



Food and Agriculture
Organization of the
United Nations



浙江大學
ZHEJIANG UNIVERSITY

RURAL E-COMMERCE DEVELOPMENT

EXPERIENCE FROM CHINA



DIGITAL AGRICULTURE REPORT

**RURAL
E-COMMERCE
DEVELOPMENT**
EXPERIENCE FROM CHINA

Published by
Food and Agriculture Organization of the United Nations
and
Zhejiang University

Required citation:

FAO and ZJU. 2021. *Digital agriculture report: Rural e-commerce development experience from China*. Rome. <https://doi.org/10.4060/cb4960en>

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ISBN 978-92-5-134510-8 [FAO]

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FOREWORD

Creating momentum towards the achievement of the 17 Sustainable Development Goals (SDGs) is a task that requires the concerted collaboration and commitment of all. Making our agri-food systems MORE efficient, inclusive, resilient and sustainable is key to reaching the SDGs.

Agri-food systems are the world's largest economic sector in terms of employment, livelihoods and planetary impact, but they are in dire need of transformative change to address the challenges of food security and nutrition, inclusive growth and the sustainable management of natural resources.

Transforming the agri-food sector can improve the lives of all, in a wide range of key areas – economic, social and environmental. Rural e-commerce can be an important driver of this process of revitalization, by integrating and connecting rural populations and agricultural activities with urban markets and consumers. This requires the availability of electronic and mobile platforms, as well as basic infrastructure, such as electrification, internet access roads and warehouses to support value chains. Shaping such conditions can be achieved through public-private partnerships, with governments providing policy, strategic guidance and support to ensure an enabling environment, and the private sector supporting the development of new business models that provide rural entrepreneurs with opportunities for growth.

This report, produced by the Food and Agriculture Organization of the United Nations (FAO) and Zhejiang University, explores the role of rural e-commerce in transforming the agri-food systems in China, through the development of an innovative ecosystem that has led to market integration for agricultural producers and rural populations. The impact has been improved incomes and reduced poverty for a wide range of actors.

The report identifies the policies and incentives developed to foster rural e-commerce, as well as the public-private partnerships that have helped to advance it in rural areas and to create new business models for rural entrepreneurs in China. The report also discusses the challenges encountered, lessons learned and proposals for the way forward.

This publication also marks a step on the pathway towards the FAO-led International Platform for Digital Food and Agriculture¹, the 1000 Digital Villages Initiative;² and advocates for stronger South-South and Triangular Cooperation.

We hope that this report will contribute to improved methodologies, approaches and solutions to accelerate inclusive and sustainable development in rural communities for better production, better nutrition, a better environment, and a better life, leaving no one behind.



Qu Dongyu
Director-General
Food and Agriculture Organization of the United Nations

¹ More information available at <http://www.fao.org/3/nc855en/nc855en.pdf>

² More information available at <http://www.fao.org/asiapacific/perspectives/digital-villages/en/>

ACKNOWLEDGEMENTS

This report was jointly produced by Food and Agriculture Organization of the United Nations (FAO) and Zhejiang University China. FAO team members were Zeng Meng, Dejan Jakovljevic and Paul Whimpenny. Team members from Zhejiang University were Prof. Wei Longbao, Xu Wangfang, Zhou Yun, Yu Wenjing, Wu Zhihao and Sun Hao. Agustina Grossi and Jiang Lu provided administrative support.

Guo Hongdong (Zhejiang University) and Fang Lu (Alibaba Group) provided technical support to the team.

We would like to acknowledge the many colleagues in FAO who provided valuable technical comments and inputs to the report during its preparation: Chief Scientist Ismahane Elouafi; Chief Economist Maximo Torero Cullen; Mona Chaya, Preet Lidder and Marta Iglesias from Office of Chief Scientist; Zhang Zhongjun, Dong Le and Gao Jingya from the FAO China Office; Peter Wobst and Wang Xiaoxiao from Inclusive Rural Transformation and Gender Equality Division; George Rapsomanikis from Markets and Trade Division; Henry Burgsteden from the Office of the Director-General; Selvaraju Ramasamy, Yang Puyun, Per Rudebjer, Delgermaa Chuluunbaatar, Atef Swelam and Nevena Alexandrova from the Office of Innovation; Jong-Jin Kim, Takayuki Hagiwara, Aziz Elbehri and Eva GalvezNogales from the Regional Office for Asia and the Pacific; and Ye Anping, Liang Xiao and Michela Baratelli from the South-South and Triangular Cooperation Division.

For their valuable technical comments and guidance at various stages, the team thanks Olukemi Afun-Ogidan (African Development Bank); Natalia Bayona, Gabriela Gill and Arizmendi Addaia (World Tourism Organization); Wallace Cheng (World Food Programme); Hani Eskandar (International Telecommunication Union); Torbjörn Fredriksson and Thomas Van Giffen (United Nations Conference on Trade and Development); Jan Hinrichs and Zhang Qingfeng (Asian Development Bank); Ulla Kask (World Trade Organization); Nie Fengying (Chinese Academy of Agricultural Sciences); Srinivasu Pappula (Tata Consultancy Services); Hannah Reed (Bill and Melinda Gates Foundation); Parmesh Shah (World Bank Group); Kieron Swift (Inter-American Development Bank); Eliane Ubalijoro (Future Earth); Wang Xiaobing and Wang Yingkuan (Ministry of Agriculture and Rural Affairs of China); Wang Xiangdong (Chinese Academy of Social Sciences); Sjaak Wolfert (Wageningen University and Research); Karl Wurster (United States Agency for International Development); Zhao Chunjiang (Chinese Academy of Engineering); and Zheng Bin, Zuo Chengming, Wang Lan, Xu Fei, Nan Xi, Hao Fangjia, Ouyang Cheng and Zhao Yanan (Alibaba Group).

Editing: Green Ink

Design and layout: Green Ink, United Kingdom (www.greenink.co.uk)

ABBREVIATIONS AND ACRONYMS

5G	5th-generation
AI	artificial intelligence
B2B	business-to-business
B2C	business-to-consumer
CO₂e	carbon dioxide equivalent
C2B	consumer-to-business
C2C	consumer-to-consumer
CNY	Chinese yuan
COVID-19	coronavirus disease 2019
CPC	Communist Party of China
EDI	electronic data interchanges
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
GIAHS	Globally Important Agricultural Heritage Systems
GMV	Gross Merchandise Volume
IT	information technology
ha	hectare
SDGs	Sustainable Development Goals
UNWTO	World Tourism Organization

EXECUTIVE SUMMARY

The ecosystems development of electronic commerce, or e-commerce, can help to accelerate inclusive and sustainable development in rural communities by creating new jobs and income-generating opportunities and improved services for rural dwellers.

In various parts of the world – in both developed and developing countries and in both urban and rural settings – e-commerce is playing a significant role in driving consumption, employment, entrepreneurship and poverty alleviation.

The process of buying and/or selling products or services through electronic/digital platforms, e-commerce has accelerated rapidly in recent years, as sellers discover a more efficient, lower-cost method of moving their goods and services, and consumers are attracted by the greater choice, convenience and price competition that it offers.

Nowhere is this trend more acute than in China, which is leading the world in e-commerce, currently accounting for more than 42 percent of global e-commerce transactions, compared with 1 percent just 10 years ago and representing an annual growth rate of 50 percent since 2011 (Smith, 2018).

In a country with a deliberate policy of pursuing e-commerce as an engine of growth, particularly in rural areas, the Chinese experience has shown that digital technology through public-private partnerships can promote inclusive development and that online trading can become an important tool for poverty reduction and rural revitalization.

This publication, produced by the Food and Agriculture Organization of the United Nations and China's Zhejiang University, examines how favourable government policies and strategies have helped rural e-commerce to advance the transformation of agricultural markets, enabling farmers and entrepreneurs to increase production efficiency and connecting them to larger markets, while attracting migrant workers – especially young people – back to their villages and, in so doing, helping to reboot the economy and revive

the social fabric of the countryside. As the largest developing country in the world, China can provide reference experience for other developing countries in agricultural digital transformation.

A selection of case studies illustrates how rural e-commerce is creating opportunities for diversification and new markets for rural people and communities in various parts of China, including vulnerable groups such as women and youth.

Identifying good practices in the rural e-commerce arena, the report also explores some of the challenges raised by the shift towards this pattern of business and consumption. Chief among these are concerns for environmental impacts. While digital management methods reduce the need for inventory stocking and paper-based advertising, e-commerce logistics generate large volumes of packaging waste, as well as carbon emissions through freight transport for rapid deliveries and returns.

Other challenges to rural e-commerce include inadequate infrastructures and inefficient logistics in some rural areas, weak digital skills capacities, especially among traditional farmers, poor produce standardization, weak production capacity of high-quality products, inadequate capacity to meet food safety requirements, and high initial investment requirements, which threaten to put this income-generating method beyond the reach of the most disadvantaged rural groups.

Due to this and a number of other reasons, the report makes clear that rural e-commerce does not represent a silver bullet for poverty reduction. However, with the right support, ideally from a blend of public-private actors and interventions, this business model can provide a new tool for farmers and other agri-based enterprises, helping them to improve production efficiency, expand their customer base and increase revenues, while serving as an underlying driving force for rural entrepreneurship.

1. E-COMMERCE – AN ENGINE OF GROWTH FOR DIGITAL AGRICULTURE

1.1 A brief history of e-commerce

Electronic commerce, or e-commerce, is the transactional process of buying and/or selling products or services via an electronic/digital platform. The Organisation for Economic Co-operation and Development (OECD) defines e-commerce as: ‘...the sale or purchase of goods and services conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods and services do not have to be conducted online...’. Common features of e-commerce include: (a) an array of products or services, which are sometimes standardized; (b) packaging; (c) payment methods; (d) in/outbound delivery logistics; (e) promotion and marketing; and (f) security and sanitary fulfilment.

The concept of e-commerce first made its appearance 70 years ago (Zwass; dos Santos, Sabino, Morais and Gonçalves, 2017), originating as a channel for the exchange of business documents, such as orders or invoices, between suppliers and their commercial clients, with a system of ordering goods mainly by telex. During the 1970s and 1980s, e-commerce developed into simple electronic business transactions and teleshopping, handled primarily through computer-to-computer electronic data interchange (Miva, 2011).

