



## OWC 2020 Paper Submission - Science Forum

### *Topic 3 - Transition towards organic and sustainable food systems*

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#### **FOOD SYSTEMS SUSTAINABILITY TRANSITION: A MULTI-LEVEL ANALYSIS OF CONVENTIONAL, VERTICAL AND ORGANIC VEGETABLE PRODUCTION IN THE YANGTZE RIVER DELTA GOLDEN TRIANGLE (CHINA)**

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**Full Paper Publication:** Yes

**Abstract:** The dominant global corporate food regime disrupts ecological and social spheres. Attempts towards transition toward more sustainable food regimes exist but the pathways are manifold. The aim of this study is to disentangle potential pathways for sustainability transition of the Yangtze River Delta (YRD) food system in China. Thus, we measure and contextualize the level of sustainability of alternative and dominant vegetable production regimes. Three farms were selected as case studies: conventional (representing the dominant corporate regime), vertical (representing a corporate-environmental niche) and organic (representing an ecological niche). Results illuminate the motivation of potential pathways of sustainability transitions in the YRD. The dominant corporate regime is currently influenced in terms of sustainability by a) technological innovation coming from the corporate-environmental niche, and b) ecological and social innovations coming from the ecological niche.

**Introduction:** Research on the global food system in relation to sustainability suggests a need for urgent reforms [1]. China recognized its contribution to global harm and has taken steps to transform its agricultural sector [2]. In order to grasp the complexity of system transitions, a location-specific food systems approach is needed [3]. This study takes place in the YRD, an area characterized by intense urbanization and industrial concentration, with Shanghai at its center. Sustainability analyses generally focus on productivity without looking at the embeddedness of farms in food system. As suggested in Organic 3.0, it is key to account for the real costs and benefits related to environmental integrity, human health, society, and culture, of any food system [4]. This study conducts a holistic sustainability evaluation of the food production systems embedded in YRD, China. By that, it aims to inform the sustainability of potential transition pathways in the region.

**Material and methods:** The authors performed a comprehensive sustainability analysis of the vegetable food system in the YRD based on fieldwork collected from September 2019 to December 2020.

The multi-level perspective (MLP) framework on socio-technical transitions [5] is a tool to analyze sustainability transitions of food systems [3]. According to the MLP, there are three levels of structuration of food systems: regime (dominant practice), niche (alternative practice, locus of innovation), and landscape (socio-technical setting). This framework was

applied to identify and characterize alternative food niches in the YRD vegetable food system, and compare them to the dominant corporatist regime, with a focus on production practices, surrounding value chains, and supporting structures [3,7].

The analysis was conducted in three parts. First, based on data collected in a comprehensive literature review, the authors used codes to highlight (1) features of the dominant food production regime and (2) features of alternative food production niches. The literature pool included articles concerning Chinese types of food production systems [11;12], food regimes [6;13-16], food systems [7;17;18], and food system sustainability [1;19-21].

Second, these findings were combined with key informant interviews. Nine in-depth, semi-structured interviews were conducted with food systems and agricultural experts, including international organizations (e.g. IFOAM Asia), Chinese NGOs, academics, farmers, and farm suppliers in the YRD. Qualitative data analysis was performed on the interview transcriptions in order to identify (1) drivers of food system change, (2) food production systems, (3) value chains, and (4) support structures. Results identify one dominant and at least two emerging alternative food production niches: a corporate-environmental niche and an ecological niche.

The third part of the analysis involved performing a sustainability evaluation for each of the food production regimes identified in the YRD. For each food production regime, a single farm was selected as a case study in order to explore the niche's influence on the overall food system in terms of sustainability. Sampling of case studies was based on their representativity of the three regimes, farmers' availability to participate, and type of production. The sustainability performance evaluation was implemented on the case studies using the FAO's Sustainability Assessment of Food and Agriculture Systems (SAFA), which is refined in 21 core sustainability themes, 48 sub-themes and their related indicators. Sustainability scores were calculated based on data extracted from farm records (e.g. productivity, energy consumption, crop rotation, economic values, etc.) and from interviewing farm managers and employees [9].

**Results:** The aim of this study was to provide 1) insight into the sustainability transitions of Chinese food systems; and 2) a holistic sustainability comparison which assesses the true value and costs of food systems focusing on conventional, organic, and vertical production practices in the YRD.

