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ACHIEVING URBAN FOOD
SECURITY THROUGH A
PUBLIC-PRIVATE HYBRID
FOOD PROVISIONING
SYSTEM: A CASE STUDY
OF NANJING, CHINA

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Abstract

Private and public markets are two models of urban food retailing governance. This paper examines the public-private hybrid model of urban food provisioning system and its governance in Nanjing, China. Based on data from surveys, non-structured interviews, and bibliographical material analysis, we examine the public-private hybrid model and its linkages with urban food security. Our analysis shows that the public-private hybrid model of food markets and its governance ensures a relatively high-level urban food security in Nanjing. We argue that the hybrid food market governance system effectively integrates public and private capital into a government-supported and regulated, small-business-based system in both food wholesale and retailing sectors. In the public-private hybrid system, wholesale markets and wet markets provide a physical “marketplace” for small-scale private food vendors to operate their business, while the private capital-based supermarkets is also integrated into the system of urban food provisioning. The paper reveals how the “crawling peg” policy and the regulation on the usage of marketplaces have ensured that the development of wet markets keeps pace with population growth. While the public-private hybrid system helps avoid market failure and government failure in food provisioning, it faces challenges such as reliance on fiscal inputs.

Keywords

food governance, urban food security, food provisioning, public-private hybrid system

This is the 24th discussion paper in a series published by the Hungry Cities Partnership (HCP), an international research project examining food security and inclusive growth in cities in the Global South. The five-year collaborative project aims to understand how cities in the Global South will manage the food security challenges arising from rapid urbanization and the transformation of urban food systems. The Partnership is funded by the Social Sciences and Humanities Research Council of Canada (SSHRC) and the International Development Research Centre (IDRC) through the International Partnerships for Sustainable Societies (IPaSS) Program. Additional support was provided by the Queen Elizabeth Diamond Jubilee Advanced Scholars Program.

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Introduction

One of the key challenges in current urban food system governance is how to ensure easy access to food for low-income communities in order to avoid and ameliorate the problem of “food deserts” (Walker et al 2010). In the United States, supermarkets migrating away from low-income urban communities have been shown to contribute to the formation of food deserts (Ruelas et al 2012). Although supermarkets have expanded into low-income urban areas in countries such as South Africa, the often highly processed food they sell has negative impacts on household food security (Battersby et al 2015). Supermarkets cannot meet the food security needs of the poor despite the advantages they offer of food safety and lower prices (Battersby et al 2015). Market-based expansion of supermarkets has thus had a limited impact in reducing food insecurity (Peyton et al 2015). This is exemplified by the persistence of “food deserts” in developed countries. As a result, so-called “alternative” food provisioning systems have received increasing attention (Kurland and Aleci 2015).

Previous research has identified four main approaches to the problem of low or limited accessibility to fresh and healthy food in urban areas. The first is to introduce new supermarkets or grocery stores into low-accessibility areas (Boos 2012, Sadler et al 2013). The second is to support the informal food retail sector, including street vendors (Battersby 2012). Third, farmers’ and public markets have been recommended as an alternative to buying food from supermarkets (Boos 2012). The promotion of farmers’ markets is commonly considered to be a reasonable way to address the issue of limited access to healthy food in US municipalities (Freedman et al 2017, Alfonso et al 2010). Some research has suggested that these markets have been effective in improving access to healthy food in low-income urban areas (McCracken et al 2012).

A growing number of cities in the US have introduced farmers’ markets in recent years (Hulbrock et al 2017). However, while they may improve geographical access to healthy food, they do not

necessarily improve the affordability of food in those areas (Boos 2012). Also, farmers’ markets rarely open on a daily basis (Connell 2009, Freedman et al 2017). A US study also found that farmers’ markets in low-income neighbourhoods are smaller and provide fewer healthy food choices than those in wealthy neighbourhoods (Lowery et al 2016). Despite their effectiveness in improving food accessibility, the bulk of the evidence thus suggests that the development of farmers’ markets in the United States and Canada has not substantially changed the landscape of food retailing (Connell 2009, Freedman et al 2017).

A fourth approach to improving food access in low-income areas calls for more policy attention to the development of public markets (Morales 2009). Although the meaning of the term “public market” has varied over time and from place to place, it is traditionally defined as a market with municipal ownership and operation (Kurland and Aleci 2015), with three common characteristics: (a) public goals, (b) located in a community, and (c) made up of independent businesses rather than franchises (Project for Public Spaces 2003). Unlike farmers’ markets, public markets are usually located in permanent structures (Kurland and Aleci 2015, Lowery et al 2016).

Historically, public markets have played an important role in urban food retailing in European cities (Fava et al 2016), but the number of public markets is declining in many cities arguably due to the supermarket revolution in western countries (Salcido et al 2015). Yet, in the United States, the potential of public markets for improving urban food security has been rediscovered and recognized in recent years (Morales 2011, Morales and Kettles 2010). Public markets have emerged after their disappearance in the mid-20th century with an increasing number of US cities making an effort to re-establish these markets (Morales 2009). Government subsidies have been a key factor in supporting municipal public markets. The aim is not only to ensure more equitable food distribution, but also to enrich the functioning of “public places” (Kurland and Aleci, 2015). Both the disappearance and re-emergence of public markets in the US suggests

“larger structural transformations reshaping the role of state authority in the governance of food and urban spaces” (Kurland and Aleci 2015: 506).

Public markets also play a role in the urban food supply system in countries outside the United States. In Zambia, for example, public markets make healthy food available at affordable prices (Blekking et al 2017). In Mexico City, municipal public markets play an important role in the urban food supply system and their importance to socio-economic relationships (such as the relationship between vendors, customers, vendors and customers, vendors and their products) has been increasing (Pensado-Leglise and Smolski 2017, Salcido et al 2015).