However, it was not until the 1990s that online shopping became possible through the Internet (Agileinfo ways, 2011). In 1992, *Book Stacks Unlimited* was launched as an online bookstore, originally using the dial-up bulletin board format, before switching to the Internet in 1994 and operating from the books.com domain. In 1995,

Amazon was introduced as an e-commerce platform for books (History, 2021), and later as one of the first e-commerce sites for general products. In the same year, eBay was launched as a web-based auction platform (eBay, 2020). In 1998, PayPal made its appearance on the e-commerce stage as a money transfer tool, and the following year Alibaba Online was launched as an online marketplace (Alibaba Group, 2020). Since then (Marfice, 2020), e-commerce has evolved rapidly, with new platforms/technologies and innovations in business models and markets, in the process, changing the way that we live, shop and do business. As of 2019, around 54 percent of the global population was estimated to use the Internet. Internet access has spread vastly, but gaps persist across countries and grow progressively as average income per capita decreases. Moreover, gender imbalances also extend into the digital realm, with rural women having the least access to the Internet. Worldwide, 48 percent of women have access to the Internet, compared with 58 percent of men (FAO, 2020).

The new e-commerce business models have transformed traditional commerce, value chains and cultures, either complementing them or creating new channels. The strong focus of e-commerce on convenience and easy product comparison requires reorganizing the supply chain in its different stages. These new models have the following characteristics and advantages. They offer: (a) access to products/services in a convenient way for clients, through location-less 24/7 services, with advanced recommendation features; (b) convenient and reliable means of payment, eliminating the complexity and bureaucracy of traditional mechanisms; and (c) end-to-end logistics with a high level of operational and sanitary reliability and traceability. They also offer expanding sales

scope for producers, especially small-scale ones, enabling them to reduce their production costs and increase sales revenue.

Growth in e-commerce has accelerated in recent years, particularly during the COVID-19 pandemic (UNCTAD, 2021). COVID-19 has also showcased how transformative e-commerce is and can be in the years to come. In addition, it has accentuated the urgency of addressing the barriers/issues it faces (i.e. regulatory, privacy, etc.). However, this expansion, in terms of products/services, platforms and geography, brings with it more pressure to overcome a series of issues that need to be addressed. These include consumer privacy, taxes, competition mechanisms, cross-border trade and the environment. Some of these issues include the following, as demonstrated by OECD (2009).

- Consumer and privacy protection, taking into consideration vulnerable consumers (such as children), users' personal data protection, product safety and recalls.
- Tax policy challenges, especially in relation to cross-border trade, considering how and where value is created, as well as data collection and the mobility of intangible assets.
- Questions of competition, taking into account the disruptive capacity of the e-commerce model and the bundling of services (mobile payment, social media, live streaming, powerful logistics) that constitute a high barrier to entry for newcomers, and social and environmental impacts.

- Trade considerations, due to digitally enabled services and packages of goods and the blurring of borders, especially in cross-border flows.
- Environmental issues – although the net effect of e-commerce is not clear-cut, changes related to logistics and infrastructure can have national, regional and local impacts.
- Sociocultural implications, since the development of e-commerce is changing the way that we interact with and relate to the products themselves, as well as to the logistics and to agents in the supply chain.

This report aims to provide a framework for understanding, analysing and identifying good practices in the rural e-commerce arena, paying special attention to its particular features and some of the challenges that these raise.

1.2 The e-commerce model

The e-commerce model is a new type of trade method that relies on modern information technology (IT) and network technology, integrates financial electronics, management information, and business information networks, and aims to achieve the harmony and unity of logistics, capital flow and information flow.

An e-commerce model must contain the following elements (see Figure 1.1): producers or suppliers and customers, connected through a platform (web, mobile or other electronic mechanism); a payment or contribution method; and the logistics of physical or digital distribution.

FIGURE 1.1 The basic e-commerce model



Source: Tracy Watson, [2020].

To a lesser or greater extent, the e-commerce model may consist of the following players.

1. **Marketplaces:** These are the various places where sellers can list their products or services with the marketplace operator, providing a platform that connects buyers and sellers. The marketplace charges a transaction fee for its service. Classic examples include: (a) business-to-consumer (B2C), where a business sells a good or service to an individual consumer; (b) business-to-business (B2B), where a business sells a good or service to another business; (c) consumer-to-consumer (C2C), where a consumer sells a good or service to another consumer; and (d) consumer-to-business (C2B), where a consumer sells their products or services to a business or organization.
2. **Retailers:** These are responsible for finding their own customers and have full control over the customer experience. The direct business model typically requires significant marketing spend and a means of driving traffic to the platform. Unlike marketplaces, which primarily facilitate transactions, retailers often try to provide a curated experience for their customers and guide them through a unique discovery process.
3. **Brands:** These are now using their own platforms and social media accounts to sell directly to customers. They have the most focused selection, the highest level of customized experience, and the strongest connection with the customer, and also bear full responsibility for the marketing and fulfilment of their products and services.

E-commerce can have advantages for both sellers and customers, drawing both parties closer together, which in turn can result in increased productivity and competition. The customer can choose between different sellers and buy the most relevant products, depending on their requirements, preferences and budget. Moreover, customers have access to virtual stores 24/7.

Regardless of the particular model, e-commerce is rapidly evolving to take account of the different realities of consumers, producers, logistics and

means of payment, and is likely to continue to develop further in the coming years, responding to customers' changing needs and contexts.

1.3 Local and global impact

The development of e-commerce worldwide is generating economic, social and, to some extent, environmental value. E-commerce is adding to the sustainability dimensions, but it is also important to note the adverse impact it has and how it can try to address such effects – packaging and waste, for example.

Although documented results are lacking in some areas, there is substantial evidence of economic impacts, especially related to sales and growth.

- The size of the global e-commerce market was estimated at over USD9 000 billion in 2019 and was expected to reach more than USD10 000 billion in 2020, growing at a compound annual growth rate of 14.7 percent from 2020 to 2027 (Grand View Research, 2020; UNCTAD, 2021).
- To date, Asia-Pacific and North America have led the regional totals for both bricks-and-mortar and e-commerce sales, followed by western Europe (Samet, 2020). China's dominance means that 62.6 percent of all digital sales in 2020 were expected to take place in Asia-Pacific, with North America and western Europe distant trailers, at 19.1 percent and 12.7 percent, respectively (Cramer-Flood, 2020).
- Features of e-commerce include greater efficiency in end-to-end distribution value chains, reducing the cost of inventory management, the materials ordering process and labour (Baršauskas, Šarapovas and Cvilikas, 2008), and transaction costs, while streamlining supply chains, eliminating intermediaries, and enabling small and medium-sized enterprises to access new markets (Alvarez, Huamani and Coronado, 2020). Global value chains have become important and are widespread in food and agriculture. About one-third of global agricultural and food exports are traded within global value chains (FAO, 2020).

- An ecosystem has emerged in tandem with the growth of e-commerce (Wang *et al.*, 2017), producing the conditions for innovation and the development of new businesses. There is evidence that e-commerce has enabled start-up firms to widen their customer base, and that e-commerce provides low-cost services to grow their businesses (Lee *et al.*, 2018).
- From the perspective of consumers, e-commerce platforms reduce the presence of intermediaries and increase price competition by bringing together large numbers of producers and suppliers, enabling customers to purchase goods and services at lower prices.

The social impact of e-commerce can be summarized as the following (Sumanjeet, 2009; UNCTAD, 2020b; OECD, 1999),

- Democratization of access to goods and services to consumers through different mechanisms, particularly cross-border goods and services.
- Poverty reduction – e-commerce has brought producers and suppliers closer to consumers and expanded the sales of agricultural and food products, with strong potential for improving income and revenues, especially for marginalized groups, such as small-scale farmers, women and youth.
- The e-commerce boom has created more job opportunities and new types of work, such as partnerships in online store operations, deliveries and live streaming. At the same time, it may also cause unemployment in traditional market channels.
- Increased availability of goods and services, providing 24-hour access, 7 days a week, thereby reducing the need to anticipate purchases.
- Greater transparency for consumers through increased availability of information, not only regarding prices, but also the characteristics of products and through the reviews of other consumers (Zhang *et al.*, 2017).

Finally, in terms of the environment, e-commerce has had an impact on sustainability, though it has also had a number of serious negative implications:

- Reduced product inventory and waste, due to a better match of demand (adequate demand forecasting) and supply (Bertram and Chi, 2018).
- However, increased packaging, due to delivery, generates large amounts of waste (Escursell, Llorach-Massana and Blanca Roncero, 2021). Some companies are working on using packaging from recycled or biodegradable materials. For example, Zara recently announced that it is planning to ensure that 100 percent of the cardboard used in its shipments is recycled (Chua, 2021; EAE, 2021).
- Potential changes in volumes of greenhouse gas emissions (increase or decrease) from transportation, depending on modes and distance (Bjerkkan, Bjørgen and Hjelkrem, 2020). For example, reverser logistics (return logistics) generate carbon emissions; according to some estimates, around 10 percent of goods sold through e-commerce in the United States of America are returned to retailers each year, generating the equivalent of 15 million tonnes of carbon emissions (Cannone, 2021).
- E-commerce may have a lower carbon footprint than traditional in-store shopping due to more efficient logistics, but fast shipping could increase carbon dioxide (CO₂) emissions and costs. In the case of Mexico, there is evidence that fast shipping has caused CO₂ emissions and related costs to rise by up to 15 percent and 68 percent, respectively (Muñoz-Villamizar, Velázquez-Martínez, Haro, Ferrer and Mariño, 2021).

To transform e-commerce into green commerce, companies need to invest in packaging innovation and sustainable supply chain mechanisms, including reverse logistics systems that promote reuse and recycling; consumers also need to display sustainable consumption behaviour.

A special case that should be mentioned is the increase in the use and volumes of goods and services traded through e-commerce as a consequence of COVID-19. According to the *e-Economy SEA 2020 Report*, respondents spend more time shopping online for various goods and services, except for travel and transport (see Figure 1.2) (Google, Temasek and Bain, 2020).

The pandemic has accelerated the expansion of e-commerce into new companies, customers and product types. This has allowed new and old customers access to a wide variety of products and enabled some companies to continue operating despite contact restrictions and other measures. However, limitations and digital gaps persist in the adoption of e-commerce, and in some cases these have increased. In the case of consumers, systemic challenges related to connectivity, financial inclusion, skills and trust (for example, issues related to digital security, privacy and consumer protection) have been brought into sharp relief. Meanwhile, in the case of firms and producers, there is a need for policy-makers to reduce regulatory uncertainty, in order to support the creation of innovative business models (OECD, 2020).

