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Co-evolution of technology and rural society: The Blossoming of *Taobao* Villages in the Information Era, China

Abstract

Over the last decade, more than 4,310 villages (known as *Taobao* villages) in China have achieved significant economic growth due to e-commerce. The changes in these villages represents a new development path that is distinct from that of the traditional Chinese villages. This paper examines this growth experience, arguing that the 'blossoming' of the *Taobao* villages is essentially the result of the interaction and co-evolution of Information and Communications Technology (ICT) and China's rural society. This study will be based on case studies of three *Taobao villages*. As ICT and e-commerce are embedded in rural society, the potential of existing organizations and skills in the countryside can be fully explored through synergy. This research finds that with the accessibility of China's huge online market for rural products, the traditional weak rural economic organizations in *Taobao* villages are gradually evolving into strong economic organizations, which have greatly enhanced their capacity to adapt to the flexible demands of the online economy. It is found in the research that the co-evolution of ICT and rural society are still in the development stage, which can have broad and profound impacts on the future transformation of rural China.

Keywords

China; ICT and e-commerce; economic organization; rural society; *Taobao* villages

1. Introduction and Context

With the rise of Information and Communications Technology (ICT) and the information economy, the development of technology has greatly increased the productive capacity of society, which reshapes the form of global economic relations and organizations. Castells (1996) argued that a new form of network-based organization is emerging. It is a highly dynamic and innovative open system. At the same time, the organizational form has been affected by local culture and the institutional environment, within which it would be embedded. In the process of interacting among technology, institutions and the evolution of the relationship between capital and labor, society has also been profoundly transformed (Castells, 1996). Since the 1990s, there have been various detailed studies on the relationship between technological transformation of a society and the evolution of spatial forms (Hall and Pain, 2006; Castells, 1996; Mitchell, 1996; Graham and Marvin, 2001; Sassen, 1991; Carreau, 1991; De Souza e Silva, 2006; Zook and Graham, 2007; Gordon and De Souza e Silva, 2011). These research studies focused on the emergence and impacts of social technology transformation in metropolitan regions (Castells, 1996), including both urban and rural areas, open space and high-density residential areas. It is based on research suggesting that the socioeconomic functions formed by ICT-derived networks are establishing a series of locally-based activities and organizations (Castells, 1996). This phenomenon has clearly happened

in some areas of China. In the past decade, the rapid development of ICT and the application of e-commerce are reshaping China's rural society at an unimaginable speed. In 2019, there were more than 4,310 *Taobao* villages in China, 90% of which are located in Chinese three major metropolitan regions: the Pearl River Delta, the Yangtze River Delta, and the Beijing-Tianjin-Hebei Region. The definition of a *Taobao* village comes from the Ali Research Institute[1], referring to a village in which at least 10% of its residents operate online stores, generating annual sales of at least RMB 10 million (about $1.4 million). According to the report of Ali Research Institute (2019), between July 1st 2018 and June 30th 2019, the sales value of online stores of villages in China exceeded RMB 700 billion, generating more than 6.83 million jobs, which would not have been available in rural areas without the online platform. AS a consequence, reverse migration has occurred in that a significant proportion of former rural-to-urban migrants have returned to the countryside (Qia, Zheng and Guo, 2019; Luo and He, 2017; Zhou, Yang and Gao, 2017; Zhou, 2018a; Zhou, 2018b).These developments illustrate that e-commerce can be a powerful instrument for economic growth and rural household welfare improvement (The World Bank and Alibaba Group, 2019).Thus, *Taobao* villages have attracted wide interest among academics and policymakers.

Research on the *Taobao* villages is at the preliminary stages, but is increasing rapidly. Recent investigations have mainly focused on the imbalance of location of *Taobao* villages and their business activities (Luo and He, 2017) and the stakeholders in the formation and development of the process (Qia, Zheng and Guo, 2019). It is argued in some studies that *Taobao* villages unveiled a new type of rural urbanization as a result of e-commerce in the information age. This process could restructure the social, economic and physical spaces in rural areas (Luo and He, 2017). The development of *Taobao* villages connected a large number of scattered, small-scale enterprises in rural China to the modern urban-based firms through ICP and logistics networks. *Taobao* villages generate the new phenomenon of ‘online urbanization’ and ‘real-time urbanization’ (Lou and Hu, 2018). *Taobao* villages have established a space for the flows of information, technology and commodities. With the support of ICT, rural villagers are able to realize and share different types of real-time flows, capital, commodities, information and technologies without actually migrating from their villages. E-commerce breaks the dependence of trade on spatial location and distance, reshapes the urban-rural commodity trading model, and promotes a new urban-rural network (Wang, et al., 2017; Chen and Zhang, 2018).