In many Asian countries, wet markets (both public and private) remain an important part of urban food retail. Despite food hygiene and safety concerns, wet markets are widely distributed in Asia (Sharif et al 2015). Most of the research on wet markets has focused on why and how wet markets have survived amidst the supermarket revolution and government policies transforming wet-markets to supermarkets (Huang et al 2015, Reardon et al 2012). Broadly speaking, two reasons are given for the survival of wet markets. First, wet markets demonstrate various advantages over supermarkets, including lower prices and freshness of food (Bougoure and Lee 2009). Second, wet markets provide spaces for social interaction as well as benefits such as price discounts, negotiation, and special treatment for specific customers (Mele et al 2015). Literature on wet market persistence focuses on their advantages to consumers and their function as social spaces, but neglects the government’s role as a public service provider in supporting the wet market system. In particular, little attention has been paid to the role of state capital and public-private hybrid market models.

The literature on the governance of urban markets also tends to focus on the retailing of food and has paid little attention to the governance of wholesale markets and the connections between the governance of retailers and wholesalers. Yet, in Nanjing and many other Chinese cities, wholesale markets are the major food sources for wet markets and

supermarkets (Zhang and Pan 2013). This paper aims to address these gaps in the literature on food market governance by examining the public-private hybridity of the food provisioning system in Nanjing, China.

The paper first describes the data sources used in this study. Next, it provides an overview of food security and food safety conditions in Nanjing based on Hungry Cities Partnership (HCP) household survey data. The following sections examine the institutional framework for governing the urban food system in Chinese cities and public-private hybridity within Nanjing’s wholesale and wet markets system. The paper concludes with a discussion of the advantages and challenges of the public-private hybrid market model.

Methodology

The following data sources are drawn on for this discussion:

- Data from the HCP and Nanjing University baseline household-level food security survey of 1,210 randomly selected households conducted in 2015.
- Data from a 2017 survey of 641 randomly-selected small food vendors in 42 of the city’s 351 wet markets.
- Comparative data on household food security in four other HCP partner cities: Mexico City (Mexico), Kingston (Jamaica), Maputo (Mozambique), and Nairobi (Kenya).
- Key informant interviews with one wet market manager, two wholesale markets managers, five government officials from urban planning, commercial administration, and urban administration (known as *chengguan* in Chinese) in 2017.
- Geo-information on wet markets in Nanjing collected from the online database Baidumap (Zhong et al 2018).

- Various bibliographical materials were also collected and reviewed. These include government documents, laws, and regulations regarding food markets collected largely through legislative and governmental websites, academic literature, and news reports regarding Nanjing City's food markets.
- Information on food enterprises, including their business scale, building area, and ownership, was collected from their websites.

A City Close to 'Zero Hunger'

The 2015 HCP household survey in Nanjing found a high-level of household food security. Four FANTA indicators were used to assess levels of food security: the HFIAS (Household Food Insecurity Access Scale) (Coates et al 2007, Swindale and Bilinsky 2006a), HFIAP (Household Food Insecurity Access Prevalence) (Coates et al 2007), HDDS (Household Dietary Diversity Score) (Swindale and Bilinsky 2006b), and MAHFP (Months of Adequate Household Food Provisioning) (Bilinsky and Swindale 2010). Table 1 compares the HFIAP findings for Nanjing with Mexico City, Kingston, Maputo, Nairobi, and another HCP partner city: Cape Town, South Africa.

The proportion of food secure households varied from a low of 26% in Kingston to a high of 79% in Nanjing. Similarly, Nanjing had the lowest proportion of severely food insecure households at 2%.

Over one-quarter of households in all of the other cities were severely food insecure.

The HDDS scores for the different cities indicate that Nanjing also had a significantly higher level of dietary diversity. The mean household HDDS was 7.8 out of a possible score of 12. No other city had a mean score over 7.0 and some, such as Kingston and Maputo, had scores of less than 5.0. Table 2 shows the cumulative frequency distribution of HDDS scores for each city. In Nanjing, only 10% of households had an HDDS of 4.0 or less, which is indicative of a low quality, monotonous diet. In two of the cities, Nairobi and Cape Town, the figure was closer to 20%, while in Kingston and Maputo it was nearly 60%. A score of 6.0 or more is generally considered the minimum for a sufficiently nutritious diet. In Nanjing, 73% of households fell into this category compared to 58% in Cape Town, 41% in Nairobi, 38% in Mexico City, 23% in Kingston, and 13% in Maputo.

The MAHFP provides a measure of food stability over the course of the previous year by asking households how many months of the year they had adequate food. A score of 12 indicates that they had adequate food all year round, while a score of 0 indicates that the household never had adequate food. Table 3 shows that almost 100% of Nanjing households had a score of 12, compared to 80% of households in Mexico City, 75% in Kingston, 62% in Maputo, and only 53% in Nairobi. This finding indicates that Nanjing is close to being a city of "zero hunger" from the perspective of urban households getting enough food all year round.

TABLE 1: Levels of Household Food Security in HCP Cities

	Mexico City (%)	Kingston (%)	Maputo (%)	Nairobi (%)	Cape Town (%)	Nanjing (%)
Food secure	49.5	26.4	28.6	29.2	45.5	78.9
Mildly food insecure	12.2	9.2	11.0	12.6	5.7	13.8
Moderately food insecure	11.5	27.5	22.0	33.0	12.9	5.3
Severely food insecure	26.8	37.0	38.3	25.2	36.0	2.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	1,201	698	2,056	1,402	2,500	1,178

Source: HCP

TABLE 2: Dietary Diversity in HCP Cities

HDDS	Mexico City (cumulative %)	Kingston (cumulative %)	Maputo (cumulative %)	Nairobi (cumulative %)	Cape Town (cumulative %)	Nanjing (cumulative %)
0	0.6	0.9	0.5	1.1	0.5	0.0
1	1.2	5.7	3.9	1.3	2.6	0.6
2	7.9	22.3	26.5	4.9	7.9	1.4
3	19.8	42.3	42.2	11.7	14.0	5.0
4	33.3	59.0	59.9	23.8	20.7	10.0
5	49.8	70.6	76.2	40.9	29.3	17.1
6	61.5	78.8	87.3	59.3	42.3	26.7
7	73.8	85.8	94.0	73.5	57.1	39.0
8	82.6	90.4	97.2	85.9	73.3	56.6
9	89.9	95.6	98.6	95.2	86.0	74.8
10	95.8	98.3	99.7	98.6	93.3	88.3
11	99.3	99.7	100.0	99.6	97.5	97.4
12	100.0	100.0	100.0	100.0	100.0	100.0
Mean HDDS	5.9	4.5	4.1	6.1	6.8	7.8