New policies are needed to address the increased competition in the sector and an enabling environment for e-commerce, including services for communication and transparency, logistics and trade. At the same time, it will be important

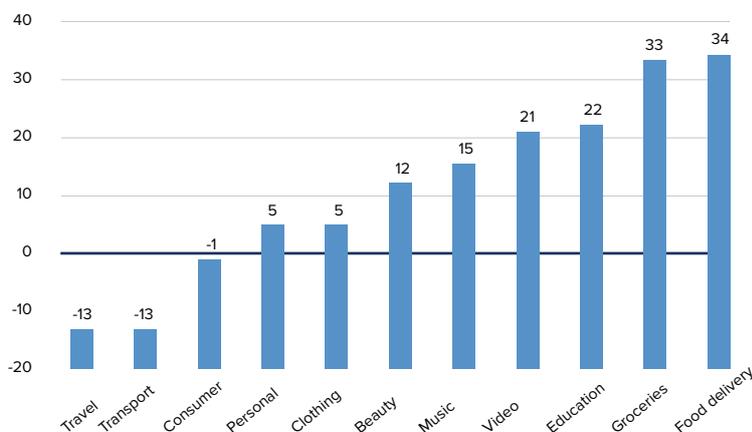
to increase innovation in products and services, business models, logistics and means of payment, to achieve greater inclusion and sustainability.

1.4 Rural e-commerce

Rural e-commerce essentially means using the Internet to purchase products or services from rural areas, and/or to sell goods or services to customers based there (Kong, 2019). In 2019, China's rural online retail sales reached CNY (Chinese yuan) 1.7 trillion (USD262 billion), with a year-on-year growth of 19.1 percent, 2.6 percentage points higher than that of China's online retail sales. Among these sales, the online retail sales of rural physical goods reached CNY1.3 trillion (USD200 billion), accounting for 78 percent of the national rural online retail sales, with a year-on-year growth of 21.2 percent. The online retail sales of poverty-stricken counties reached CNY148.99 billion (USD22.9 billion), up 18.5 percent year-on-year. The net retail sales of agricultural products nationwide reached CNY397.5 billion (USD61.3 billion), up 27 percent year-on-year. Leisure food, tea and tonic food sales ranked in the top three places, accounting for 24.9 percent, 12.0 percent and 11.8 percent, respectively (MOFCOM, 2020).

Engaging the rural population in both production and consumption opens up substantial potential for development, and rural e-commerce has

FIGURE 1.2 Percentage of respondents who spent more time shopping online for various goods and services



Source: Google, Temasek and Bain, [2020].



already started to solve many of the challenges that arise in the commercialization of agricultural products. These centre around the fact that: (a) agricultural products are highly perishable; (b) they are poorly standardized; (c) in the case of China, as in many other countries of the South, they are often grown on a small scale, without much planning; (d) consumers prefer to choose which food products to buy according to their freshness, ripeness, size, and so on. In order to make strategic planting decisions, rural communities need more orders, larger markets, transparent interaction with consumers, and robust estimates of demand. With its ability to break down geographical and information barriers, rural e-commerce seems to be the solution to many of these problems.

With the improvement of infrastructures (more stable electricity, faster Internet speed, smoother roads) (CGTN, 2020), as well as logistics services, and secure and popular digital payment methods, e-commerce is transforming the consumer landscape in rural areas of China, where residents once relied on going to larger cities or weekly markets to shop (Ma, 2020).

The latest data show that 96.6 percent of townships have already established express delivery outlets, and that 26 provinces (autonomous regions and municipalities) have

achieved full coverage of township express delivery outlets, speeding up the circulation of agricultural products entering urban centres, and – conversely – industrial products entering rural regions (Liu, 2020).

- Rural e-commerce has lowered the threshold for both staples and high-value products to enter the market, especially the latter, and has promoted better and faster development of rural industries guided by updated market information and precise market demand.
- This accelerated growth has created opportunities that have attracted entrepreneurs, as well as migrant workers, demobilized soldiers, and college students to return to their home towns or villages to start businesses, creating a virtuous ecosystem, and helping to close the gap between rural and urban youth (The Economist, 2021).

The development of rural e-commerce over the past decade in China (Cortese, 2020) – based on innovation ecosystems for entrepreneurs and social credit (MERICS, 2021), and supported by government policies – has helped drive growth in rural areas. In so doing, it is generating important benefits, in particular poverty alleviation and a reduction in inequality.

1.5 Challenges to developing rural e-commerce

Challenges to developing rural e-commerce, in China as in many other countries, include the following.

1. Lack of solid infrastructure system

The development of rural e-commerce relies on a solid infrastructure system to make digital technologies accessible and affordable in rural areas. The foundation is a stable electricity supply and full Internet coverage. Although most rural areas in China have now been connected to the Internet, problems remain, such as poor network quality, weak signal, slow Internet speed and high network costs. Compared with the economically developed areas in the east of the country, the cost of supplying fibre optic cable to villages in western farming and pastoral areas is much higher.³ In addition, the high Internet consultation fee makes it impossible for poor farmers to afford the service. Another important infrastructure is the logistics system, ranging from wider and smoother roads to efficient logistics and delivery services, particularly express logistics for perishable agrifood products. County-level and village-level transfer stations are needed to facilitate both the upward flow of agrifood products from rural to urban centres and the downward flow of products and services from urban to rural areas. The logistics system in rural areas can significantly affect the scale and efficiency of local e-commerce. There is still a long way to go before advanced technologies such as big data and artificial intelligence (AI) become established in rural areas, requiring substantial efforts and investments.

2. A comprehensive and scientific policy and strategic framework

The policy and strategic framework for digital agriculture and rural e-commerce is the supporting mechanism for incorporating the digital component into rural agriculture. This depends on the intervention of policy-makers who understand digital agriculture and rural e-commerce, and the potential benefits that they present, as well as the risks and challenges. The policy and strategic framework should be

equitable and inclusive, and be designed from both economic and social perspectives. Policy incentives, such as credit support, training subsidies and tax reduction, are required to help small-scale farmers overcome difficulties in venturing into e-commerce operations. In addition, conditions need to be framed for a digital ecosystem that can narrow the rural-urban divide, address data privacy and security issues, and balance the development of marginalized groups such as youth and women. Currently, most underdeveloped rural areas – and the vulnerable groups who live there – do not enjoy appropriate government policies to support rural e-commerce.

3. Farmers' capability and motivation

Small-scale farmers face various challenges in taking advantage of digital agriculture and rural e-commerce. Since smallholder farmers often lack literacy and technical skills, it can be difficult for them to understand and use many types of digital technology. As a result, it is important that solutions and techniques are tailor-made for this group. Education in information technology (IT) is still at an early stage in many rural areas, with inadequate and insufficient teaching facilities. Governments must invest in digital education, including developing knowledge and digital skills for extension officers serving smallholder farmers. These may not realize the value of digital innovations in helping to increase their productivity and improve their livelihoods, which in turn can lead to weak motivation for farmers to participate in rural e-commerce. In addition, farmers lack the corresponding e-commerce skills, so they need training in digital marketing (live streaming / social media).

4. The role of the private sector

The private sector, in particular large e-commerce enterprises and platforms, plays an important role in promoting the development of rural e-commerce in China. Private companies have invested extensively in establishing inclusive digital payment methods to increase the efficiency of trading and provide secured transaction mechanisms to address issues of trust and safety in online trading. They are investing in building logistics systems to facilitate the delivery of products and services, and are working on

³ The cost of connecting villages to the Internet is CNY200 000 to CNY300 000 in the economically developed eastern areas, and CNY700 000 to CNY800 000 in the agricultural and pastoral areas of the west. See www.tibet.cn/cn/fp/201806/t20180613_5936495.html

last-mile logistics to increase the penetration rate of rural populations and expand their market share in various counties and villages. To attract more start-ups and small-scale producers and suppliers, a number of e-commerce platforms are making efforts to design user-friendly tools and innovative mechanisms that promote the entrepreneurship and growth of sellers, including training sessions, especially for new sellers. Public-private partnerships are emerging as a major force to create an enabling ecosystem for digital agriculture. However, the existence and growth of large e-commerce enterprises are still a rare occurrence in most developing countries.

1.6 China's leading role in e-commerce

China leads the world in e-commerce, accounting for more than 42 percent of global e-commerce transactions (Cramer-Flood, 2020), up from 1 percent about a decade ago, as stated in the *Five trends shaping the future of e-commerce in China* (Fan and Backaler, 2018). In 2020, China's online retail sales reached CNY11.76 trillion (USD1.8 trillion), including CNY1.79 trillion (USD276 billion) in rural areas, up 8.9 percent year-on-year. Rural e-commerce is developing rapidly (MOFCOM, 2021). This clear dominance not only reflects the high volume traded through e-commerce platforms, but also the creation of an ecosystem of innovation, supported by enabling conditions for the growth of new talents and opportunities, through public policies (Wade and Shan, 2021; PwC, 2017; Fang, 2019; Nunez, 2021).

China has seen rapid growth in the adoption and evolution of e-commerce as a new business model and tool for commercial development. This is mainly due to: (a) the existence of leaders in technology, such as the Alibaba Group, JingDong, Pinduoduo and Tencent; (b) strong Internet penetration and high levels of expertise in the use

of applications; (c) reliable and secure payment systems made widely available; (d) government policies to support e-commerce, especially in rural areas; and (e) extensive coverage of logistics systems and transport infrastructure.

The rapid development of this sector, combined with a large and growing digital consumer base and an increasingly well-developed services ecosystem, has fueled tremendous growth, both domestically and abroad, through cross-border trade. This environment is driving innovations in commerce and digital commerce, with China serving as a test bed for new ideas that will drive the future of the global e-commerce market.

The public-private collaboration that has been developed in China has led to the launch of support programmes to provide rural residents with greater access to a wider variety of goods and services, while developing farmers' capacities to use e-commerce to sell their agricultural products directly to urban consumers on online platforms (He and Zhu, 2020; Luo, 2019). In the few years since its joint launch by the Ministry of Finance and the Ministry of Commerce in 2014, China's Rural E-commerce Demonstration Program has achieved promising results, both in developing rural e-commerce and in poverty alleviation (NARR, 2020). China has achieved full coverage of 832 state-level poverty-stricken counties, actively promoted the poverty alleviation project through e-commerce, and tapped the potential of e-commerce for driving increases in income for the poor.