However, there are only a limited number of *Taobao* village studies which examine the impact on the local economic and social structure. There are two currently differing perspectives to explain this phenomenon. The first is to explain the situation from the perspective of the development of technology. It is believed that ICT and the application of e-commerce enable rural areas to have equal market opportunities (Leong et al., 2016;) due to instantly establishing links between sellers and buyers generated by e-commerce (Wrigley, Lowe and Currah, 2002), and lower transaction costs (Qia, Zheng and Guo, 2019) that create new niche markets tailored to consumer demand (Kelly, 2016). Thus, it is suggested that *Taobao* villages are formed as a

[1] Ali Research Institute, the task of which is to research for e-commerce, industrial upgrading, macroeconomics and etc. in line to massive data of online trade, was established by Alibaba Group in April 2007.

consequence of technological change. The second perspective views this phenomenon as a bottom-up grassroots movement in rural society based on a new process. This perspective is built on case studies and emphasizes the importance of grassroots leaders in the early stages of rural e-commerce (Zhou et al., 2017; Luo and He, 2017). In Chinese *Taobao* villages, some pioneers advertised their experiences and encouraged more people to engage in e-commerce activities through the spread of rural acquaintance societies (Qia, Zheng and Guo, 2019). This was facilitated by young people who returned to rural China from coastal urban areas, bringing with them financial capital, technology and advanced management ideas (Ali Research Institute, 2019). This perspective appears to explain the early development of e-commerce in rural areas.

Although these two perspectives help to understand the phenomenon of *Taobao* villages, neither provides a comprehensive and accurate understanding of how and why *Taobao* villages appeared in China in the information era. The first perspective leaves an open but crucial question: why did the rural e-commerce occur in some villages but not in others? The second perspective simply attributes the causes to individual factors but ignores the powerful effect of technological changes and the possible transformation of rural economic organizations in *Taobao* villages. Therefore, it is necessary to have the third perspective on the co-evolution of technology and rural society in the Chinese *Taobao* village. From this perspective, technological development is inseparable from the realistic social development path, while technology reshapes social relations in this process (MacKenzie and Wajcman, 1999; Geels, 2004) and restructures the local society as the consequence. The relationship between technology and society is a complex interaction or a recursive process of cause and effect (Williams and Edge, 1996). As Castells (1996) asserts, it involves a convergence between technology and the organization of production processes so that the final outcome depends on a complex pattern of interaction.

In addition, the macro political economic background characteristics of *Taobao* villages are also of importance. In the development process of *Taobao* villages, the state and internet giants formed a complex "state-business" relationship (Anthony, 2017), which had a profound impact on the villages. The research of Shen and Shen (2018) on rural development discusses the characteristics of China's multi-level government mechanism. It is believed that coordination at a higher level than at the village is conducive to rural development (Zhu, 2017).

The structure of the present paper is organized as follows. This section has introduced the problem and discussed the contributions of others in this research area. Section 2 presents the research methodology adopted for this study. The development history of *Taobao* villages in Jiangsu Province, from which the studies pursued here were selected, is introduced in Section 3. Section 4 contains information on the 3 cases study *Taobao* villages, and their productive activities. Section 5 discusses the findings of the study, while the conclusions of the research are given in Section 6.

2. Research Method

Based on the points identified in the review of existing literature on the issue, the present paper addresses two research questions. First, how is ICT and e-commerce embedded in the countryside and how does it interact with rural economic organizations? Second, how has the rural economic

organization changed as the consequence of the interaction of e-commerce and ICT and what can be expected from this evolution?

