promotion Week, with the slogan 'Guard the Green Water and Mountain, Share the Green Life'.

Source: Table compiled from various sources, mainly from Zhang et al. *(2020)*

Farming management and certification are essential for organic agriculture development to make sure that farming practices are compliant with organic regulations. In China in 2019 the launch of the third version of the national organic standard was a significant achievement. Currently, CNCA is, under the State Administration for Market Regulation, the only one national authority supervising organic sector in China. Any sold product in the market must meet the national organic standard and must be labelled with a unique digital identification number. Certification Bodies need to be registered in CNCA before they conduct organic certification. Accreditation is not a mandated requirement. However, supervision measures may be more strictly implemented to those Certification Bodies without accreditation.

The central government has geared its efforts towards developing rural areas by promoting organic agriculture. According to the 'Two mountains' theory highlighted by the President Xi Jinping (Xiang-chao,

2018), the annual 'No. 1 central government policy' and the 2020 'Agriculture and Rural Green Development Key Points' of the Ministry of Agriculture and Rural Affairs of the People's Republic of China, both emphasize enhancing certified organic management. On September 21st, 2020, the State Administration for Market Regulation (SAMR) launched the Organic Product Certification Promotion Week with the slogan 'Guard the Green Water and Mountain, Share the Green Life'. 2020 was the first time that one of the provincial governments - Jiangxi Province - stated that organic vegetable certification should be stimulated by their policy 'developing vegetable production in a high-quality way'. China is seeking more international cooperation in the organic sector, based on the 'One Belt and One Road' national policy (Imam, 2020). Many organic products were shown in the 3rd China International import Expo in Shanghai in 2020. The SAMR launched o a project to compare China's organic regulation and management system with the IFOAM Norms and the U.S. National Organic Programme (NOP) standards.

There are currently three types of agricultural production (including imports) with associated legal standards in China. 'Organic' is the strictest standard and requires organic certification bodies, inspectors and operators to comply with Chinese national regulations. No synthetic chemical additives or pollutants and products involving genetically modification technologies are permitted. Full traceability is provided by a unique barcode. 'Green food' is a specific Chinese standard allowing limited quantities of synthetic additives to crops and the land on which they are grown. 'Pollution Free Agricultural Food' was a standard where pollutants, additives and toxic residues must remain within limits set by national standards for safety. This certification was stopped in 2019 as the Ministry of Agriculture and Rural Affairs believes it should be the minimum standard and requirements for all agricultural products. In addition, there are also 'Ecological products' that do not follow any national or local standards and are subject to no inspections. The CGFDC, which oversees organic food standards and applies quality certifications for green food, joined the *International Federation of Organic Agriculture Movements* (*IFOAM* - Organics International) in 1993 and currently has set up food regulatory agencies, commissioned quality inspection agencies and green food producing environmental branches. The IFOAM Norms form the basis of the Organic

Guarantee System of IFOAM - Organics International. The IFOAM website is available at: https://www.ifoam.bio/our-work/how/standards-certification/organic-guarantee-system/coros. IFOAM Asia launched the IFOAM Country Office to enable better networking in China. In 2020 the IFOAM Asia offices in China and the Philippines have been legally consolidated and are in full operation (Willer *et al.*, 2021). China has now fully implemented organic regulations on organic agriculture (Willer *et al.*, 2020). Though not a government initiative, Demeter certification lately received a strong interest. In 2019 in China 7 farms with a total area of 108 ha, 1 processor and 1 distributor were under bio-organic management and have a Demeter certification

The market supervision surveys of national authority CNCA have showed much better results with 95% of the samples collected from marketplace in compliance with organic standards. All the certificates can be traced on the national CNCA's website. China has now an advanced sourcing system to trace certified products since each package of organic product sold in the market must be attached to a designated unique number from which you may get all necessary information of the organic status of the product. Of course, this is only an end of pipe control; it does not solve the problem from the root if the certification itself is not qualified. It leads to another issue of certification integrity. In China, until 2019 the number of organic product Certification Bodies (CBs) has reached 85 that are registered by CNCA for conducting organic certification (Zhang Y, 2020). The supervision on those CBs is not only a tough issue in China but also in the other parts of the world as well. Nowadays, the supervision and punishments against fake certification (even failure in certification) are getting serious and almost no CBs dare to "sell" certificates. Punishment mechanisms, such as withdrawal from market permanently were improved to increase cost of cheating (Zhang Y, 2020). Solving the confidence problem is key to getting more people to eat organic. Measures are taken to address these concerns. As an example, a company displays organic certificates in store, and customers can scan a barcode to view information such as how the product was planted and harvested. The system is now unique in the organic world. It indicates, among other things, which certification body has certified the product, for which year; the expiry date of the certification; the amount of products in the package and also the web link to the producer

(processor) and the certification body.