Now, the example of China's use of e-commerce as an engine for rural development and poverty alleviation, delivered through public-private partnerships, is inspiring the design of similar programmes in other developing countries with large rural populations, such as Egypt, India and Viet Nam (MCIT, 2016; MEITY, 2016; PM, 2016; UNCTAD, 2016).

2. RURAL E-COMMERCE IN CHINA

This section illustrates the development of rural e-commerce in China, with a focus on the case of the country's Taobao Villages, as an example of how this model is being developed in rural areas. Also examined are the structural conditions set in place to promote digital transactions in rural areas as a tool for combating poverty.

2.1 The history of e-commerce in China

China's e-commerce market, the largest in the world, has grown at an annual rate of 50 percent since 2011. It had reached USD2 300 billion by 2020, and is expected to rise by another 21 percent by 2021 (see Table 2.1) (eMarketer, 2020).

In various parts of the world – in both developed and developing countries and in both urban and rural settings – e-commerce is playing a significant role in driving consumption, employment, entrepreneurship and poverty alleviation.

In China, following the successful roll-out of e-commerce in urban areas, steps have been taken to introduce it to rural areas in recent years (Vidal and Faz, 2020; Wilson, 2021). Despite starting relatively late, the process has advanced swiftly, with a series of policies and strategies that have promoted agriculture and rural development, creating significant economic, social and environmental impacts in their wake.

The development of rural e-commerce in China can be traced back to 2004, when the Chinese Government began to pay close attention to the digital and informational transformation of agriculture (General Office of the State Council, 2004). The Ministry of Agriculture of China (now the Ministry of Agriculture and Rural Affairs) organized the first round of a 'Rural Electronic Information' project and announced the establishment of a cable infrastructure network in rural areas, which became the foundation for the development of rural e-commerce.

TABLE 2.1 Top ten countries, ranked by retail e-commerce sales (billions), in United States dollars

Ranking	Country	2020	2021	% change
1	China*	2 296.95	2 779.31	21.0
2	United States	794.50	843.15	6.1
3	United Kingdom of Great Britain and Northern Ireland	180.39	169.02	-6.3
4	Japan	141.26	144.08	2.0
5	South Korea	110.60	120.56	9.0
6	Germany	96.86	101.51	4.8
7	France	73.80	80.00	8.4
8	India	55.35	67.53	22.0
9	Canada	39.22	44.12	12.5
10	Spain	36.40	37.12	2.0

Note: includes products or services ordered using the Internet via any device, regardless of the method of payment or fulfilment; excludes travel and event tickets, payments such as bill pay, taxes or money transfers, food services and drinking place sales, gambling and other vice goods sales.

**excludes Hong Kong*

Source: eMarketer, [2020].



By 2007, e-commerce platforms and enterprises had begun to spring up, and rural dwellers started using online platforms to sell agricultural products. Since then, backed by favourable government policies and strategies, rural e-commerce has become part of the country's digital and industrial transformation.

The global financial crisis of 2008 caused serious and widespread disruption to the economy in China, especially to small-scale traders and producers. Against this backdrop, Liuqingyan village, in Yiwu County, began discovering the advantages of using Alibaba's e-commerce platform to develop new business models. Rural residents were encouraged to participate in it, providing employment and entrepreneurship opportunities for local landless farmers. With a growing number of online sellers and buyers, China's first Taobao Village was formed in 2009, marking the first step on the path towards rural e-commerce development.

Since 2014, e-commerce has become one of the top-level design concepts for rural development in China. Alibaba, jd.com, Suning and other e-commerce giants have joined up with regional e-commerce platforms such as Dow Club, Ganjie and Lecuntao to take e-commerce to rural areas. A turning point for the country's rural e-commerce came in 2015, when the Central Committee of the Communist Party of China, the State Council and other relevant departments drew up a series of poverty alleviation policies, and formally listed 'poverty alleviation through e-commerce'

as one of the top ten policies. The extension of e-commerce to rural areas was vigorously promoted nationwide, and its development potential officially recognized.

By 2016, the rural market had become the main battlefield for e-commerce platforms. With the creation of large numbers of rural e-commerce models and platforms, Pinduoduo emerged as a new model, based on the group purchase of agricultural products.

In 2017, the Central Committee of the Communist Party of China issued a document that deployed the development of rural e-commerce in specific areas for the first time (MARA, 2020).

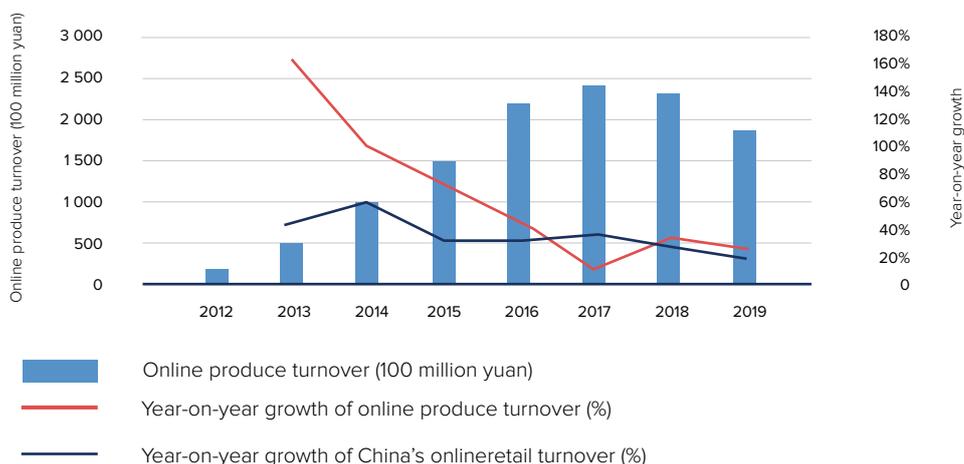
Since 2019, supply and demand channels for credit have been improved and rural e-commerce has developed rapidly under close supervision – especially aimed at benefiting small-scale farmers; new profitable models have started to emerge, particularly those related to real-time transmission. The type and number of rural e-commerce platforms have steadily increased. With the expansion of the rural consumer market and the promotion of 'Internet + Agriculture' as a business concept, e-commerce trading platforms dedicated to agricultural products have gradually diversified, expanding to include bulk agricultural products and services, delivered through e-commerce providers such as Cloud Farm, Farm Doctor, Joyvio and Yimutian.

At the same time, produce e-commerce, especially of fresh produce, has emerged as a new business model, offering a wider marketing channel for local agricultural produce, by harnessing e-commerce to sell directly to consumers nationwide from the fields.

China's online produce turnover saw successive increases between 2012 and 2019, ending the period at CNY397.5 billion (USD60.6 billion) in 2019, with a year-on-year growth rate of 27 percent (see Figure 2.1). From 2012 to 2016, the proportion of online produce turnover in online retail turnover generally increased year by year, only falling in 2017–2018 before increasing again to 3.73 percent in 2019 (see Figure 2.2).

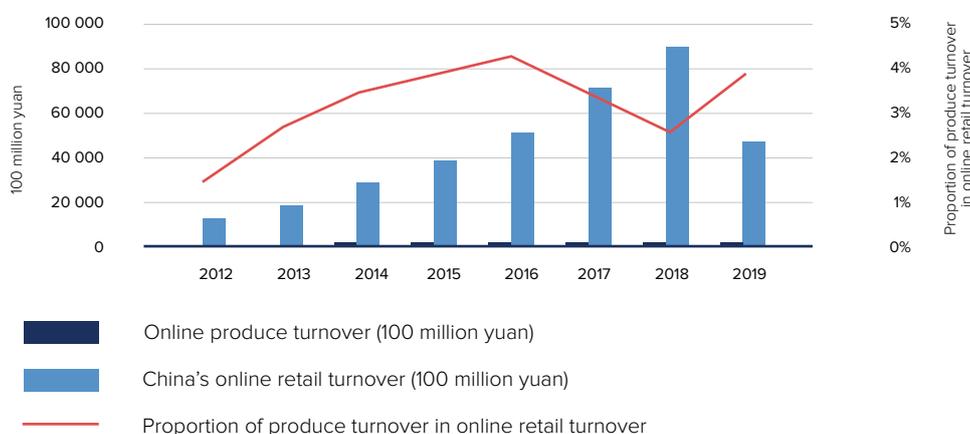
Although the agricultural product e-commerce ecosystem has experienced dramatic improvement, it has also faced a number of difficulties. Many particular features of agriculture are challenging, such as the short shelf-life of agricultural products, high transport costs, and insufficient equipment in cold chain logistics. However, advances in China's logistics system have led to improvements in many of these areas, including lower transport costs and better capacities to store fresh produce. The e-commerce business model is able to modify the original supply chain structure for agricultural products, which makes a considerable contribution to reducing the number of intermediaries, and hence the transaction costs. As a result, large numbers of e-commerce platforms have been attracted to this sector, especially for fresh agricultural produce.

FIGURE 2.1 Growth of online produce turnover in China



Source: Ministry of Commerce of the People's Republic of China, [2020].

FIGURE 2.2 Proportion of produce turnover in online retail turnover



Source: Ministry of Commerce of the People's Republic of China, [2020].