Source: HCP

TABLE 3: Stability of Household Food Supply in HCP Cities

No. of months	Mexico City (%)	Kingston (%)	Maputo (%)	Nairobi (%)	Cape Town (%)	Nanjing (%)
0	1.4	2.6	3.2	1.1	7.0	0.0
1	0.0	0.1	1.3	0.1	1.4	0.0
2	0.0	0.0	0.5	0.1	0.3	0.0
3	0.0	0.0	1.1	0.1	0.4	0.0
4	0.0	0.6	0.6	0.2	0.5	0.0
5	0.3	1.2	1.3	0.6	1.3	0.0
6	0.6	0.6	1.6	0.8	1.7	0.0
7	1.2	0.6	2.0	1.6	3.2	0.0
8	1.5	1.2	4.5	3.8	5.1	0.0
9	4.4	3.3	5.9	7.8	9.9	0.0
10	5.4	6.8	9.1	14.3	9.7	0.4
11	5.1	7.8	7.4	16.3	8.8	0.4
12	80.1	75.3	61.6	53.1	50.7	99.2

Source: HCP

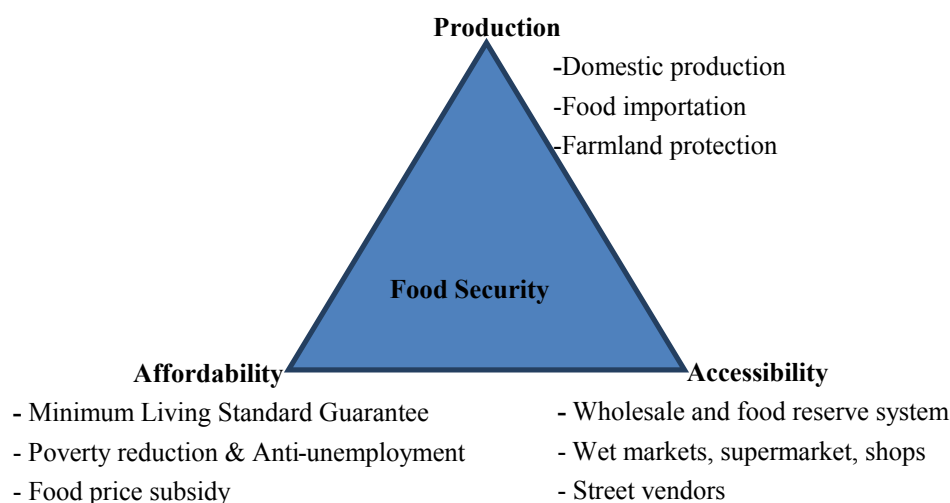
Institutional Framework for Urban Food Security in China

In China, the complexity of urban food security governance can be understood as a holistic three-dimensional policy framework (Figure 1). The figure includes the three dimensions of policies that influence food security: food affordability, food production, and food accessibility. The governance of the food retailing system to ensure food

accessibility is one of the key dimensions of urban food security in the country.

Lack of access to food is a key cause of food insecurity among low-income urban households (Crush and Frayne 2011). Although supermarkets have often been considered a remedy for food insecurity in poor urban neighbourhoods, large retailers also sell unhealthy produce and prepared meals at a low price (Rudkin 2015, Sadler et al 2013), which exacerbates the health consequences of unhealthy diets

FIGURE 1: Policy Triangle for Urban Food Security in China



(Rudkin 2015). Indeed, food accessibility includes both economic and spatial dimensions (Crush and Frayne 2011). Geographical access to food is merely one part of the issue (Sadler et al 2013). It is challenging to ensure both economic and spatial accessibility, which means ensuring low food prices and locating food outlets close to households.

In the Chinese context, four policy pillars have been established to ensure both economic and geographical access of food: the “rice bag” policy, the “vegetable basket” policy, the “crawling peg” policy (the mandatory requirement of wet market construction in urban planning), and the public-private hybrid model of food outlet management and operation. The rice bag and vegetable basket policies are two key policies for ensuring a sufficient food supply in China, implemented since the mid-1990s (Huang and Rozelle 2006, Tuan and Ke 1999). The rice bag policy – also known as the provincial governors’ rice (grain) bag responsibility system (*mi daizi shengzhang fuzezhi*) – mandates that provincial governors and governments are responsible for ensuring the grain supply and stabilizing grain prices (State Council 1995, Tuan and Ke 1999). The vegetable basket policy – also known as the city mayors’ vegetable basket responsibility system – makes prefectural-level city mayors responsible for the provision of non-grain food, including vegetables, meat, and fish (Tuan and Ke 1999). In recent years, the vegetable basket policy has increased in scope to include not only ensuring

fresh non-grain food production and provisioning, but also the development of food marketplaces such as the planning and construction of wet markets (Ministry of Agriculture 2017).

For food security reasons, it is important to ensure that the establishment of new food markets keeps pace with urban expansion (Blekking et al 2017). Unlike in the United States, where the food system has long been absent from urban planning practices (Pothukuchi and Kaufman 2000), the food system is at the centre of China’s urban planning practices, as reflected in the crawling peg policy. Wet markets are considered important public facilities, rather than private businesses, and it is the local government’s direct responsibility to monitor their operation and facilitate their development. The Nanjing government’s interventions in the development of wet markets are reflected in a few critical regulations, particularly the Code of Urban Residential Areas Planning & Design (GB 50180-93), which was issued in 1993 and amended in 2000, 2002, and 2016. The Code mandates that a wet market with a building area of 500–1,000m² be established for any residential area with a population of 10,000–15,000 people. For residential areas with a population of 30,000 to 50,000 people, 1,000–1,200m² of wet market space is required (MHURD (Ministry of Housing 2016).