Now, group certification (a certain number of small-scale farmers can get organized and be certified as a single entity) is required to be inspected annually. This will be helpful for smallholders to access the domestic market. To improve the efficiency of organic certification and farm management, Zhen *et al.* (2020) established a risk-based indicator system (an organic certification catalogue) of organic crop production. This risk-assessment system follows Chinese organic regulations and distinguishes between dimensions (production, management and environment), themes and indicators. They observed that the three highest risk themes were plant protection, detection and soil fertility management. According to the authors top indicators were: pesticide detection rate, nutrient satisfaction rate, the proportion of non-chemical treatment, the severity of crop diseases, pests and weeds, and the quality of soil environment. In the study of Zhen *et al.* (2020) it turned out that chemicals application including pesticides and fertilizers was the main concern in organic production and certification. The results will provide producers, inspectors, and certifiers with useful references to reduce the risk of non-compliance, and increase the integrity and credibility during organic production and certification.

The initiative to build up an ecological and organic sector was originally initiated for export. The first export of a certified organic product (tea) took place in 1990, using the Netherlands' SKAL organic certification. An example of an export-oriented organic enterprise with a full value chain operation, contract farming and high quality organic vegetables for export and for high-income domestic consumers is mentioned by Song *et al.* (2012). It is one that requires formal market channels, certification, trademarks, advertising etc., just like conventional enterprises. Inland organic food started in the late 1990's and was only available in large urban centres and was consumed especially by upper- and middle-class individuals. Some local governments have pursued favourable policies and provided subsidies and technical services for organic agricultural development. For example, partly due to the efforts of the local government, Wanzai County in southern China has become one of China's most important organic agricultural production areas (Qiao *et al.*, 2019). Qiao (2011) points out that government agencies such as the Ministry of Commerce and the Ministry of Science and Technology are increasingly involved and have issued policies

to promote the development of organic farming in China. However, there is no special national policy to promote the organic sector, although public support is essential for the development of organic farming. Scott *et al.* (2018) emphasize that support from different levels of government is still not strong enough if compared to the support given to conventional agriculture. The growing domestic market created opportunities for private companies, large agribusiness companies engaged in contract farming and Farmer's Professional Cooperatives (FPCs). The Chinese government established a supportive environment through implementing the Cooperative Law, developing a series of favourable policies, intervening directly in the establishment and operation of cooperatives, providing various forms of financial and non-financial support. However, this support has been disproportionally channelled towards larger farms (Scott *et al.*, 2018). The government favours large farms with subsidies and excludes small farms because of high certification cost. Apart from these costs, in China individual small farmers are basically not able to do organic by themselves unless they are organized or contracted and managed by companies who are doing organic business. This contradicts with the original intention of organic farms, which are committed to producing organic products locally and promoting local community development, reduction of off-farm inputs and fair trade. This is why CSA is developing rapidly in China. Though the government has not and unlikely in the near future to accept or recognize CSA products as organic, CSA is still developing and has formed a strong national CSA group, which has already held national annual CSA conferences for 12 years. See also section 4.

Civil society-based initiatives concerning organic agriculture

Simultaneously with the growing public anxiety around food safety and environmental concerns since the eighties of the last century a bottom-up civil society-based movement started. Scott *et al.* (2018) point out that NGO's and Chinese activists started the civil society-based initiatives derived from practices in North America and Europe. NGO's are not well developed in China. These are not independent institutions and they are placed under restrictions because of the goal of maintaining harmony. The activists adapt alternative food production initiatives, organic production, Community Supported Agriculture (CSA), farmers' markets and buying clubs. Chinese