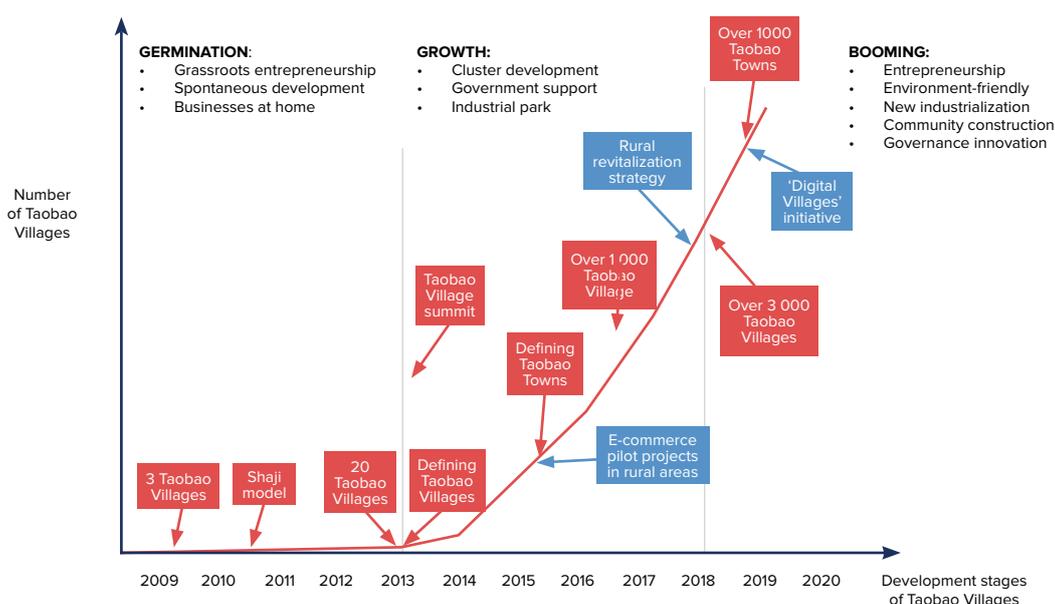
2.2 Taobao Villages – pioneers of rural e-commerce in China

A concept first launched in 2009 (Li, 2017), Taobao Villages are rural e-commerce hubs that feature Alibaba’s logistics, service and training to encourage farmers to engage in online sales of farm produce and local specialties. Taobao Villages have become an important benchmark to describe the development of China’s e-commerce. Defined by Alibaba – Taobao and Tmall’s parent company – a village can be considered a Taobao Village if it has active online stores reaching more than 10 percent of local households and annual e-commerce transactions reaching more than CNY10 million (USD1.5 million) (Alizila, 2016). The rise of Taobao Villages in China illustrates the potential of rural e-commerce to generate jobs and income in rural areas.

In the past ten years, the numbers and scale of Taobao Villages have seen a sharp increase, growing from just 3 in 2009 to 5 425 villages in 2020, located across 28 provinces (including autonomous regions and municipalities) (see Figure 2.4). The success of Taobao Villages can be traced through three stages – germination (2009–2013), growth (2014–2018) and boom (2019–now) (see Figure 2.3) (Ali Research *et al.*, 2019).

1. **Germination.** People living on the fringe of cities were generally the first to come into contact with the e-commerce business model. As grassroots innovators, many of them started e-commerce businesses at home. Their increased income inspired their neighbours to follow suit, and the number of e-commerce operators began to grow, and with it the spread of Taobao Villages.
2. **Growth.** Word of people’s income increasing through e-commerce quickly spread to surrounding villages, triggering imitation clusters. Rural residents started to become interested in learning how to use the Internet. The Government began to intervene, providing guidance and support for e-commerce operations. The provision of large-scale industrial spaces and supporting facilities laid the foundation for the development of rural e-commerce.
3. **Boom.** The Taobao Village development model has since been copied on a large scale. With the development of a better living environment and modern rural governance models, the number of Taobao Villages began to rise exponentially, leading to substantial increases in farmers’ incomes and the revitalization of rural areas.

FIGURE 2.3 Development stages of Taobao Villages



Source: Ali Research *et al.*, [2019].

In some rural areas, e-commerce is gaining sufficient scale to lead to the formation of bigger clusters of rural e-tailers. These bigger clusters are referred to as Taobao Towns, with a Taobao Town defined as a town, township or street that comprises at least three Taobao Villages. The first batch of 19 Taobao Towns came into being in 2014, and they have steadily increased since then (Alizila, 2016). As of 2020, there were 1 756 Taobao Towns in China (see Figure 2.4).

Taobao Villages are mainly concentrated in eastern China. Of the 3 022 Taobao Villages that existed in 2018, most (3 089 or 96 percent) were located in the Eastern region, though from 2014 to 2018, the compound annual growth rate of Taobao Villages in the Central region was 97 percent. In the Western region, the first 2 Taobao Villages appeared in 2014, and by 2018 the number had increased to only 14 villages. Taobao Villages are concentrated in four high-density core areas, namely Beijing-Tianjin-Hebei, the Yangtze River Delta core area, western coastal China and the Pearl River Delta core area (Diao, Chen, Ding and Zeng, 2017). The distribution of Taobao Villages is mainly affected by natural resources, geographical location, industrial concentration and Internet penetration. Compared with the Central and Western regions, the Eastern region of China has rich natural resources, convenient transport links, a strong industrial presence and good Internet services, which explains the relatively large numbers of Taobao Villages there.

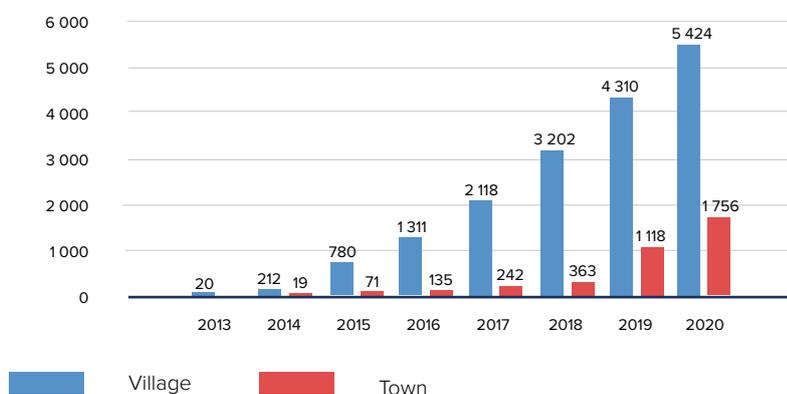
Almost all Taobao Villages have delivery and collection services and a variety of logistics service providers. In 2018, 48 percent of Taobao Villages

in China had logistics centres or warehouses, while in 2016 only 25 percent of rural villages in China were equipped with such centres. Some 62 percent of Taobao Villages have more than 5 logistics or express companies providing services, and 27 percent have more than 10 such companies. All large Taobao Villages (Taobao Villages with a total of more than CNY197 million (USD30 million) in commodity transactions) have at least 3 companies providing logistics services.

All Taobao Villages have broadband Internet and mobile communication network coverage. In 2017, more than 50 percent of residents in Taobao Villages used the Internet, and most of them used smartphones (see Figures 2.5 and 2.6) (World Bank, 2019a). Households in Taobao Villages have income levels similar to those of urban households and much higher than those of households in rural areas (non-Taobao Villages). Average household per capita income in Taobao Villages (CNY35 000 per year in 2017 (USD5 000)) is nearly three times higher than the rural average in China (CNY13 432 per year in 2017 (USD2 000)), and close to the urban average (CNY36 396 in 2017 (USD5 000)). While a majority of the Taobao Villages are in coastal areas with higher income levels, the difference is still notable (World Bank, 2019a). Most Taobao villagers say that their social status has remained equal to or improved compared with the past.

The success story of Taobao Villages shows that digital technology can promote inclusive growth in rural China and that e-commerce has become an important tool for poverty alleviation and rural revitalization in China. The skills threshold of

FIGURE 2.4 Numbers of Taobao Villages and Taobao Towns



Source: Ali Research, [2021].



rural development is lower, and even people with a modest education level can earn more income by participating in e-commerce. The experience of Taobao Villages has galvanized strong interest among researchers, policy-makers and private enterprises.

2.3 Structural conditions for developing rural e-commerce

The structural prerequisites for the development of rural e-commerce fall into the following categories: (a) infrastructure and logistics, such as access to the Internet and mobile networks, access to roads and a logistics network; (b) human capital, specifically the ability to use digital and mobile applications, the presence of entrepreneurs and incubation services capable of innovating in rural electronic commerce models; (c) financing capacity and access to credit; and (d) a conducive business environment, with adequate incentives and clear regulations that facilitate business development. China’s experience in establishing these conditions is described in the following sections.

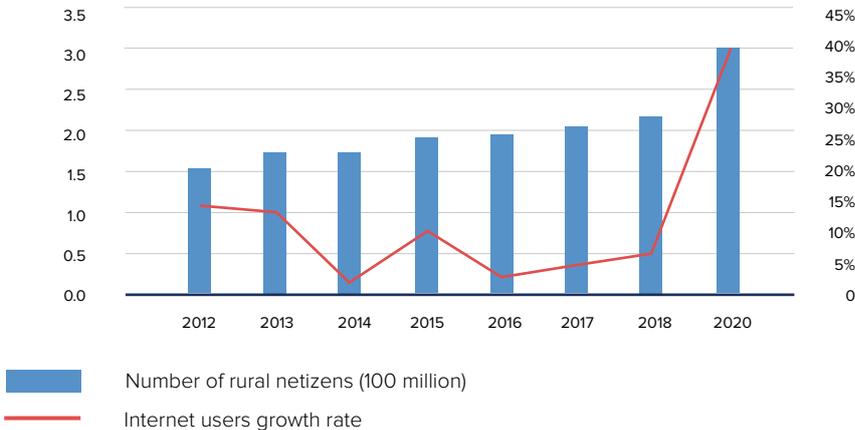
2.3.1 The growth of rural netizens

With the vigorous development of the rural Internet, China has created an inclusive, ubiquitous, green and safe broadband network.

In 2019, China built the world’s largest optical fibre and mobile communication network, with an optical fibre and 4G coverage rate of more than 98 percent for its administrative villages. According to the latest statistics from the China Internet Network Information Center, as of December 2019, the number of Internet users in China had reached 989 million, or 69 percent of China’s total population.

According to data released in December 2020, the number of Internet users in rural areas in China had reached 309 million, an increase of 87.71 million from the end of 2018 and an increase of 31.2 percent from 2018 (see Figure 2.5). As of December 2020, about 55.9 percent of rural areas had access to the Internet, while the percentage of urban areas was 77.9 percent, representing an increase of 17.5 percent on figures for the end of 2018.

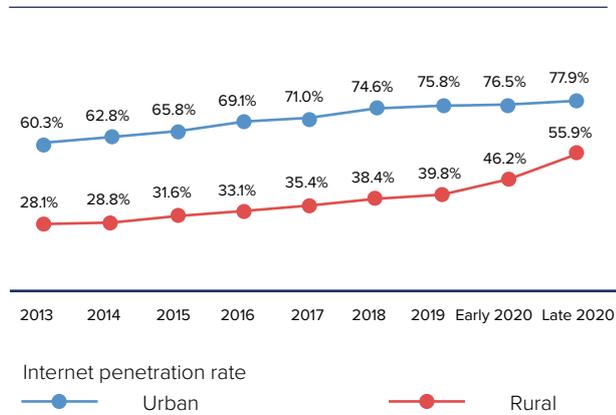
FIGURE 2.5 Number and growth of netizens in rural China from 2012 to 2020



Source: China Internet Network Information Center, [2021].