In this research, it is assumed that ICT and e-commerce do not necessarily lead to the development of *Taobao* villages; but rather development depends on the complex interaction between technology and the rural society in which it is embedded. A hypothesis is proposed that with the opening of an online market to the rural specialty products and continuity of market growth, the existing weak rural economic organizations can be upgraded through synergy with the support of ICT, and then developed into new types of strong economic organizations, which may greatly enhance their abilities to organize production and coordinate resources, while adapting to the needs of flexible production in the online economy, the consequence of which is changes to rural society. Although this hypothesis appears to be quite complex at first sight, in fact it is relatively simple: by adopting this form of technology, village development can take place.

Case studies are adopted as the research method. The actual execution of the research was divided into three phases. In the first phase between February and April 2016, a reconnaissance visit was made to *Taobao* villages in Jiangsu Province. It was found that there were similarities in approach to business, products and operation mechanism among them. Three villages were selected for in-depth analysis: *Xiaojing*, Xiwang and *Yanli*. These were selected as they were seen as typical cases involved in e-commerce trade, in agriculture, handicrafts and the clothing industry.

During the second phase of the research, from May 2016 to May 2018, a detailed investigation and survey was carried out. In addition to official documents and statistics, semi-structured interviews were carried out with key informants involved in the activities. Interviews were carried out with senior personnel from 51 e-commerce companies, 36 factories and 108 rural family workshops. These in-depth interviews led to an understanding of the social and economic impacts of the technological applications of e-commerce as well as the resulting local development. In addition, relevant officials from the Economic Development Bureau and the Trade Promotion Bureau of the local town or administrative district were interviewed, including the head of the e-commerce industrial park and village committee leaders. The interview questions focused on the actual activities, policies and intentions of local governments in the development of rural e-commerce.

In the third phase of the research, between June and September 2018, follow-up visits were made to the three villages for further data collection, primarily to fill gaps in the information collected in the earlier visit.

3. The Blossoming of *Taobao* Villages in Jiangsu, China

Before the development of e-commerce, rural areas in China faced difficulties in two main constraints. First, in a manner similar to other developing countries, they were unable to develop economies of scale and advanced technology and, as a result, were unable to develop efficient production methods. Second, under the special urban-rural dual systems in China, agriculture was seen as their 'official' function, meaning that any secondary sector pursuits, such as industrial development, occurred only rarely. However, despite these constraints, in the rural areas of Southern Jiangsu Province, located as it was within the Yangtze River Delta, activities such as the production of clothing and textiles, the processing of agricultural products and handicrafts had

historic roots. In the 1980s and 1990s, there was a period of flourishing rural industrialization leading to rapid development of township enterprises. Many *Taobao* villages had been specialized in producing certain products before the development of e-commerce. Their ascent to *Taobao* village-status therefore came easily. By 2019. there were more than 450 *Taobao* villages in Jiangsu Province, and the number is continuing growth.

In 2003, Alibaba launched the *Taobao* platform[2], which was the first "Customer-to-Customer" (C2C) e-commerce in China. In order to regulate the operation of such businesses, the *Electronic Signature Act* and the *Online Trading Platform Service Self-Regulations* were promulgated in China in April 2005 to provide a legal foundation for e-commerce service providers (Kwak et al., 2019). Some isolated responses to these initiatives began to appear in the countryside, especially in the rural industrial clusters, with Jiangsu as one example. An early e-commerce initiative was to open online shops. Many small private enterprises were transformed from the township and village enterprises and rural family workshops and took the lead in selling goods on the *Taobao* platform as an opportunity to deal with the problem of appropriate market. However, large-scale firms did not participate in the e-commerce activities at the beginning to their advantages of having existing market scale effects and offline distribution channels for their products.

Concurrently, the Jiangsu Provincial Government promoted the policy of concentrated land uses for housing and industrial activities (Suzhou Municipal People's Government, 2004) to increase land use efficiency. This policy changed the spatial form of the traditional rural settlement pattern from scattered rural residences to a concentrated form consisting of, multi-story, multi-family housing units. In addition, a number of centralized enterprise parks were established. With this land consolidation, in the long run, more land was available for e-commerce activities, although this took time to develop.