In 2003, the Nanjing Municipal Government issued Regulations on Wet Markets Planning

and Construction, which specifies that a new wet market with an area of no less than 1,000m² should be constructed for a newly-developed residential area of larger than 50,000m² (Nanjing Municipal Government, 2003). This regulation defines a wet market as a covered or indoor marketplace where more than 90% of goods are fresh produce (Nanjing Municipal Government 2003). In 2016, the crawling peg policy in Nanjing was updated by Regulations on Commercial Network Planning and Construction, which requires 50-75m² of wet market build area per 1,000 persons within 500-600 metres radius of service (Nanjing Municipal Government 2016). These statutory requirements ensure relatively equal and easy access to wet markets for Nanjing residents and that wet market development keeps up with urban population growth.

Public-Private Hybrid Model for Urban Food System Governance

The public-private hybrid model of urban food system governance is another critical element of the Chinese urban food system. This model distinguishes Chinese cities from those in many other countries. Hybridity is reflected in the collaboration between the public and the private sector in managing and operating food markets. The public-private hybridity of food outlet operation is designed to ensure the sustainable operation of wet markets and the economic accessibility (affordability) of food. The affordability of food is also enhanced through government subsidies to low-income households and university canteens. The subsidy is adjusted based on changes in food prices (Nanjing Municipal Government 2010). Despite the distinctiveness of this institutional setting, there have been no studies systematically analyzing how it actually works in practice.

Public-Private Hybridity of Wholesale Markets

Two factors shape the dynamics of the management and operation of wholesale markets in Nanjing. The first is competition between state and private

capital, as reflected in the mixed ownership of the five main wholesale markets in Nanjing (Table 4). Except for Xingang Cereal & Oil Market, which specializes in trading cereals and cooking oil, the other four wholesale markets trade all kinds of non-grain foods. The former is state-owned. Zhongcai Market is also state-controlled, while the other three are operated by private companies. Xingang Cereal & Oil Market and Zhongcai Market are the biggest wholesale markets for grain and non-grain foods, respectively. Zhongcai Market supplies an estimated 70% of fresh produce in Nanjing (Ma et al 2015), and Xingang Cereal & Oil Market accounts for an estimated 60% of cereal provision (Chen et al 2016).

The second main feature of these wholesale markets is that all are operated with a “corporation plus small private business” model. This involves the corporation managing the market but usually leasing out the stall space in the market to small private vendors. For example, there are more than 100 merchants in the Xingang Cereal & Oil Market. Nanjing Non-Staple Agricultural Products Logistics Distribution Centre provides more than 4,000 merchants with space in Zhongcai Market. Tianhuan Market provides about 2,000 stalls for small businesses.

Governance Structure of Wet Markets

The governance structure of wet markets in Nanjing is characterized by the separation of ownership, management, and administration (Figure 2). Since a city-initiated campaign to renovate and upgrade wet markets in 2007, most wet markets in Nanjing are located within permanent structures. There are three kinds of stakeholders in a wet market: property owners of the marketplace, wet market management entities, and market vendors. The property of wet markets (i.e. the stall space and facilities), both publicly and privately owned, is commonly leased to wet market management companies, which rent the food stalls to vendors. The government oversees the leasing of property, food stall renting, business operations, and management (Figure 2).

TABLE 4: Wholesale Food Markets in Nanjing

Market	Company	Ownership structure	No. of merchants	Main foods sold	Building area (m ²)
Zhongcai Market ¹	Nanjing Non-Staple Agricultural Products Logistics Distribution Centre Co. Ltd.	State-controlled company	More than 4,000	Meat, vegetables, fruit, aquatic products, grains. Supplies 70% of fresh produce in Nanjing	520,000
Tianhuan Market ²	Nanjing Tianhuan Food Co. Ltd.	Private corporation	1,200	Frozen meat	380,000
Jiangbei Produce Wholesale Market ³	Hujiang Commercial Co. Ltd.	Private corporation		Aquatic products, vegetables, fruit. Supplies 85% of aquatic products in Nanjing	388,000
Tianyinshan Produce Wholesale Market ⁴	Jinbao Market Co. Ltd	Private corporation		Vegetables, fruit, frozen meat	127,900
Xingang Cereal & Oil Market ⁵	Nanjing Xiaguan Grain Depot	State-owned corporation	108 merchants for grains or cooking oil, 300 for non-grain foods	Cereals and oil. Supplies 60% of cereals in Nanjing	81,000

Sources:
¹ <http://www.njnfwl.com/about.aspx?Typeld=1&Fld=t1:1:1>; <http://www.njnfwl.com/about.aspx?Typeld=130&Fld=t1:130:1>
² http://www.njthsp.com/content_show.aspx?page=about; <http://www.njdaily.cn/2014/0710/886520.shtml>;
http://jiuban.moa.gov.cn/fwllm/qgxxlb/js/201302/t20130220_3221791.htm
³ <http://www.njjbsc.com/pdetail/24.html>
⁴ http://www.njgrain.com/about.asp?dan_id=2; <http://xh.jsgrain.gov.cn/default.php?mod=article&do=detail&tid=1092610>
⁵ http://www.njlsjt.com/news_detail.asp?news_id=1345

Market venues are commonly owned by the state, although both public and private ownership exists. Public ownership includes government or state ownership, state-owned enterprise ownership, and collective ownership. Public ownership therefore facilitates the state's involvement in the operation of wet markets. Government ownership includes wet market structures owned by municipal-level, district-level, and street-level governments. Collective ownership includes situations where the structures of wet markets are owned by urban residential committees (*jumin weiyuanhui*) or village committees (*cunmin weiyuanhui*) (Xia and Chen 2010). There are two types of private ownership of wet market structures: individual and private enterprises (Xia and Chen 2010). An estimated 50% of wet market buildings were state-owned or collectively-owned in 2010 (Xia and Chen 2010).

In effect, governments, urban residential committees and village committees dominate the ownership of buildings and infrastructure for wet markets in Nanjing.