In addition, China's Internet access gap between urban and rural areas is gradually narrowing, declining to 22 percent by 2020 from 32.2 percent in 2013 (see Figure 2.6).

FIGURE 2.6 Urban and rural Internet access from 2015 to 2020



Source: China Internet Network Information Center, [2021].

In terms of gender balance, females are the main users of rural e-commerce, since a rising number of young rural men are migrants, while women stay behind to take care of their family. According to the *Research report on China's rural e-commerce market, 2019*, released by Big Data-Research, a third-party data mining and market research organization, female users accounted for 60.2 percent of Chinese rural e-commerce users and males 39.8 percent in the first quarter of 2019.

2.3.2 Advances in smart rural logistics

Logistics is a top priority for successful e-commerce, especially in a rural context. Rural logistics networks involve large volumes and heavy cargos, especially for raw agricultural materials, but the unit price, cargo quantity and shipping frequency are low (ADB, 2017).

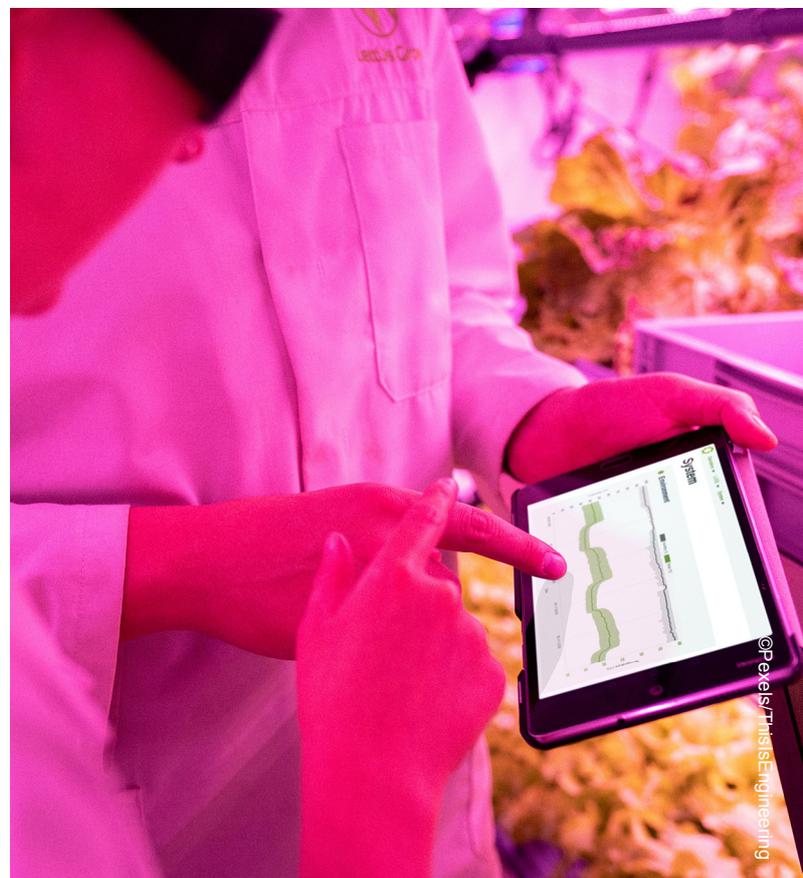
In addition, the origins and destinations of the packages are spread over a wide geographical area. Initially, for reasons of cost, many express companies established agencies only at township level. As a result, express packages were not able to reach villages, and rural producers were also unable to send their agricultural products to buyers.

To solve this problem, China's postal service regulator made a three-year plan, pledging to cover all administrative villages in the country with express services before the end of 2022 (Xinhua Net, 2020b). Taking logistics provider

Deppon Express as an example, in recent years this has started to develop logistics for agricultural products. By the end of 2019, the township coverage rate of express outlets had reached 94 percent, and the direct delivery mode had been adopted to help agricultural product brands to shorten the supply chain and reduce transaction costs (Logclub, 2020).

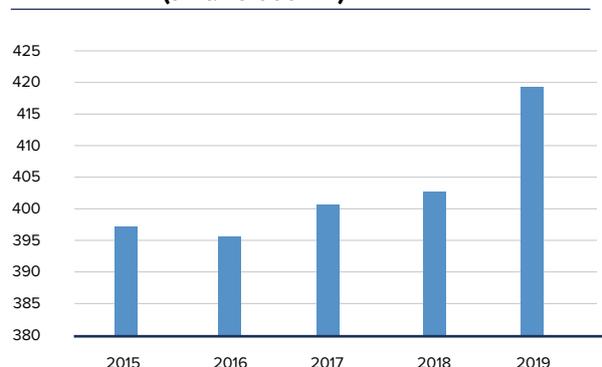
Given the substantial logistics demands in rural areas, the Government has a role to play in coordinating efforts and investment from the private sector and catalysing synergies, while also strengthening guarantees and bringing modern logistics services to remote locations.

A sound road network is the basic condition for the construction of logistics. The Government of China has increased the construction of rural power grids and emphasized the need to consolidate and improve stable rural power supplies. From 2015 to 2019, China's rural road construction showed an overall growth trend. As of the end of 2019, China's rural roads extended over a total of 4.205 million kilometres, an increase of 4 percent compared with 2018.



The growth rate in recent years has exceeded that of total road construction for the first time, by 0.6 of a percentage point.

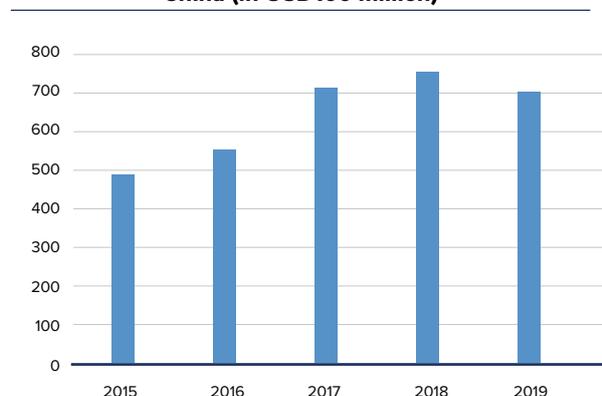
FIGURE 2.7 Rural road construction mileage (unit: 10 000 km)



Source: Ministry of Transport of China, [2020].

Between 2015 and 2018, China's rural road construction investment increased year-on-year, and the growth rate of rural road investment was higher than that of total investment in road construction. However, in 2018 the growth rate of China's rural road construction investment slowed significantly. By 2019, China's rural road construction investment had declined for the first time since 2015. According to data from the Ministry of Transport, China's rural road construction attracted an investment of CNY466.3 billion (USD71.2 billion) in 2019, a drop of 6.5 percent. Combined with the year-on-year increase in the building of rural roads in China from 2015 to 2019, this reflects the investment efficiency of rural road construction in the early stages.

FIGURE 2.8 Investment in rural road construction in China (in USD100 million)



Source: Ministry of Transport of China, [2020].

An adequate supply of electricity is also a prerequisite for the construction of the Internet of things. In 2016, China launched a new round of rural power grid transformation and upgrading projects. In September 2017, the State Grid Corporation of China announced a new round of rural power grid transformation, for a total investment of CNY142.4 billion (USD21.7 billion). It completed the power supply of 1.535 million farmland motorized wells and power grid transformation and upgrading for 66 000 small towns (central villages), and connected 78 000 natural villages to a power supply, benefiting 160 million rural people and covering 140 million acres (56.6 million hectares) of farmland. In 2019, China's 'access to electricity' ranking was 12th in the world on access to electricity (ADB, 2020).

The accessibility of logistics has also been improved, and express delivery services have been scaled out to the countryside on a broad scale. By the end of 2019, postal services had been extended to 556 000 administrative villages across the country, with more than 30 000 express service stations and 63 000 public delivery stations, covering 96.6 percent of China's rural areas (Zhang, 2020).

In 2020, the coverage of express delivery services in rural areas continued to expand, and e-commerce service sites were implemented. According to preliminary statistics, as of the second quarter of 2020, 96.6 percent of villages had been equipped with postal e-commerce service stations (Liu, 2020). In addition, drone technology has penetrated into rural areas, multiple drone transport routes have been completed, and smart logistics infrastructure and distribution systems have matured (Fan, 2020).

In the long term, covering all administrative villages with express services is expected not only to improve logistics efficiency in rural areas and lower logistics costs, but also to promote in-depth integration between postal services and modern agriculture and rural tourism, thereby contributing to poverty alleviation. A complete rural logistics system is not only the premise for the development of rural e-commerce, but also a basic prerequisite for rural revitalization.

2.3.3 An enabling ecosystem

a. Support from major institutions and policies for rural e-commerce

At present, the new generation of IT innovation is unprecedented, constantly generating new technologies, products and models, which are bringing about a transformation of global economic patterns and industry and creating major opportunities for the development of a digital countryside.

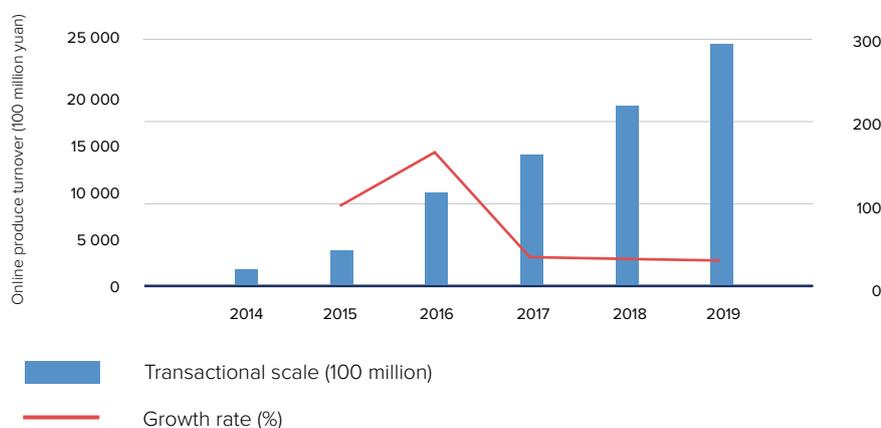
All transactions developed in rural areas belong to the category of rural e-commerce. The scale of transaction volumes has risen steadily with the increasing growth rate of rural e-commerce in China between 2014 and 2019 (see Figure 2.9).