After the global financial crisis in 2008, the Chinese economy was transformed incrementally from export-led to domestic consumption-driven. A series of policies (GOCPC , 2015; MOC, 2015) were released to promote business environments that were favorable to e-commerce activities. Subsequently, some large-scale firms began to move part of their business online and to remodel themselves into a multichannel organizational form, known as 'bricks and clicks' firms（Currah,2002）. In the year of 2013, China racked up to $314 billion online sales and become the largest online market in the world since then. The prosperity of e-commerce has spawned several new types of Web-based intermediaries and data service providers. These companies in turn further accelerate the evolution of e-commerce activities. In recent years, there are a large number of local B2B (Business to Business) platforms, data companies and APP development companies that are for supporting local production emerging in towns and villages in China, including local branches of Ali and other e-commerce companies. During this period, the development of e-commerce in *Taobao* villages has accelerated.

The survey revealed that, over the past two decades, the development of *Taobao* villages in Jiangsu province can be divided into two stages. In the first stage, scattered villagers and small enterprises use e-commerce to sell products on the *Taobao* platform. The profits from online sales

[2] An online market platform, which was established by Alibaba Group in May 2003, is similar to Aamazon

stimulated *Taobao* villages to produce more products. However, in the context of the global financial crisis and the transformation of Chinese economy into a consumption-driven domestic market, *Taobao* villages began to enter the second phase of acceleration and upgrading. Some *Taobao* villages have been developed and expanded to be small towns in terms of their size and population due to the central government policy to encourage the development of rural e-commerce and the involvement of many large enterprises in e-commerce. At the second stage, with the combination and continuous evolution of e-commerce and local production, new information intermediaries and data service providers have emerged, which have further accelerated the rural e-commerce activities.

4. Three *Taobao* Villages in Jiangsu, China

In this section, an examination is made of three *Taobao* villages which are respectively involved in agriculture, handicrafts and industry. The purpose is to illustrate the changes in rural economic organizations of different industry types in the process of the embedding of ICT.

4.1 *Xiaojing* village: social and population changes

This research illustrates that the delivery of e-commence in rural China attracts young people back to the countryside for new job opportunities. E-commerce creates the social and production changes, as well as offering rural population new and higher income jobs and a new approach to production.

Xiaojing Village is located on the northeastern bank of *Yangcheng* Lake in *Suzhou*. By the end of 2014, the number of employees in e-commerce in the village was 1,427, accounting for 49.4% of the village's population of 2,890 persons. The profit from farming is very low. With the help of the *Taobao* platform, sales and chain logistics, villagers can sell hairy crabs, a local delicacy in abundant supply, directly to buyers via e-commerce instead of through middlemen. In addition, at the early stage of e-commerce development in *Xiaojing* village, some villagers applied for development loans with the support from local government. The village committee acted as a guarantor. By the end of 2014, there were 107 online shops and 1,427 e-commerce employees that accounted for 49.4% of the resident population. The e-commerce transaction volume exceeded RMB 310 million ($ 43.7 million) per year.

Many new jobs have been created around Taobao sales, attracting the return of the rural younger generation. Some jobs are directly related to e-commerce, such as online shop owners, website design, e-commerce marketing and Taobao photography. Others that are indirectly related to e-commerce including upstream or downstream links, such as logistics distribution. As young people return to the countryside from urban areas, rural production has been greatly expanded. In the survey, it was found that a new type of production unit has been formed based on e-commerce: hairy crab breeding and ancillary services, which accounted for two-thirds of employment generated. The core workers of e-commerce companies are mainly local people. Important tasks, such as accounting and management, are generally held by family members or acquaintances. Some ancillary services are undertaken by migrants or temporary workers. It was also found that a new intergenerational division of labor within rural households had been established. In the past, young people and their parents were engaged in farming together. Now young people in the

Taobao villages are engaged in e-commerce sales while their parents are engaged in breeding crabs. The younger generations are more innovative in e-commerce sales, while their parents are more experienced in farming. This new intergenerational division of labor can better meet the needs of the online market.

Because that the villagers of *Xiaojing* started e-commerce activities earlier, they have accumulated abundant experience. There are more than 100 online shops in *Xiaojing* village. These stores have formed a good consumer reputation on the Taobao platform. For this reason, villagers are contracting out surrounding ponds for larger scale farming, and many nearby peasants supply their hairy crabs to *Xiaojing's* online stores. In the case of *Xiaojing* village, it was observed that in the past the countryside was only a breeding base, but now they have incorporated sales, packaging and logistics into their operations. The result is that more profits are being retained in the rural areas. This in turn has resulted in an improvement in quality, increasing sales further.