The dominance of public ownership of market venues in Nanjing is a direct result of government policy. Since 2011, the Nanjing Municipal Government has made efforts to increase the proportion of wet markets under public ownership. In 2011, it issued a policy document called Suggestions for Enhancing the Construction of Food Distribution System and Ensuring the Stable Food Supply in the Market (Nanjing Municipal Government 2011). The policy requires that the ownership of newly-developed marketplaces be transferred to district-level government. This is formalized in the 2016 Regulation on the Administration of Commercial

Outlets Planning and Construction in Nanjing City (Nanjing Municipal Government 2016).

There are multiple types of wet market management entities in terms of ownership. Before 1995, most wet markets in Nanjing were established and managed by the government department of commercial administration (Standing Committee of Jiangsu Provincial People’s Congress 1998). The State Council required a separation between the supervision (or administration) and management (operation) of food markets in 1995 (*guanban fenli*) (Standing Committee of Jiangsu Provincial People’s Congress 1998). In 1998, the Provincial People’s Congress in Jiangsu issued a new regulation to prohibit governmental agencies from establishing or running new wet markets (Standing Committee of Nanjing Municipal People’s Congress 2004). Thus, wet market management companies today can be state-owned, privately-owned, or collectively-owned. Most wet market management entities are not purely state-owned companies (XHBYNET 2010), and most wet markets with public ownership

of the marketplace are managed by private companies (Wang 2010, Zou and Zhang 2011).

The business operators in wet markets include vendors and shopkeepers. Vendors have independent businesses, while shopkeepers have franchise stores of agri-food companies. According to the HCP vendor survey, food stalls rented from companies or individuals account for 52% of all the stall within wet markets. Another 24% are rented from the council/municipal government, while 21% are owned by operators (Table 5). Renting from companies, individuals, or the municipality is the dominant occupancy/tenure status, accounting for 76% in total. Shopkeepers who have franchise stores of large agri-food companies sell goods supplied by these companies directly rather than by buying from wholesale markets. For instance, there are franchise stores from Yurun Group Limited and Shineway Group (Shuanghui) in Nanda Heyuan Wet Market. Like the vegetable stalls, the franchise stores within wet markets are commonly operated by two people.

FIGURE 2: Ownership, Management and Administration of Wet Markets

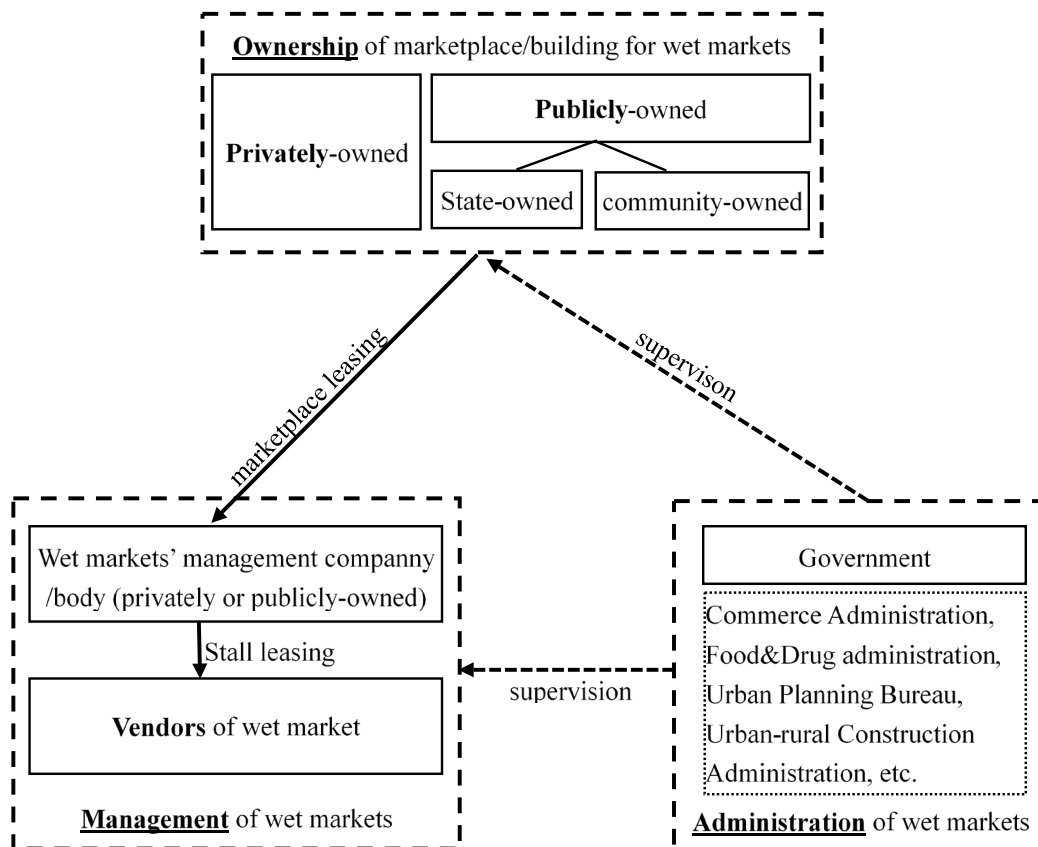


TABLE 5: Occupancy/Tenure Status of Business Premises within Wet Markets, 2017

Occupancy/tenure status	No.	%
Pay rent to private owner (company or individual)	324	52.3
Pay rent to council/municipality	150	24.2
I own it/ am part owner	132	21.3
Rent-free, with permission	6	1.0
Rent-free, without permission (squatting)	1	0.2
Other	6	1.0
Total	619	100.0

Public Investments in Wet Market Upgrading

From 2000 to 2011, Nanjing Municipal Government's policy orientation of wet market development gradually moved from treating wet markets as profit-oriented businesses to public welfare-oriented infrastructure. During the 1990s and early 2000s, the Nanjing Municipal Government tended to view wet markets as a private market development issue, rather serving the public interest. However, following the guidance of the *guanban fenli* reform required by the State Council in the mid-1990s (Standing Committee of Jiangsu Provincial People's Congress, 1998), the Market Administration Regulations of Nanjing City were issued in 1998 and came into effect in 1999. In 2003, Regulations on Wet Markets Planning and Construction came into effect, following the principle of "marketization reform" advocated in the early 2000s, and determined that wet markets be profit-oriented (Chen et al 2010). The government's perspective on the role of wet markets changed around 2010 with a new policy entitled Regulations on Marketplace Management, which acknowledged the public-interest nature (*gongyi xing*) of wet markets, and replaced the 1998 Market Administration Regulations of Nanjing City (Standing Committee of Nanjing Municipal People's Congress 2010).