Since 2019, rural e-commerce has become a new battleground for major e-commerce players, and the numbers of Internet-based technology companies working in agriculture-related fields have risen rapidly. Through digitization, the production and sales of agricultural products have opened up, the mode of agricultural production has changed, and farmers' production habits and lifestyles have been profoundly affected (Luo, 2019). E-commerce can help agricultural producers to understand market dynamics accurately and in real time, reduce the risk of production for agricultural producers, and promote the rational organization of agricultural production. At the same time, with the help of network communication, smallholder farmers can become organized to improve market competitiveness.

As part of this trend, e-commerce companies are extending their business activities to the front end of the agricultural supply chain, taking advantages of big data and the Internet to collect specific e-commerce trading and product information, so as to organize efficient crop planting and animal husbandry. For example, Alibaba launched the '1 000 US dollars per mu [the land unit in China equal to 666m²] production plan', which aims to achieve this output value through the Internet, and will build 1 000 digital agricultural bases across the country, as well as creating agricultural and rural digital infrastructure and digital agriculture demonstrations (CNR, 2018). Meanwhile, Jingdong launched its 'poverty alleviation running chicken', 'AI pig-raising' (Global Times, 2019), hydroponic vegetable base and other projects, committed to the digital upgrading of every link in the agricultural value chain, as part of a strategy to promote agriculture and create new growth space for the supply of agricultural products.

New infrastructure support policies have provided opportunities for digital construction in rural areas. Harnessing the Internet as a carrier, the plan is to focus on the innovative application of digitization in the whole agricultural sector value chain. The final objective is to rebuild the agricultural ecosystem and promote the high-quality development of the rural economy. A chronological summary of these policies is presented in Table 2.2.

FIGURE 2.9 Transaction scale and growth rate of rural e-commerce in China



Source: Qianzhan Industry Research Institute, [2021].

TABLE 2.2 China's rural e-commerce policy from 2015 to 2020

Year	Month	Department	Policy
2015	February	The State Council of the Communist Party of China (CPC)	Several opinions on strengthening reform and innovation and speeding up agricultural modernization
		Ministry of Agriculture	Opinions on doing a solid job of agricultural and rural economic work in 2015
	April	Ministry of Commerce	Key points of e-commerce in 2015
		State Council of the CPC	Decision on deepening the comprehensive reform of supply and marketing cooperatives
	May	State Council of the CPC	Opinions on vigorously developing e-commerce and accelerating the cultivation of new economic power
	June	State Council of the CPC	Guiding opinions on actively promoting the 'Internet plus' action
		State Council of the CPC	Opinions on accelerating the transformation of agricultural development mode
	September	Ministry of Agriculture National Development and Reform Commission Ministry of Commerce	Action plan for promoting agricultural e-commerce development
		State Council of the CPC	Opinions on promoting online and offline interaction and accelerating transformation and upgrading of innovative development of commercial circulation
	November	State Council of the CPC	Guiding opinions on accelerating the development of rural e-commerce
2016	January	State Council of the CPC	Opinions on implementing the new concept of development, speeding up agricultural modernization and realizing the goal of a well-off society
		Ministry of Agriculture	Opinions on doing a solid job of agricultural and rural economic work in 2016
	March	Ministry of Commerce National Development and Reform Commission Ministry of Transport General Administration of Customs State Post Office National Standards Committee	Notice on the national special plan for e-commerce logistics development (2016–2020)
	April	State Council of the CPC	Opinions on implementation of the Internet, plus circulation plan of action
	May	Ministry of Agriculture	'Internet plus' three-year action plan for modern agriculture
	July	Ministry of Commerce	Rural e-commerce service standard
	November	Poverty Alleviation Office of the State Council	Guidance on promoting targeted poverty alleviation through e-commerce

Year	Month	Department	Policy
2017	February	State Council of the CPC	Opinions on accelerating the development of agricultural supply-side reform
	August	Ministry of Commerce Ministry of Agriculture	Notice on deepening cooperation between agriculture and commerce and vigorously developing e-commerce of agricultural products
	December	Ministry of Agriculture	Opinions on deeply implementing the 'one village, one product' industry promotion action in poor villages
2018	January	State Council of the CPC	Opinions of the CPC Central Committee and the State Council on implementing the Rural Revitalization Strategy
		Ministry of Finance	Financial management measures for comprehensive agricultural development
	March	National Tourism Bureau	Notice on organizing and recommending financial support for key tourism poverty alleviation projects
	May	Ministry of Finance Ministry of Commerce Poverty Alleviation Office of the State Council	Notice on the comprehensive demonstration of e-commerce in rural areas in 2018
	June	Ministry of Industry and Information Technology	Implementation plan for the promoting of network Poverty Alleviation (2018—2020)
2019	January	State Council of the CPC	Guiding opinions on further developing consumption to help win the battle of poverty alleviation
	February	State Council of the CPC	Opinions on promoting the organic connection between small farmers and modern agricultural development
	May	State Council of the CPC	Opinions on establishing and improving the system, mechanism and policy system of urban and rural integrated development
		Ministry of Finance Ministry of Commerce Poverty Alleviation Office of the State Council	Notice on the comprehensive demonstration of e-commerce in rural areas in 2019
	August	State Council of the CPC	Opinions on accelerating the development of circulation and promoting commercial consumption
2020	June	Ministry of Finance Ministry of Commerce Poverty Alleviation Office of the State Council	Notice on the comprehensive demonstration of e-commerce in rural areas in 2020

Source: Qianzhan Research Institute, [2020]; Authors, [2021].

b. Upgrading conservation technology for agricultural products

Well-functioning global value chains based on improved cold chain technology can allow more trade of fruit and vegetables that would otherwise spoil during transport. They can thus increase dietary diversity for consumers. The construction of cold chains for agricultural products is accelerating in China. In 2020, the Government stipulated that the construction of state-owned storage and cold chain logistics facilities for agricultural products should be started, and that central budget investment should be allocated for the construction of a group of cold chain logistics bases (FAO, 2021). By 2019, the Ministry of Commerce had supported the construction of 837 agricultural product cold chain logistics projects, promoting a consumer shift towards buying fresh food online (CBH, 2020).

Fresh agricultural products have the characteristics of high unit prices and high repurchase rates. In recent years, this sector has been the focus of fierce competition among major e-commerce platforms, and recent breakthroughs in transport technology have injected new competitiveness into e-commerce for agricultural products.

In June 2019, the Ministry of Finance, together with the Ministry of Commerce, issued a notice on promoting the interconnection of agriculture and commerce and improving the agricultural supply chain, proposing the investment of central funds to boost social capital and support weak links and key areas in the chain (see Table 2.2). Based on a system of public-private partnership, the B2B model for e-commerce of fresh agricultural produce was designed to usher in a new round of development opportunities. In 2019, transactions in China's fresh produce e-commerce sector accounted for about CNY162 billion (USD24.7 billion), maintaining a stable growth of 29.2 percent over figures for 2017 (iiMedia, 2020).

c. Increased consumption provides new impetus for rural e-commerce

A series of government policies focus on poverty alleviation through increased consumption, with e-commerce targeted as an important pathway. The country's 'e-commerce poverty alleviation policy' not only opens up sales channels for

high-quality products in poor areas, but also allows consumers to contribute to rural poverty alleviation (CPAD, 2016).

Activities based on large-scale integrated e-commerce platforms, vertical professional e-commerce platforms and various social network platforms are helping to drive poverty alleviation through e-commerce, expanding the scope of rural sales and promoting industrial transformation in poor areas.

In 2019, the eastern coastal areas directly purchased and helped to sell agricultural products in poverty-stricken areas to a value of CNY48.3 billion (USD7.3 billion); the central Government, state organs and central enterprises directly purchased and helped to sell agricultural products in designated poverty-stricken counties to a value of CNY15.4 billion (USD2.3 billion); meanwhile, other types of state-owned enterprise, private enterprises and social organizations directly purchased and helped to sell agricultural products in poverty-stricken areas to a value of more than CNY100 billion (USD15.3 billion) (CAC, 2020). In March 2020, 28 central government departments jointly launched the 'special action of poverty alleviation through consumption in 2020' (NDRC, 2020).

2.3.4 Cultivating new farmers and skills

There is a shortage of skills in rural e-commerce, especially in operations promotion, art design and data analysis. Other skills required include those in the fields of customer service, logistics and warehousing.

From a historical perspective, given the distribution of China's rural population, developing rural e-commerce skills has been complex, with difficulties compounded by a lack of awareness of e-commerce in many rural areas (Zhao and Yu, 2019). To overcome these challenges, China has used a three-pronged strategy to promote rural e-commerce skills, by:

- a. **encouraging study** – including through e-commerce seminars and by cultivating vocational skills, to encourage farmers to engage in e-commerce and the emergence of rural e-commerce entrepreneurial leaders, with a strong focus on youth;



b. providing support – for skills acquisition by industrial technicians and entrepreneurs, including through the hiring of foreign experts and consultants, cooperation with foreign universities and other institutions, and promotion of an Incubation Park, as well as innovation and entrepreneurship platforms;

c. pursuing local capacity-building – setting up local e-commerce training institutions, combining local vocational education resources to discover and tap talents, and strengthening training, especially for farmers.

3. MODELS IN RURAL E-COMMERCE

The rapid growth of rural e-commerce in China, supported by the structural conditions required to advance it, has led to the development of various models, of which two stand out, aimed at promoting the ‘agricultural products up’ strategy.⁴ These are the traditional e-commerce platform model and the social e-commerce platform model. The first is represented by Alibaba⁵, China’s largest e-commerce platform and one of the world’s top seven digital platforms. The second is represented by Pinduoduo⁶, which recorded more than CNY270 billion (USD41 billion) in agriculture-related GMV in 2020, up from CNY136 billion in 2019 making it the largest agriculture platform in China (Pinduoduo, 2021).

3.1 Two e-commerce platform models

3.1.1 The traditional e-commerce platform model

The traditional e-commerce platform model centres on search scenarios of ‘consumers seeking goods’. This model requires consumers to retrieve commodity information only from databases with which they are already familiar, and to search for the goods by themselves. It is used by large e-commerce companies, whereby multiple sellers can sell their products to a broad consumer base, and consumers can purchase a variety of products and services. Using this model, Alibaba, jd.com and Suning have focused on expanding their market share of rural markets in recent years. Also based on this model, rural Taobao (Alibaba) and JD Service Union⁷ service stores have taken traditional online retail to rural contexts, stimulating the exchange of technology, capital, skills and physical materials between urban and rural areas.