4.2 *Xiwang* village: production change for different demands and market expansion

The online market has enlarged consumer choice and transformed the economic organization in rural China by leading to the development of different markets for various demands of different consumers and encouraged specialized production.

Xiwang village is one of the famous professional handicraft villages in *Yixing* City that produces teapots. The purple sand clay, found on the west bank of *Taihu Lake*, is used by villagers to make teapots. This activity has been developed for generations, based on master/apprentice relationships to ensure quality. The village has a population of just over 2,000. More than 80% of inhabitants are engaged in the production of *Zisha* (purple sand) teapots. By 2015, the annual output value of the purple sand industry in *Xiwang* Village reached RMB 160 million ($ 22.6 million) with net income of RMB 45,200 ($6,377) per capita, with *Xiwang* village having the highest income in *Yixing* City.

The traditional handicraft industry in *Xiwang* has benefited significantly from ICT and the online market. The teapot was originally a relatively small cultural product. The online market has triggered a huge increase in demand, leading to new production methods for the humble. The survey revealed that luxury and high quality teapots were still being produced in the traditional manner, mainly for richer private consumers. However, the online market has led to demand for lower quality and less expensive teapots. The production process has been refined, with the body of the pot being drawn by machine while the spout, handle and lid are made by craftsmen. Even the location of production has become flexible in order to meet this increase in demand, with production of components dispersed to different workshops for later assembly. This modularization has facilitated large-scale production. The changes in production has resulted in reorganized productive resources and social relations in accordance with the standardization and modular production requirements of the teapot.

The ICT and online market have brought new opportunities to rural China in the form of timely online feedback from e-commerce users, but also, as in the case of *Xiwang*, in the form of increased demand for *Zisha* products. New production processes have been developed, such as modular production and interfirm collaboration, as well as the formation of large scale upstream and

downstream production collaboration. More importantly, diversification of teapot products has stimulated new technologies in the production process of a traditional handicraft, such as pottery carving and dotting, which in turn require new artisans and highly skilled labor.

As one villager observed:

The teapots are popular on the Internet and sold very well online……but the needs of different buyers are very diversified. Now there are many immigrants from Anhui and Jiangxi Provinces in the village. They bring in crafts such as pottery and spotting. They form very good inter-professional collaborations with local villagers. (interview with a villager, March 2017)

In *Xiwang* village, the rural revitalization is not simply to repair and renovate the environment, but is closely combined with the development of the industry which is adapted to this new economy. With the rapid development of the teapot production, the village establishes its local features which showcase its entrepreneurship, communication linkages and traditional skills and experience.

4.3 *Yanli* village: data-driving and market led production

ICT generates significant data which can be fully used to support production. The data-driven and market led approach, provides opportunities for small and medium size economic organizations that may not have the capacity for large scale production yet provides them with scale opportunities that are appropriate to their capacity.

Yanli village, which is about 4 km from a local clothing wholesale market to its North, covers an area of 3.2 square kilometers, with 3,337 of residents. Before the development of e-commerce, there were in the village many small and medium sized enterprises (SME) concerned with clothing, primarily in the form of family workshops. The clothing produced was sold through wholesale market. With the advent of e-commerce, hundreds of clothing companies moved to *Yanli* village. In the last 10 years, the village has attracted more than 15,000 migrants. In 2014, the volume of e-commerce transaction of this village reached RMB 840 million ($ 119 million) according to an interview with the head of the e-commerce enterprise park (interviewed on May 8th 2018).

The case of *Yanli* village illustrates another type of change of the business operation in rural China. Compared to the first two cases, *Yanli* village reveals a more complex rural economic organization structure: data-driven production. E-commerce creates a unique type of market for selling special style garments identified by search engines from e-platforms which reveal the online purchasing preferences of consumers.

Ali, one of the major e-commerce providers in China, has also made a contribution to the changes of rural economic organization. The survey found that nearly 60% of online stores in *Yanli* village are using '*Business Advisor'*, which is a paid plug-in data tool developed by Ali to make decisions.