The transition in the state's positioning of wet markets has led to increasing public investment in upgrading wet markets. Since 2007, Nanjing Municipal Government has launched four rounds of wet market upgrading, funded and subsidized by public funds:

- From 2007 to 2008, the Nanjing government supported an upgrade of 133 wet markets with

about CNY44 million (USD6.1 million) of investment provided by municipal and district-level governments (Nanjing Municipal Government 2007).

- From 2009 to 2012, the government upgraded 40 wet markets with an investment of CNY52 million (USD7.6 million) (Nanjing Municipal Government 2008, 2011).
- From 2013 to 2014, the government invested about CNY60 million (USD9.7 million) in upgrading 120 wet markets (Nanjing Municipal Government 2012, 2013).
- In 2017, Nanjing Municipal Government announced plans to upgrade 230 wet markets by 2019 (Nanjing Municipal Government 2017b), 36 of which received government subsidies of CNY13 million (USD2.1 million) in 2018 (Nanjing Municipal Government 2017a).

These upgrades had to follow certain standards. Three sets of standards were issued by the Nanjing Municipal Government: in 2003, 2007, and 2013. Building on other supportive policies, these upgrades greatly enhanced the capacity of wet markets to meet urban residents' food demands.

Harnessing Private Capital to Develop Public Ownership

The Nanjing government has implemented a policy to harness private capital to develop wet markets. In 2011, it issued its Suggestions for Enhancing the Construction of Food Distribution System and Ensuring the Stable Food Supply in the Market, which requires that real-estate developers build a

wet market for a newly-built residential building complex and that the ownership of the marketplace be transferred to district or county-level governments (Nanjing Municipal Government 2011). The district or county-level government then authorizes a management company to manage the market through opening bids. This requirement was formalized in the Regulations on Commercial Network Planning and Construction in 2016 (Nanjing Municipal Government 2016). This coercive regulation as part of the crawling peg policy enhances public-private hybridity in the establishment of wet markets and ensures government control over the development of wet markets.

Special Regulations on Wet Markets

There are two kinds of regulations regarding the use of wet market space: on the usage of marketplaces and of food stalls. The former is also called the regulation on the usage of market buildings, as wet markets are increasingly located inside buildings. This regulation, which was enacted in 2000, stipulates that the building used or designated for wet markets cannot be changed or converted to other usages without the permission of the Nanjing Municipal Government (Nanjing Municipal Government 2003). The regulation on the usage of stalls refers to the requirements regarding goods sold within wet markets. The policy issued in 2003 requires that no less than 90% of goods sold within wet markets are fresh produce (Nanjing Municipal Government 2003).

These usage regulations contribute greatly to ensuring access to healthy food in urban areas. They demonstrate that, besides physical and economic access to food, ensuring access to healthy food is also a concern of government. On the one hand, regulation of the usage of market buildings allows wet markets to survive in the face of fierce competition from other more economically profitable land uses inside the city. On the other hand, these usage regulations ensure geographic access to healthy food through preventing the oversupply of unhealthy food in wet markets, and effectively countering the adverse health impacts of unhealthy

food sold in supermarkets; a major consequence of supermarket expansion in western countries such as the United States (National Research Council (US) 2009).

Regulations on the rental of market stalls have been implemented in Jiangsu Province since 2011, when the Regulation on the Price of Urban Wet Markets was issued by the Jiangsu Provincial Government. This requires wet market management entities to get permission regarding stall rent from the government department of price administration and commercial administration (Jiangsu Provincial Government 2011). This is called the policy of stall rent registration (Tanweifei Beian). Following the provincial regulation, the Nanjing Municipal Government has implemented the policy in Nanjing (Nanjing Municipal Government 2012).

The policy of Favourable Price of Power and Water has been implemented since 2011 (Nanjing Municipal Government 2011). The Nanjing Municipal Government offers wet markets a discounted price for water and power usage. Unlike other businesses that pay high commercial prices for electricity and water usage, wet markets pay the same price as for residential usage (Nanjing Municipal Government 2011), which is the second lowest public utility price standard and only higher than for agricultural production.

Policies Regulating Supermarkets for Urban Food Security

Food policies in Nanjing not only regulate wet markets, many of which are publicly owned, but also regulate private-sector supermarkets. Several studies have demonstrated the important role of supermarkets in Nanjing's urban food system. Supermarkets and wet markets accounted for about 28% and 60% respectively of fresh produce retail in Chinese cities in 2014 (Yu 2014). In Nanjing, supermarkets and wet markets are commonly open seven days per week and about 14 hours per day. Business hours are from around 6:00 to 20:00 for wet markets and 8:00 to 22:00 for supermarkets. The different business hours address the time

constraints of different households for grocery shopping. In 2011, the Nanjing Municipal Government defined the roles of wet markets, supermarkets, and small shops in the city's fresh food retailing system as "a food provisioning system based on wet markets complemented by supermarkets' fresh produce zones and direct-sale store located within residential neighbourhoods" (Nanjing Municipal Government 2011). There were an estimated 351 wet markets and 63 supermarkets with fresh produce zones in Nanjing City in 2017 (Zhong et al 2018). None of the 63 supermarkets are state-owned.

The Nanjing Municipal Government has made two efforts to harness privately-owned supermarkets to contribute to urban food security. One approach is the regulation of the area of fresh produce zones within a supermarket. The 2011 Suggestions for Enhancing the Construction of Food Distribution System and Ensuring Stable Food Supply in the Market stipulates that existing supermarkets should have no less than 20% of their business area devoted to selling fresh produce (and 30% for newly-established supermarkets) (Nanjing Municipal Government 2011). The other policy is to incorporate fresh produce zones of supermarkets into wet market upgrading subsidy programs so that supermarkets can also get subsidies. In 2018, the Nanjing Municipal Government issued its Administration of the Special Fund for Upgrading Wet Markets in Nanjing City. According to this policy, supermarkets will get subsidies equal to 30% of their investment in the establishment or upgrading of a fresh produce zone that is more than 500m² (Nanjing Municipal Government 2018). These two policies ensure that supermarkets contribute to the supply and availability of fresh produce.