activists make full use of the Internet and social networks to spread information about the ecological and social alternativeness of CSA's and farmers' markets. Scott *et al.* (2018) discuss the economic, ecological, political and cultural conditions of various bottom-up Alternative Food Networks (AFNs) that are emerging now in China, and compare them with their counterparts in the West (Renting *et al.*, 2003). AFN's in China have to do with stronger interventions of the state. Willer and Lernoud (2018) mentioned significant increase in national and local organic groups in China, such as organic marketing clubs or organic marketing alliances as marketing platforms, while CSA's and Participatory Guarantee Systems (PGS) are attracting much interest. PGS are locally focused quality assurance systems. They certify producers based on the active participation of stakeholders and are built on a foundation of trust, social networks, and knowledge exchange (IFOAM). Though about PGS there are no national rules on organic agriculture, they are particularly suitable for small scale-farmers and local markets. In China in 2018 and 2019 there were no producers certified under this system. In 2018 there are 167 and in 2019 there are about 1000 producers involved in a process of conversion to get PGS certification (verification). The PGS certification provides small and marginal farmers with better access to certified organic markets (Willer and Lernoud, 2018).

In China, CSA farms and farmers' markets have a strong desire to promote ecological, social justice and political values to customers, while the customers are mainly driven by food safety and health concerns. The Chinese CSA movement has developed rapidly and still increases. In 2015 over 800 CSAs with 100,000 consumers are contributing to these new food systems in more than a dozen cities across the country (Hitchman, 2015). In 2018 more than 1.000 CSA groups were represented at the National CSA Conference (Willer and Lernoud, 2019). The CSA model directly links smallholder producers to ordinary consumers, providing them with high quality organic produce at a reasonable price. There is normally no formal certification, and the relationship is based on interactions between producers and consumers, which foster mutual trust and benefits. Most CSA operators in China are well-educated people from urban backgrounds, while a few are educated young people. So, the normal food producers (local farmers) are mostly role-following the leadership of the CSA farm leaders.

Peasant farmers only provide labour and have been marginalized in decision making in CSA operations. The CSA's have not typically been established, as in the West, to oppose the globalized industrial food system. In China safe or healthy food in terms of avoiding residues and being more nutritious is most important. CSA's are based on local production and consumption, directly linking producers to consumers through rural-urban interactions that develop mutual trust. In the build-up phase CSA's were often supported by NGO's while currently they became mature and NGO activities are under stricter control of the government authority. Song *et al.* (2012) mention a typical example of a small scale local market focused on a diversity of high quality local products in small amounts. In several large cities farmers' markets have become a new alternative food venue that attract large numbers of middle-class consumers, of which the Beijing Organic Farmers' Market is one of the best-known. Most of them emerged between 2009 and 2010. Farmers' markets are also considered as places of dispute, such as disputes about the term 'organic', downplaying 'local'. Organic food companies engaged in the cultivation, production, distribution and home delivery service of organic food, arise in China. The Beijing Organic and Beyond Corporation (OABC), founded in 2007, has demonstration farms and has become a leading organic food company in China. OABC's company profile mentions that the company has set up partner organic farms in Beijing, Shandong, Shanxi, Jiangxi, Jiangsu, Heilongjiang and Inner Mongolia (OABC, 2021). Another grassroots Chinese movement is called the New Rural Reconstruction Movement (NRRM). It is an emerging alternative rural development movement that functions as a hub for the convergence and scaling up of various alternative food initiatives.

As a result of the modernization process the Chinese rural areas are suffering from job losses, the stagnation of rural livelihoods, and the deterioration of rural culture. Because organic farming is labour-intensive and thus can improve employment, especially for women, compared to the conventional production system, Zhang *et al.* (2007) concluded that organic farming would be an attractive business in rural areas. They observed 210 million surplus labourers in rural areas in 2003. However, due to the rapid economic growth China's surplus rural labour will diminish. Although, if with the COVID-19 crisis the economy is declining, there might be a labour

stream returning back to rural areas. However, there is no substantial evidence that a stream of labour is returning to the rural areas. Nowadays most of the rural areas suffer from the lack of workers and costs of hiring labour have become high for farm managers. On the other hand organic operation, with premium prices of 20% – 200% (Zhang *et al.*, 2007), can also improve the incomes of the farmers. This, and the stagnation of rural livelihoods, and the deterioration of rural culture, provides a good basis to develop organic agriculture. Also Scott *et al.* (2018) pay much attention to these tremendous opportunities of diversified ecological agriculture to address food safety concerns as part of holistic strategies to build long-term fertility, healthy agro-ecosystems and secure livelihoods.