A CEO of a clothing enterprise stated:

'Business Advisor' provides multi-dimensional analysis data of online shops, including online merchandise flow data (the number of online shops visited by customers), conversion rate data

(the ratio of customers purchasing to customers visiting), and collection data (the condition of online shops being visited by customers). We use the data to judge the trend and demands more accurately, and to find out the potential problems, so as to carry out effective actions ...such as when our company specially set up two flexible production lines for online high-quality clothes (interview on May 9th 2018).

In order to cope with demands of consumers for special style of garments, a large number of SMEs and family workshops in *Yanli* village have had to change their traditional model of production and approach to the market for clothing sales by reorganizing their network reliance on data from online market and '*Business Advisor'*. The survey revealed that a fashion designer may have to design more than ten different styles of a certain garment; all of which would then be provided online for the feedback from potential consumers in real time. The most popular, potential best seller, would then be provided for mass production in *Yanli* village (*interview with workshop operators on May 9th 2018*). Internet generates this model of consumption and production efficiently, establishing links among the fashion designer, consumers and producers. It is a market and data driven model. This model identifies the specific required styles of fashion demanded by the market which is beneficial to economic organizations with limited capacity and with limited marketing ability in rural areas. It avoids potential risk.

One CEO of a clothing enterprise noted:

"If an item of clothing were designed to sell for more than 500,000 pieces on Taobao platform, 1-2 large factories will be the providers of the products. There may not be opportunity for any small enterprises due to their capacity of production. Now, consumers need a more specific style of fashion but limited volume. ICT offers opportunities to link designer, consumers and our small enterprises. This brings great opportunities to our small and medium-sized enterprises." (interview May 9th 2018).

The garment industry in *Yanli* has experienced significant agglomeration effects. As a result, there are opportunities for younger people with innovative ideas to find employment. Some are fashion designers, others are involved in marketing and/or providing live advertising online to show fashion style to the potential consumers. Some young people engage in cross-border e-commerce sales. A university graduate majoring in broadcasting reported that she had confidence in the future of *Yanli* village and hoped to utilize her education background for clothing sales to realize her dream (*interview on May 8th 2018*). One result has bene the growth in population of the village.

Some new functional enterprises in *Yanli* village also play key roles in accurately matching the relationship between upstream and downstream production, producers and consumers (Table 1). These new enterprises are evolving in the combination of e-commerce and local production. Now there are many subcontracts that help cooperation between local SMEs and rural families. Once innovative changes take place in the upper reach of the supply chain, production cooperation between downstream SMEs and family workshops can be quickly adjusted and regrouped to form new production networks.

Table 1 Some new businesses and enterprises in *Yanli* village

Main services	Business model	Typical enterprises
Cross-border e-commerce services for enterprises	B2B C2B	Alibaba.com (Changshu branch), DH gate.com,
Professional information services, including fashion trends; online and offline staff training for enterprises	B2B	Sxxl.com, Suzhou Hua'ao Culture Media Co. LTD
Professional webcast service and online marketing strategy for garment manufacturing enterprises	B2C	*Cat Forest* studio (Taobao live sales ranked fifth)

Source: Outcomes of the survey (May 2018).

Notes: B2B: business to business; C2B: Customer to business; B2C: business to Customer

It was found that local governance institutions had been reformed to promote e-commerce development. Local government administration mechanisms have been reformed in order to accelerate possibility of coordinating resources at township and village levels. A new type of administration known as '*integration of enterprise parks and towns'* has emerged to reduce the management complexities and administrative costs. This model combines management for enterprise (industrial) parks and for towns into one by implementing 'a team for two bodies' to integrate and merge government functions. A series of specific policies for reducing taxes and attracting talent were adopted. Supported by a series of specific institutional arrangements, the local government was required to support and guarantee the vitality of the rural e-commerce economic activities and ultimately promoted the development and transformation of rural areas. *Yanli* village had been supported by the funding from the local government to improve the village infrastructure as an e-commerce demonstration village. Many enterprises and individuals who engaged in e-commerce have also applied for tax deductions and talent supporting policies (interview with *Mocheng* community leader, July 2017). Furthermore, township and rural development plans were produced to allocate space for e-commerce economic activities. In *Yanli* village, an e-commerce enterprise park was established to promote the development of e-commerce as proposed by rural planning policy.