Private, Public or Hybrid?

The public-private hybrid market model has been adopted by other cities in mainland China, such as Hangzhou and Shanghai, although they all have their own distinctive policy environment (Zou and Zhang 2011). The Nanjing example allows us to interrogate the food security implications of the hybrid urban food market system and its

governance. Despite the advantages of this hybrid system in enhancing food security, it also has its limits. This section therefore focuses on the advantages and challenges of the public-private hybrid market model.

Avoiding Market Failure and Government Failure

Poor access to healthy food has been viewed as a reflection of market failure by some researchers (Rocha 2007). Although food security is a complex issue, urban food insecurity is usually triggered by a low level of food accessibility rather than absolute food shortages (Battersby et al 2015). Ensuring food accessibility is therefore the key to urban food security. Infrastructure barriers to food access have been identified by many studies (Slade et al 2016). Profit-motivated food markets cannot spontaneously ensure the urban poor's food security (Battersby et al 2015). It is therefore necessary for urban planning to take food access into account.

Urban planning has a major role to play in addressing the issue of physical access to food. Slade et al (2016) identify three key aspects of urban planning that greatly influence food security: strategic planning and policy development, infrastructure development, and land use regulation. Chinese city governments in general take food security as an administrative priority. This reflects the central position of food in people's daily lives. As the Chinese saying goes, "Food is God" (Scott et al 2014). The issue of food accessibility has therefore been a key aspect of city government concern with "Minsheng Issues" (People's Livelihood Issues) in China.

Besides ensuring physical access to food, another major challenge facing Chinese local governments is ensuring food affordability for urban households and the profitability of wet market vendors. The Nanjing Municipal Government established the public-private hybrid wet market system to ensure the physical access of urban households to food. In 2015, 80% of surveyed urban households in Nanjing had a network distance to the nearest wet market or supermarket of less than two kilometres (Zhong et al 2018). The public-private hybrid wet

market system has also effectively ensured that the development of wet markets aligns well with the growth of the urban population. While the crawling peg policy can ensure the construction of wet markets, it cannot, in and of itself, ensure that the addition of a new wet market helps nearby households to easily access affordable healthy food within a short distance.

The following paragraphs explain how the public-private model ensures the development of wet markets and balances the affordability of food sold in the markets with the profitability of market vendors. The crawling peg policy ensures easy access to small-scale food stores in mixed-land-use areas. The planning code of urban residential community planning requires that wet markets are planned as a part of the whole residential community (MHURD 2016). This is very different from the situation in many western countries where it is rare to access food easily through small-scale food stores located on mixed-used community land because of economies of scale and zoning ordinances (National Research Council 2009).

Moreover, the Nanjing Municipal Government uses the model of “Build-Transfer-Operate” to develop new wet markets, and the government requirement for real-estate developers to build the marketplace is in the contract of land conveyance. The real-estate developers then transfer the marketplace (building) to the district-level (sub-city) government (Nanjing Municipal Government 2016). The district-level government selects management entities to run the wet market (Nanjing Municipal Government 2016). This makes governments powerful agents in developing new wet markets and relatively independent from wet market management. This model is designed to avoid not only government failure caused by government directly running wet markets, but also market failure that will only build markets in profitable areas.

Another advantage of the hybrid market system is the integration of many small food businesses in the wholesale and wet market system. Unlike in western countries, such as the United States, where

big corporations dominate the food retailing system (Boos 2012), a key feature of the public-private hybrid food retailing system in Chinese cities is that both the wholesale markets and wet markets are essentially assemblies of “small” business (i.e. merchants in wholesale markets and vendors in wet markets). This limits the power of big corporations in wholesale and retailing markets. For instance, although Zhongcai Wholesale Market dominates Nanjing’s fresh food supply, there is no big corporation that dominates the “wholesaling” of fresh food. In our survey of 42 wet markets, there were 43.2 stalls on average in each wet market. Because those markets are assemblies, it is almost impossible for vendors within wet markets or merchants within wholesale markets to monopolize food sales. It is also difficult for vendors within wet markets or merchants within wholesale markets to forge alliances to manipulate food prices. This pattern of small business assembly thus contributes to the affordability of food.

The public-private hybrid system does well in balancing affordability and profitability. The public-private hybrid at wholesale level, together with the public-private hybrid wet market system, enables the government to balance food affordability and vendor profitability in wet markets. The government has maintained its influential role in stabilizing food prices in wholesale markets through the public-private hybrid system at the wholesale level. Empirical studies elsewhere have shown that a reduction in corporate concentration in the food retail sector contributes to food price reduction (Corte et al 2015). The public-private hybrid wet market system in Nanjing has contributed to the decentralization of the food retail sector. The system effectively ensures the competition between vendors in a wet market and between wet markets, which contributes to stable food prices. Furthermore, government can control the operational cost of food stalls within wet markets through stall rent regulations, which ensures the profitability of wet market vending. In sum, the food supply system in Nanjing, and many other cities in China, is not purely dictated by market forces. Instead, the public-private hybridity of wet markets and supermarkets

allows the government to intervene in various ways. It is these interventions that correct possible market failure and make the urban food system work in terms of ensuring a high level of food security.

Fiscal Challenges of the Public-Private Hybrid System

The public features of wet markets make their upgrades and renovations reliant on public fiscal inputs. As mentioned above, the government in Nanjing has launched four rounds of wet market upgrading since 2007. The total subsidy for the four rounds was CNY169 million (about USD 26.5 million). Due to the public-private hybridity of wet markets, the Nanjing Municipal Government is able to control the stall rent in wet markets. The government essentially has the final say in determining the rent because of the policy of stall rent registration, which leaves limited space for wet market management entities to make profits. This could discourage wet market management entities from upgrading the markets with their own funds. Hence, maintaining the facilities of wet markets needs financial support from municipal or district-level governments. However, the program of wet market upgrading is episodic and has not been institutionalized to ensure long-term financial support from the government. For instance, the Administration of the Special Fund for Upgrading Wet Markets in Nanjing City is a policy that is only valid for three years (from 2017 to 2019). The continued maintenance of wet markets is always at risk due to the lack of long-term institutional arrangements for fiscal inputs.