Various restrictions hinder the development of Chinese organic farming. According to Scott *et al.* (2018) the development of civil society-based alternatives in China is slowed by the top-down decision making, the pervasive uncertainty of the authoritarian state, absence of civil society institutions, bureaucratic requirements for NGO-registration and the seemingly excessive state oversight of mundane activities like holding farmers' markets. In addition, it is complicated because small-scale organic farmers are largely excluded from organic certification and the value of traditional agro-ecological practices goes unnoticed by state planners and society at large. Moreover, farmers cannot earn a price premium for food grown without agrochemicals and there are no support organizations for the organic sector. There is only limited research on organic production techniques in China. In this socio-economic context rural development alternatives emerge as critical reflection of mainstream 'modernization'. Zhang *et al.* (2007) mentioned the following constraints for the development of Chinese organic agriculture. Most of the farmers have no financial capital to invest in the fields, and to pay for organic certification. Furthermore there was a lack of substantial and practical techniques. The majority of the farmers still practice traditional agricultural. They have to keep the original agriculture practice such as crop rotation, diversified plantation, manure application and legume crop integration, etc. for soil fertility maintenance and pest & disease control. Expressing concern about food safety, as observed in North America and Western Europe, is possible as long as the complaints are not linked to political issues in state-controlled China. Zhang *et al.* (2007) mentioned the following constraints for the development of

small-scale Chinese organic agriculture. Less policy support from government and enterprises is a constraint for the farmers to develop the organic farming. There is a lack of substantial and practical techniques to support farmers with the substantial technologies for pest, and disease and weed control, and soil fertile maintenance. The cost of certification is too much for the small-scale farmers to develop organic products. Generally, most Chinese farmers are too small-scale, too weak in obtaining organic technologies and too isolated in terms of market access. Price premiums are high for some products, while for others the premiums decrease as global competition escalates (IFAD, 2005). Research is needed on scientific organic operation technology, reasonable management measures and standards and the demonstration of a successful business models.

Future

China is gradually transforming its food system from the state coordinated food security miracle, overshadowed by food safety concerns, to a system with nascent but increasing civil society and private sector participation. Since the eighties of the last century we can identity two main developments in the Chinese agricultural and food system. First, a modernization strategy of the government that later was combined with a strategy to conserve small-scale agriculture. Second, an organic development started by a government based ecological strategy (top-down) and by civil society initiatives (bottom-up) to implement organic agriculture. In this section I discuss the perspectives of these strategies and initiatives for the future. The modernization strategy, the strategy to conserve small-scale agriculture and the ecological strategy of the government are top-down initiated. Wang (2017) observed that the voices of Chinese farmers themselves are generally absent in these strategies. He concluded that the assumptions underlying these strategies did not match completely with farmers' perspectives. Neither strategy offers a comprehensive and integrated response to the current sustainability threats of agriculture. Wang's conclusion is that a strategy for sustainable development of agriculture in China should address a wide diversity of needs and goals as articulated by Chinese farmers themselves, otherwise it would lack the support it needs to be successful. He identified policy goals by which these strategies could better take farmers' needs and preferences into account. The development of the modernization

strategy was induced by concerns about food security. According to Wang (2017) the modernization strategy neglects the need for rural migrant workers to maintain their small land holdings as a fall-back option, and measures to control agrochemical pollution are ineffective due to the strategy's emphasis on enhancing agricultural production. Intensification could only be applied in flat areas, while large proportions of farmlands are distributed in hilly and mountainous areas where it is impossible to intensively operate. Further intensification of agriculture is not a solution for Chinese agriculture. It is encouraging that the Chinese government in 2015 has introduced a national policy that starting from 2020 the whole nation should be zero growth in the use of chemical fertilizers and pesticides by 2020 (Jin and Zhou, 2018). The Plan for National Economic and Social Development even speaks of encouraging reduction in the use of chemical fertilizers and pesticides (NDRC, 2021).