The case studies of three *Taobao* villages explore specifically the changes of rural economic organizations of different industrial types when ICT and e-commerce were embedded in the countryside. They support the argument that the blossoming of *Taobao* villages in China is essentially the process of the interaction between ICT and rural society.

5. Discussion

Our research has addressed the aforementioned two research questions. The empirical research on the three cases illustrates that the success of *Taobao* villages cannot be understood simply as the application of ICT, e-commerce, or other technologies in rural China. The application of new technologies has changed the traditional approach to rural production and significantly impacted rural society from both social and economic perspectives by establishing a new network of economic organizations. The technology of ICT has not only opened up online markets which extends connections to the outside world from rural areas and established a new form of economic network for production and consumption, but has also influenced the roadmap of Chinese

urbanization since this activity supports good paying job opportunities in *Taobao* villages which attracts talent to rural areas. It is suggested that this approach is as a co-evolutionary path of rural development based on ICT and e-commerce, as summarized in Figure 1.

Figure 1 about here

Figure 1 The Impacts of Co-evolutionary Path of Rural Economic Structure by ICT and E-commerce

Source: Research findings

Fei (1948) argued that there are three basic types of traditional rural economic organizations in China, including small-scale agricultural production, household manual production and workshop production. Since the Chinese rural reform in 1978, characterized by the so-called 'Household Responsibility System' coupled with land contracted to each household, there has always been a defect in the resulting small and scattered production of each household and their accessibility to the market. In contrast to mature market structures, these rural production units rely mainly on the acquaintance society, such as blood, kinship, friends and other *guanxi* (relationships) to maintain their production and market. They lack scale production effects and technology and are far away from the consumer market. However, the application of new technology, such as ICT, has changed traditional and weak rural economic structures.

In the early stages of e-commerce and online markets, villagers played an important role in actively participating in the application of new technology, such as ICT, in order to sell their products, such as various agricultural goods and handicrafts in order to enlarge their market and seek business collaboration opportunities. The so-called 'ripple effect' (Fei, 1948) in Chinese rural traditional acquaintance society has made a significant contribution in the delivery of e-commerce and ICT. The information about and experience with online sales, especially reports of successful cases spreads rapidly among relatives, friends and neighbors.

After more than a decade of development, local product brands have been built up in the *Taobao* villages. This research illustrates that when supported by the technology of ICT and emergence of e-commerce, strong economic organizations can be developed as required due to this new approach to the supply and demand network. The traditional weak economic organizations, such as family workshops and small rural enterprises, which have a limited production capacity, have to be upgraded and strengthened to cope with this new internet-based model of consumption and production in order to serve a market in both China and the outside world. As the study reveals, this new approach has transformed the activities in these three *Taobao* villages in their approach to production scale and productivity.

It is found in this research that the e-commerce activities on hairy crabs has formed a new economic network between *Xiaojing* village, as the e-commerce transaction node, and its wider surrounding hinterland settlements, to increase the production to meet the demand of consumption. The changing demands and consumption shift the production mode. In order to meet the needs of

different consumer groups, *Xiwang* village artisans, who have a long history and are well known for producing traditional handmade teapots, have changed their approaches to production. Similarly, in the clothing industry, due to the diverse and specific demands of consumers, in *Yanli* village, small batch production organizations with the capability of creating special products, have emerged.

With the establishment of strong economic organizations and the benefits obtained through interaction with ICT and e-commerce, as well as their co-evolvement to preserve the market, rural society and its demographic structure, have been profoundly impacted. After a decade of development, the *Taobao* platform has expanded from the original e-commerce platform to a complex e-commerce ecosystem (Romagnoli and Garbelli, 2017). Logistics technology and financial service support are highly integrated onto the platform, search engines continue to iterate, and various marketing methods are emerging. Due to the information transfer between users and producers in the process of e-commerce transactions, producers can obtain feedback on innovative products based on the needs of users (Wrigley and Currah, 2002). This innovation from the 'bottom-up' process of e-commerce has prompted organizations to continuously adjust and iterate. In this process, various small and micro innovations are constantly emerging in the online market, and acceptable returns on commodities and supply are guaranteed. All of these changes are due to ICT and e-commerce. This technology has had broad and profound impacts on rural Chinese society.