More than Retailing: Holistic Approach to Retailing and Wholesale Markets

Wholesale markets have received much less attention than the retail sector in food studies research. As the agriculture sector has moved away from the jurisdiction of urban government in many countries, how cities govern their food supply system has become a central problem in urban management (Baics 2016). Currently, most literature on urban

food provisioning focuses on food retailing, which is the downstream of the urban food supply chain. Yet, this should not be isolated from wholesale markets, particularly in the Chinese context. This is because the retail price of food is greatly influenced by wholesale markets. From this point of view, food affordability is not only subject to food retailing but also to food wholesaling. Improvement in geographical access to food does not necessarily lead to an increase in food affordability. Urban government therefore needs a more holistic consideration of the food supply chain that includes wholesaling as well as retailing.

The public-private hybrid system sheds light on the state's interventions in wholesale markets. The system has to balance carefully the power of the state and private capital in wholesale markets, to manage competition between the state and private capital, and to avoid wholesale markets being monopolized by either the state or private capital. The public-private hybrid system at the wholesale market level maintains two tiers of competition: competition between wholesale markets and the competition between wholesale merchants/vendors within a wholesale market. Competition between wholesale markets helps to prevent wholesale market management bodies from overcharging their merchants/vendors (monopoly rent). The competition between wholesale merchants within a market helps to prevent wholesale merchants from overcharging vendors from wet markets. These two tiers of competition thus contribute to food affordability.

Beyond the Dichotomy of Private and Public in Food Market Governance

Governance of the food supply system in Nanjing has experienced three iterations with corresponding time periods: the public market-centred scheme, the private market-oriented scheme, and the public-private hybrid scheme. Before 1995, most wet markets were established and operated by the state (Zou 2014, Zou and Zhang 2011). The management bodies of wet markets devoted much attention to collecting rent from vendors rather

than providing services for the development of wet markets (Hang 2000). As some pointed out, the municipal government did not necessarily directly regulate and oversee the business activities in public markets (Kurland and Aleci, 2015).

The malfunctioning of market governance was later recognized by the Chinese central government. In 1998, local governments were prohibited from operating or managing wet markets and wholesale markets (Standing Committee of Jiangsu Provincial People's Congress 1998). The Chinese government adopted two strategies to separate governmental agencies from food market operation (management) (Zou and Zhang 2011). One was to establish state-owned/held enterprises to run wholesale markets or wet markets (Zou and Zhang 2011). The other was to privatize some state-owned wholesale markets and wet markets (Chen et al 2010). The privatization and marketization of food markets made it difficult for governments to mandate the low rent of food stalls (Chen et al 2010, Zou 2014), and it was therefore a challenge to keep food prices stable and affordable (Zou and Zhang 2011).

It is in this context that the public-private hybrid governance system has been developed since 2010. The city government has tried to increase the share of state-owned wet markets through investing in private wet markets, buying-back or renting-back existing wet markets, and building new wet markets as public facilities (Nanjing Municipal Government 2011). City governments have followed the central government's guidance of separating market administration from market management (*Guanban fenli*). The transition from public market-centred to private market-oriented, and then to the current public-private hybrid scheme, reflects the fact that the government has actively redefined its roles and responsibilities in urban food governance.

There are three features of the public-private hybrid food market governance system that differentiate it from the earlier public market-based governance and private market-based governance systems. First, the public-private hybrid governance model does not specifically target deprived residents or areas. Instead, it puts emphasis on equitable access

to food and food affordability. That means a strong emphasis on the construction or development of wet markets and wholesale markets through utilizing both private capital and public fiscal funds. Second, public-private hybrid food governance highlights the public-private hybridity at the retail level (dominated by wet markets), as well as the wholesale level. Third, public-private food governance regulates the rent and the use of marketplaces, regardless of property ownership, as long as the property is designated or planned for wet market use.

Conclusion

While the food system in urban China is increasingly market-driven, the state's interventions and regulations ensure a certain public interest orientation in the operation of the urban food provisioning system. This creates what we call a public-private hybrid market system of urban food provisioning. This hybrid system has proven to be effective in maintaining urban food security in Chinese cities. The hybrid food market system, and the associated governance system, effectively integrate public/state and private capital into a government-supported and regulated, small-business-based system. In this system, wholesale and wet markets provide physical marketplaces for small-scale private food businesses. Private capital-based supermarkets are also integrated into the system of urban food provisioning, while supermarkets have no price advantage over wet markets.

This paper shows how the hybrid market governance system is underpinned by the "crawling peg" policy and the regulations on the use of marketplaces in the case of Nanjing. The crawling peg policy is a major pillar of the public-private hybrid system. It ensures that the establishment of new wet markets keeps pace with urban population growth. The regulatory restrictions for using the marketplace ensure the implementation of the crawling peg policy and the plan for food market development. As an urban planning mandate, the crawling peg policy and the regulation on the usage of

marketplaces effectively provide the physical foundation for urban food security. They have proven to be practical and reasonable schemes to approach food security in urban planning.

The public-private hybrid system of food supply governance does not come at no cost, although it helps ensure a high level of urban food security through achieving relatively equitable geographical access to food and food affordability. It depends on governmental subsidies for wet market development (i.e. construction, upgrading, and operation). Fiscal support for the public-hybrid system is determined by the state's recognition of the priority of food security in public affairs management. Besides the reliance on fiscal support, the public-private hybrid system has to develop a way to address the challenge of ensuring food safety. Although the public-hybrid model helps ensure food security, it is not the only determinant of a high-level of urban food security in Nanjing and many other cities in China. The public-private food supply governance system is only one of many factors, and high-level urban food security needs holistic and systematic support, including supporting food production, poverty reduction, and the food distribution system.

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