Because of modernization the value of farmland for biodiversity has been lost. China's National Biodiversity Strategies and Action Plan (NBSAP) for the Convention on Biological Diversity (CBD) fails to recognize traditional agriculture as an asset for biodiversity conservation bearing its unique cultural heritage, nor the drastic change in agricultural practice as one of the causes of domestic biodiversity loss. The land-use planning policy in China has led to the segregation of lands for nature conservation and agricultural production. China's Country Report on Biodiversity (under UNEP program), first published in 1998, includes the national targets. Land has even been withdrawn from agriculture for the benefit of nature. After the devastating floods in 1998, which were attributed to widespread deforestation and soil erosion, large-scale ecological restoration programs converting farmland into forests or natural grasslands, the Sloping Land Conservation Program (SLCP), were launched. Thus, only lands designated as Nature Reserves are recognized for sustaining biodiversity. Li *et al.* (2020) point out that China inherits a myriad of sustainable agricultural systems that facilitate the coexistence of humans and nature. The value of this long and rich bio-cultural heritage is a great asset for the future. Therefore a farmland biodiversity strategy is needed for China. Li *et al.* (2020) argue that farmland has to be valued not only for agricultural production, but also as a shared space within which a great number of species complete their life cycles, especially in areas where farmlands are small and scattered. In this

sense, farmland biodiversity is to be seen as a form of public good produced by agriculture as an environmental externality, which should be integrated into China's policies.

Apart from increasing scales also activities of smallholder farmers remain important. According to the statistics nowadays 70% of farmlands are still under the status of smallholders. That's why the government developed a strategy to maintain small-scale farming. However, according to Wang (2017) the strategy to conserve small-scale agriculture does not offer a solution for the widening urban-rural gap and the current environmental problems. He recommends improving the social security of rural residents and the rural education system, promoting an interactive, locally adaptive and trustful relationship between farmers and agricultural experts and scientists, and relaxing the rules of the Household Registration System. Most farmers regarded their land as an important and necessary social safety net. While off-farm work has generally been the major source of household income, the employment opportunities have declined in recent years. Song *et al.* (2012) concluded that collective platforms, structured either as cooperatives, enterprises or as groups, play a crucial role in supporting and linking smallholder farmers to markets.

Concerns about food safety and the environment induced the development of organic agriculture in China. Organic agriculture has a number of significant environmental, economic and social benefits: circular recycling of nutrients, empowering of inner capacity of agro-ecosystem, enhancing the communication between farmers and consumers, revitalizing rural economy and creating of a harmonious living environment (Meng, 2018). Two kinds of development took place: bottom-up and top-down. Though Scott *et al.* (2018) characterize the civil society initiatives for organic agriculture as bottom-up, there are arguments that here too there is a top-down introduction. After all, the initiatives mainly came from NGO's and activists. It would be interesting to know what the farmers themselves think of these initiatives. Wang (2017) however, did not include this group on his study. According to Wang (2017) the weak spot of the top-down strategy to promote ecological agriculture is the difficulty to create an effective market for high-added-value products and ecosystem services.

Also Kan and Chen (2019) argue that people opt for organic because they are concerned about food safety. But, they also point out that genuine organic sellers find themselves competing with a host of charlatans. As an example they report that in a *China Youth Daily* survey in 2018, 70% of respondents believed that organic food could easily be faked. In some places organic certification could simply be bought. An extreme accident in 2015, Kan and Chen (2019) mention, is the Tianjin Consumers' Association. Organic food products were detected of using fungicides but the farmers denied, thinking that the materials were allowed to use.

The ecological strategy of the government and the civil society-based movements to a large extent diverge. Is it possible that these two different developments live side by side in the future? From old Chinese philosophy of the time of Mencius we may learn that opposite developments are not to be seen as contradictions, but as developments that complement each other. This view is still practiced today in the *Yi-Jing* (Donkers, 2019). I find clues for this view in the conclusions of Scott *et al.* (2018), which indicate that both developments grow towards each other. Scott *et al.* (2018) mention the New Rural Reconstruction Movement (NRRM) as the most prominent initiative, referring to the values and sentiments of the Rural Reconstruction Movement of the 1920s and 1930s, with key components of civilian education in contrast with elite education, cultural activities and capacity building for self-organization. There are emerging opportunities for NRRM to connect with state development agendas and the expectations of the masses. The National Sustainable Agriculture Development Plan (2015-2030) specified tasks for sustainable agricultural development that accord with what the NRRM has been working on. Moreover, there is little discussion about the United Nations Sustainable Development Goals (SDG's), of which many are closely connected with food production following agro-ecological principles. If such a solution of complementary organic farming systems is possible anywhere in the world, then it is in China.