Significantly, the operating model of consumption and production has been continuingly expanded through synergy supported by ICT. This has significantly enhanced the organizational production capacity and resource coordination ability among the rural economic organizations that participate in this flexible production of the internet economy. This research shows that this changing mode is mainly driven by the big data that can be collected and analyzed from the internet economy.

The e-commerce platform is able to provide different types of data on commodities which comprise the big databank. The Chinese firm Alibaba, which specializes in e-commerce and internet technology, has developed the 'business advisor' to classify data which can be used for commercial purposes and which generates the necessary data businesses need to operate *Taobao*. The data provides sellers with real-time information services, giving them information on both consumers' purchase habits and preferences as well as updates on and promotions of other products. This increases the productivity of the *Taobao* villages. This research provide evidence to support the argument that a strong economic organization is essentially a localized form of network enterprise (Castells, 1996). However, with ICT, the strong economic organization in rural areas can be more flexible, dynamic and open.

One interesting finding of the research is that, given the attraction of ICT and on-line technologies, the three *Taobao* villages examined experienced reverse migration, that is, young workers who had previously moved from the villages to Chinese urban areas in order to obtain employment, were actually now retuning to the village to take advantage of employment opportunities there. This would seem to represent a new form of Chinese urbanization, and given the problems that exist in large Chinese cities, appears to be a trend that authorities might with to encourage.

The case of *Yanli* village illustrates this phenomenon. It might be said that *Yanli* village is at the center of a 'fashion boom'. The traditional methods of production and sales have been revolutionized by this new technology. As agglomeration has occurred around this industry, opportunities for higher incomes and better employment have resulted. As neo-classical economic theory would suggest, in such cases, in-migration occurs. The migrants include not just those who have earlier migrated out of the area to the big city, but also university graduates, even those from international universities. This new urban growth in the villages is a direct contribution of the local data service providers and data service platforms and an effect of their impact upon rural China. As a result, the average age of the village inhabitants has been lowered and the population is much more diversified.

6. Conclusions

The success of China's *Taobao* villages shows that ICT and e-commerce not only bring benefits to high-income developed countries and to urban areas, but also flourish in developing countries and in rural areas. The contribution of this paper is to provide a co-evolutionary analytical framework for this new economic phenomenon by taking three *Taobao* villages as cases to examine the details of changes in rural economic organizations as a result of e-commerce. This research reaches certain conclusions.

As indicated in the hypothesis, the new technologies have enhanced rural development and upgraded the form of rural economic organizations in China. The new technology has to be embedded in rural areas and interacted with rural economic organizations. It is our argument that the blossoming of *Taobao* villages in China is essentially a process of the interaction and co-evolution of technology and rural society. Weak rural economic organizations can employ ICT and e-commerce to open up online markets for rural specialty products, as has been demonstrated in the case of the three Jiangsu villages. As the case studies demonstrated, the local villagers initially adopted e-commerce as a means of expanding the market catchment and/or seeking collaboration opportunities for their traditionally produced products. Through their acquaintance network, word of this successful experience spread rapidly to surrounding areas.

The emergence of strong economic organizations is an important condition for the development and prosperity of *Taobao* villages. When the online market is operated successfully, it grows. The weak economic organizations evolve, with the support of ICT, into new types of strong economic organizations. This new productive structure enhances the producers' abilities, to organize production and to manage the necessary resources and to adapt to the flexible demands of the e-commerce. The cases of this research have provided evidence to illustrate the different types of *Taobao* village economic organization in this process of change.

Taobao villages not only bring economic restructuring to the rural economy, but also a series of profound changes to the social structure in this part of rural China. The research demonstrated that with the rapid progress of technology, the economic organizations of *Taobao* villages are themselves part of a dynamic process, rather than being in a static state. At the same time, 'bottom-up' innovations in e-commerce are forcing organizations to adapt continuously to a more flexible online market. This research provides evidence that economic prosperity attracts the

younger generation back to the village, which may change the roadmap of urbanization.

However, there are some unexplored issues from this research. Given that there are as many as 4,310 *Taobao* villages in China, the first question that inevitably arises is whether the 3 villages examined in the prosperous Jiangsu Province are typical of the other cases or in some way unique? It is necessary to deliver a further research to explore *Taobao* villages in the less redeveloped areas of central and western China to compare their commonness and differences

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