The results of the first two phases proved that the dominant food production regime corresponds to the global 'corporate' food regime characterized by large agribusinesses in combination with contract farming in the YRD. The value chains of this production system are long and the support structures include wide state and local support, subsidies, and extension services. A specialized large agribusiness with state backing was selected as representative of this regime.

Two increasingly structured pathways of sustainability transitions towards food production niches have been identified. The first involves the modification of the current productivist approach to accommodate environmentally-oriented, high-tech practices. Organized in a company structure, these farms are supported by venture capital. An urban vertical farm project was selected as a case study.

The second pathway, toward ecological food production, is a more radical niche with diverse and multi-functional production often embedded in the contract farming structure or set up by farmers' cooperatives. Short, local value chains infused with trust and tradition support this production type. An organic farm was selected as representative of this alternative food regime.

The third phase resulted in the sustainability scores of each case (Figures 1,2). The corporate food regime scored highest in economic sustainability, but the lowest in environmental sustainability among the three cases. The ecological food regime scored above the average of the three cases in most themes of sustainability except for economic.

**Discussion:** Countries aim transitioning to more sustainable food systems but multiple pathways of these transitions exist. Innovations in the YRD, which emerge in two niches, interplay with the prevailing food production regime whilst shifting it towards a new regime [5]. If the corporate regime can learn from the technological innovation of the corporate-environmental niche, and the ecological and social innovations of the ecological niche, the overall food production system of the area will better transition towards a more sustainable regime. Economic sustainability is a major driver for niches to influence the regime towards environmental sustainability. Currently, the corporate-environmental regime lacks strong support structures and has little influence on the overall food system sustainability. Some (re-)innovations of the ecological niche may alter the environmental performance of the dominant regime while not changing the organizational and institutional structure of it.

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**References:** [1] The High Level Panel of Experts (2017)

[2] UNFCCC (2018)

[3] Ingram et al (2015)

[4] Arbenz et al (2016)

[5] Geels (2010)

[6] McMichael (2009)

[7] Gaitán-Cremaschi et al (2019)

[8] Feagan (2007)

[9] FAO (2013)

[10] Hebinck et al (2018)

[11] Kismányoky et al (2017)

[12] Weimin (2001)

[13] Bernstein (2015)

[14] Friedmann (2005)

[15] McMichael (2020)

[16] Wang (2018)

[17] Liu et al (2010)

[18] Si & Scott (2019)

[19] FAO (2013)

[20] iPES (2015)

[21] Yu & Wu (2018)

**Image:**

## SAFA SCORES - EFFECT OF CORPORATE-ENVIRONMENTAL NICHE ON CORPORATE REGIME

Corporate Sumproduct Corporate-Environmental Sumproduct Mean Score

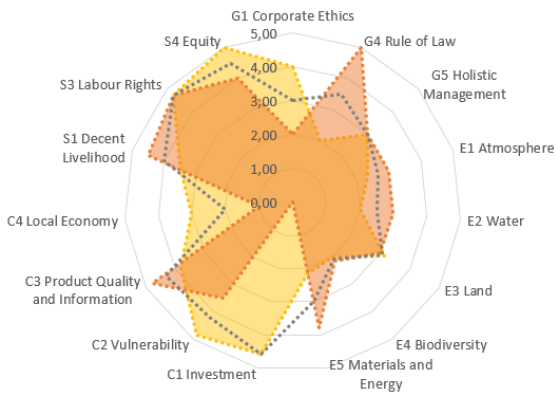
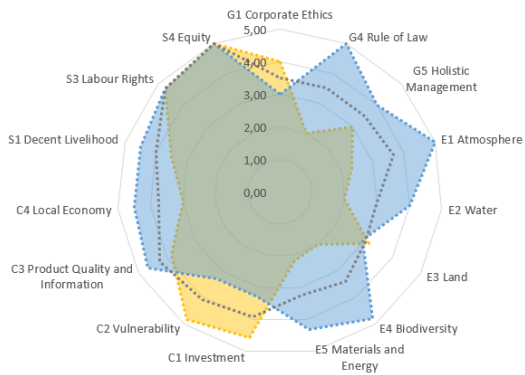


Image 2:

## SAFA SCORES - EFFECT OF ECOLOGICAL NICHE ON CORPORATE REGIME

Corporate Sumproduct Ecological Sumproduct Mean Score2



**Disclosure of Interest:** None Declared

**Keywords:** China, Embeddedness, Food system, Sustainability transitions, True value accounting