Since 2012, we have seen the danger of losing the original intention of organic farming in a trend that shows characteristics of conventional farming. This is a process through which organic agriculture gradually resembles elements of the mainstream food sector, leaving itself undistinguished from conventional agriculture. A case study of an organic

agricultural company in China by Gao *et al.* (2017) supports the conventionalization hypothesis. A non-agricultural capital injection led the company to rely on energy-intensive sources of external inputs and caused energy consumption to skyrocket for its long-distance transport. Meanwhile, commercial interests replace the social values. The conception of organic is then nothing more than a simple certification process. This could increase the possibility of selling products that are probably not sufficiently qualified as organic. Such occurrence may be considered a potential threat to the development of China's organic food industry. In other words, the prevailing tendency for the conventionalization of organic farming is more likely to contribute to the creation of an unsustainable system, resulting in an erosion of local food systems and the core values of organic farming. From the case study we may learn that social values, such as energy recycling and community building, can easily be bypassed and replaced with commercial interests. This problem of conventionalization is not just happening in China but is also applied in the organic sectors of a lot of other countries. This is a global issue in the organic movement and should be discussed in a broader context.

To make sure that organic agriculture is effective in view of the basic ancient Chinese values of harmony and food security, regardless of whether it is bottom-up or top-down, it is essential that the organic sector show increased production and productivity and that bottle-necks are solved. Currently there is a common view within the Chinese organic sector that technical bottlenecks and marketing bottlenecks are key issues the Chinese organic sector is facing. Chinese small-scale farmers are not illegible to have access to advanced and even best practical technologies, and a lot of the big organic companies are also lacking of appropriate technologies not only in farming but also in processing and storage. So far, there is no one real organic technical platform in China, while it is really an urgent need for Chinese organic sector to have. Different levels of governments could help building organic technical platforms and market platforms for organic stakeholders especially for farmers and consumers. As organic technical platforms contribute quite a bit and also should be dynamically updated, they need to have investment and continues inputs to run. The central and local governments of China are able to support if they wish or are willing to. Only with the technical support the integrity of organic production and products

will be possible, while integrity of production and products is the essential basis for a real prosperous organic market.

Benefits of ecological agriculture could further increase significant when ecological intensification is applied (Meng, 2018). This is especially important for China because there is far too little agricultural land available in China for a healthy diet, as I have shown in section 2. The notion of 'ecological intensification' highlights the need for progress in science to achieve a continuous increase in yields (intensification) without environmental (ecological) damage. The Food and Agriculture Organisation (FAO, 2009) defined ecological intensification within the framework of organic agriculture as: "Maximization of primary production per unit area without compromising the ability of the system to sustain its productive capacity". Meng (2018) notes, among other things, that in any case a better supply of nitrogen for crop production and opportunities for larger-scale extension is needed. Currently the expression of ecological intensification is used to point out a form of sustainable agriculture based on resilient food and ecosystems that produces food within the boundaries of nature and environment with positive effects on biodiversity, in combination with business management. In a literature review Meha *et al.* (2020) found that yield gains from sustainable intensification interventions across South Asia are heterogeneous, and that the average yield gains across all studies is 21%. Their results highlight that the sustainable intensification interventions should play an important role in increasing food production across South Asia. When performing ecological intensification, it is important not to proceed to conventionalization. These policies should be developed and implemented by the government, including ecological compensation, to guide a rational organic farming development. Ecological compensation may be defined as creating, restoring or enhancing nature qualities in order to counterbalance ecological damage caused by infrastructural developments.

Can we go so far as to say that there is also a rapprochement possible between ecological and conventional agriculture or is the 'modern' agricultural system a vital constraint for the development of organic agriculture and biodiversity? I agree with Meng (2018) who proposes to adopt and disseminate the concepts and technologies of organic agriculture into conventional agriculture and carry out ecological transformation of

conventional agriculture. Organic agriculture focuses on the combination of planting and breeding, recycling of organic materials (organic fertilizer and straw, etc.), planting leguminous crops, biological control, reasonable land recreation, mulching, and encouraging the use of renewable energy and degradable materials. According to Meng (2018), this deserves vigorous promotion and application in conventional agriculture. Then it becomes possible that these seemingly contrasting developments of organic and conventional agriculture grow towards each other. This will help to promote the healthy and sustainable rural and agricultural development in China.

SUMMARY AND CONCLUSIONS

China is a very large country with a long farming history, based on 4000 years of traditional practices and characterized by a huge number of smallholder farmers with extremely small farms, working in very diverse contexts. After several shortages of food, China started an agricultural modernization program in the early 1990s. Agrochemicals (fertilizers and pesticides) and fossil fuel were not avoided to meet food security and consumers' demands, with the result of several environmental and food safety concerns. We can understand this food security driven approach that protects against famine, when we realize that maintaining harmony and the relationship between food security and the moral authority of leadership is the basis of Chinese philosophy for over 2000 years, as Mencius already demonstrated in his 'Mandate of Heaven'. The boosting production, however, has serious consequences and has resulted in huge environmental and food safety challenges. In reaction, a government strategy and civil society based initiatives were undertaken for the development of ecological and organic agriculture. The modernization approach has not been abandoned, but measures have been taken for improving the situation. The Chinese government pays more attention to the position of small-scale farmers and has introduced a national policy that starting from 2020 the whole nation should be zero growth and even encourage the use of chemical fertilizers and pesticides to be reduced. This, however, I think, is not enough. Emphasis on enhancing agricultural production need better measures to control agrochemical pollution. There is a need for the rural migrant workers to maintain their small land holdings as a fall-back option.

The 'top-down' strategy of the government and the 'bottom-up' civil society initiatives to develop ecological and organic agriculture to a large extent emerged. 'Top-down' the Chinese government established a supportive environment for ecological agriculture through developing and implementing a series of favourable policies, involving in certification of organic products, intervening directly in the establishment and operation of cooperatives, providing various forms of financial and non-financial support. However, this support has been disproportionally channelled towards larger farms. China started off as large producer and exporter of organic products and later has developed sizeable internal organic markets. The weak spot of the top-down strategy to promote ecological agriculture is the difficulty to create an effective market for high-added-value products and ecosystem services. Any sold product in the market must meet the only national organic standard and must be labelled with a unique digital identification number. Organic products of other countries are allowed to be imported into China, but they also must be certified according to the Chinese national organic standard. Despite clear rules, consumers may become confused about transparency and integrity in production, processing and certification processes of organic food.

NGO's and Chinese activists started the civil society-based initiatives derived from practices in North America and Europe. Farmers' markets and the Chinese CSA movement have developed rapidly and still increase. Organic food companies engaged in the cultivation, production, distribution and home delivery service of organic food, arise in China. The grassroots movement NRRM functions as a hub for the convergence and scaling up of various alternative food initiatives. Constraints for the farmers to develop the organic farming are less policy support from government and lack of substantial and practical techniques to support farmers with the substantial technologies for pest, and disease and weed control, and soil fertile maintenance. Moreover the cost of certification is too much for the small-scale farmers to develop organic products. Generally, most Chinese farmers are too small-scale, too weak in obtaining organic technologies and too isolated in terms of market access. It helps when Chinese farmers are organized or contracted and managed by companies who are doing organic business, or be organized as practical and relatively strong cooperations. Price premiums decrease as global competition escalates.

The various approaches of organic agriculture from the government activities and civil society-based initiatives resulted in the fact that China worldwide is now one of the top 4 organic markets, and China ranked seventh as the country with the largest area of organic farmland. This could lead to the conclusion that the Chinese economy is still somewhat in the shadow of a planning economy in some areas, although a market economy now dominates. Even better results can be obtained when it works that the 'bottom-up' and 'top-down' developments live side by side in the future. To get this done we may learn from old Chinese philosophy of the time of Mencius that opposite developments are not to be seen as contradictions, but as developments that complement each other. A solution is possible when emerging opportunities for NRRM connect with state development agendas and the expectations of the masses. Moreover, the National Sustainable Agriculture Development Plan (2015-2030) specified tasks for sustainable agricultural development that accord with what the NRRM has been working on. If such a solution of complementary organic farming systems is possible anywhere in the world, then it is in China.

To make sure that organic agriculture is effective in view of the basic ancient Chinese values of food security, regardless of whether it is bottom-up or top-down, it is essential that the organic sector show increased production and productivity and that bottle-necks are solved. Benefits of ecological agriculture could further increase significant when ecological intensification is applied. This is especially important for China, because the amount of agricultural land available in China is too little to provide a healthy diet for all Chinese people. When performing ecological intensification, it is important not to proceed to conventionalization.

Can we go so far as to say that there is also a rapprochement possible between ecological and conventional agriculture? This could be possible when the concepts and technologies of organic agriculture are adopted and disseminated into conventional agriculture. By executing ecological transformation of conventional agriculture it becomes possible that these seemingly contrasting developments of organic and conventional agriculture grow towards each other. This will help to promote the healthy and sustainable rural and agricultural development in China.

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