The widespread use of e-commerce platforms could disrupt traditional agricultural value chains, reducing the need for the many intermediaries typically engaged across each stage of a chain, or changing how these intermediaries work.

Some digital e-commerce platforms provide physical logistics hubs and warehousing services that are located near consumers, which can reduce transport costs and delivery times, two critical challenges faced by smallholder farmers.

During the COVID-19 pandemic, restrictions on movements to contain the spread of the virus generated a dramatic increase in the demand for online food shopping and home delivery services in some countries. In China, estimates suggest that the share of the online market increased from 11 to 38 percent of total food retail purchases in February 2020 (FAO, 2020). Besides satisfying consumers’ demand for sufficient food, e-commerce can also deliver improved quality of freshness, safety, convenience and personalized requirements. Recently, government measures have been introduced to improve tracking and traceability in food e-commerce, with frequent sampling and penalties for online food safety infringements. With the advent of the 5G era, rural revitalization and agriculture-related policies, digital agriculture is expected to undergo further rapid development in the next five years.

In this context, beginning in 2018, the ‘1 000 US dollars per mu production plan’ of Alibaba has focused on building four ‘new infrastructures’ in digital agriculture, including technology, finance, logistics and sales (Ali Research and CARD,

⁴ Rural e-commerce mainly consists of the ‘industrial products down’ and ‘agricultural products up’. The ‘industrial products down’ refers to helping industrial products to enter the rural market. The ‘agricultural products up’ refers to use of Internet technology to sell agricultural products from rural areas to all parts of the country, especially urban markets. It also involves an overall change in the production and sales mode of agricultural products, including the provision of information services for farmers, production and processing of agricultural products, online sales of agricultural products, online payment and brand promotion, logistics supply chain management and after-sales service. More information available at <https://baijiahao.baidu.com/s?id=1635757936310889489&wfr=spider&for=pc>

⁵ Alibaba refers to two marketplaces, Taobao and Tmall. Taobao is a popular online shopping and retail platform in China. It has changed from a single C2C network market to a comprehensive retail circle including C2C, group buying, distribution, auction and other e-commerce models. More information available at <https://www.taobao.com/tbhome/page/about/taobao?spm=a21bo.9614792.1031.215658c7mU3aHL>. Tmall is a comprehensive shopping website, and a new business-to-consumer initiative created by taobao.com. More information available at <https://pages.tmall.com/wow/seller/act/2019seller?from=zebra:offline>

⁶ Pinduoduo is a mobile-only marketplace that connects millions of agricultural producers with consumers across China. More information available at <https://en.pinduoduo.com/>

⁷ JD Service Union is a comprehensive open platform that brings together various types of high-quality e-commerce outsourcing service providers. These service providers can provide personalized e-commerce products and services to third-party sellers on jd.com. More information available at <https://helpcenter.jd.com/vender/issue/804-6402.html>

2020). Based on Alibaba's digital economy, the company's Cloud Agricultural Brain has helped nearly 26 00 farmers and enterprises to practise scientific planting and breeding. Artificial intelligence technology now covers more than 100 000 acres (40 500 ha) of farmland, orchards and pastures. The inclusive finance of MYbank⁸ has served 8.97 million rural-based clients, with accumulated loan funds exceeding CNY 800 billion (USD 122 billion) as demonstrated by Dai Shan, President of Alibaba Group's B2B Business Group (2019). Meanwhile, as stated in the *Report on Alibaba Agricultural Products E-commerce 2020* (Ali Research and CARD, 2020), Alibaba's Cainiao Village⁹ has joined up with major express companies, using digital and intelligent technology to open up logistics distribution channels at county, township and village levels, and is also constructing 1 000 expressways for agricultural products. According to the *2020 Corporate Social Responsibility Report* released by Cainiao Village (2021), as of December 2020, Cainiao Village's total distribution points covered more than 1 000 provinces in 25 counties across the country. Alibaba (Taobao and Tmall) is one of China's largest online retail platforms for agricultural products. Together with Hema¹⁰ and Ele.me,¹¹ it forms an online and offline digital sales network.

In parallel to its '1 000 US dollars per mu production plan', Alibaba has established a Digital Agriculture Division to coordinate activities in digital production, logistics, marketing and finance. In addition, 'Hema Village' and 'Taobao Live' broadcasts have become new formats of digital agriculture.

Alibaba is involved in the construction of digital agricultural bases. To upgrade the traditional small-scale, scattered farm model in China, Alibaba plans to establish 1 000 large-scale digital agriculture bases aimed at ensuring the direct supply of safer, high-quality agricultural products from the place of origin to the end consumer. Using a high-tech supply chain, it is also helping farmers to improve the efficiency of planting, distribution, marketing and sales, thereby enabling them to increase their income.

To promote digital agriculture, Alibaba has announced the establishment of a 'production warehouse + sales warehouse' model, which involves strategic cooperation with the Ministry of Agriculture and Rural Affairs. The arrangement involves the creation of China's first Hema City in Zibo, Shandong Province – a 53-hectare (ha) digital agricultural industry centre comprising farm product warehouses that will serve as a hub for the distribution of fresh produce in northern China.

3.1.2 The social e-commerce platform model

This model has been developed following the advent of social media channels such as messaging app WeChat and the short video app TikTok that usually belong to the e-commerce conglomerates and are a critical part of their ecosystem (digital marketing). Under this e-commerce model, sellers can share and promote their products in their own chat groups, and consumers can share products with their friends, helping the sellers to attract a larger consumer base. This system reduces search costs for consumers and transaction costs for producers and sellers.

A leading company for this model is Pinduoduo, which has set up a system of 'farmland cloud pooling' to connect 12 million farmers. Differing from the traditional e-commerce platform model that consumers use to search the goods by themselves, this uses a new mode of 'goods seeking consumers' through 'social + algorithms'. The 'social' component means that consumers receive product recommendations from their friends and relatives by sharing information about products or produce found online through social platforms, in order to expand market depth and width. The 'algorithm' component involves Pinduoduo understanding the explicit and potential needs of platform consumers, so that high-quality agricultural products can 'actively' target consumers based on leading AI technology. The company's smart produce processing system enables the collection and rapid distribution of products that are widely

⁸ MYbank is the Zhejiang Internet Commercial Bank under Alibaba. More information available at <https://www.mybank.cn/about.htm>

⁹ Cainiao Village is led by the Cainiao Network under Alibaba. It integrates municipal express delivery, e-commerce platforms, merchants and distributors in the form of system technical support and transfers orders from Alibaba's rural Taobao or other Taobao platforms. More information available at <https://www.taobao.com/markets/cnwww/cuntao-recruit>

¹⁰ Hema is a new retail platform driven by data and technology under the Alibaba Group. Hema hopes to create a community-based one-stop new retail experience center for consumers, and bring people a 'delicious life' with technology and human touch. One of the biggest features of Hema is fast delivery: within 3 kilometres of the store, delivery is within 30 minutes. More information available at <https://www.freshhema.com/>

¹¹ In April 2018, Alibaba and Ant Financial completed a wholly owned acquisition of ele.me, more information available at <https://view.inews.qq.com/a/TEC2018040201467504>, which is mainly engaged in online food delivery, new retail, instant delivery, and the catering supply chain. More information available at <https://www.ele.me/>

dispersed in terms of both time and space, so that fresh produce can be sold within its short shelf-life. Information on agricultural production areas, including geographical locations, characteristic products and maturity periods, is inputted on the supply side, and with support from the 'produce pooling' system, produce 'automatically' finds target consumers, connecting widely dispersed production areas with more than 600 million consumers on 'cloud' (Pinduoduo, 2020; Outlook Think Tank, 2020).

3.1.3 Differences and connections between the two models

This has been developed by China social e-commerce white paper (Yibang Power Research, 2019).

a. Network effects

The most important source of value for Internet-based commerce comes from network effects. The innovation of traditional e-commerce compared with physical retail lies in the integration of retail, marketing, logistics, finance and other business formats to form a supply-side network synergy effect, which leads to the sharing and reduction of transaction costs and the improvement of organizational efficiency. On this basis, social e-commerce focuses more on the demand side, and takes further advantage of interpersonal consumer relations, thereby reducing costs and increasing efficiency.

b. Acquiring consumers

The consumer base is the foundation of the e-commerce transaction. It starts with consumers who are aware of their demand, searching for what they want on the platform, and the centralized platform distributing consumers to different sellers. However, traditional e-commerce platforms are facing declining traffic growth, and the cost of acquiring new consumers is increasing for sellers. Generating customers through social communication lowers the cost of obtaining and expanding a consumer base, making the social e-commerce model highly attractive to sellers and producers. According to Nielsen's '2019 Pan-social e-commerce in-depth research report', the penetration rate of social e-commerce in

the online shopping population has reached 80 percent.

c. Products and services

Sellers using the traditional e-commerce model make substantial efforts to design, polish and target their products to meet the diverse and personalized consumption needs of users. Rather than focusing on the products and services themselves, the social e-commerce model leverages perceptual factors, such as trust, emotion and value establishment, to promote the added value of brands, stimulate demand, lower the cost of decisions, and increase consumer purchases.

d. Contexts

Under the traditional e-commerce model, the relationship between sellers and consumers is based purely on buying and selling, and could take place only under scenes of marketplaces/platforms. In the social e-commerce model, shopping has become something that can happen any time, anywhere. The integration of social behaviour and shopping behaviour is a marked feature of this innovation.

3.2 Emerging innovative e-commerce models

3.2.1 Live streaming

Live streaming is a rapidly emerging technique of helping sellers to promote their products through online live broadcast platforms and live broadcast software, so that customers can purchase products while understanding their performance.

As of December 2020, the number of live webcast users in China had reached 617 million, an increase of more than 57 million on March 2020, and accounting for 62.4 percent of total netizens. Among these, the number of e-commerce live broadcast users was 388 million, an increase of 123 million on March 2020, accounting for 39.2 percent of total netizens (China Internet Network Information Center, 2021).

Live streaming has become an effective digital marketing model for e-commerce, bringing a range of benefits to sales of agricultural and food products and the livelihoods of farmers.



- Product exhibition and marketing are more authentic and straightforward when conducted through live streaming, reducing the risk of information asymmetry.
- Live streaming anchors play roles in interaction and communication, helping to build trust with consumers, reduce the risk of information incompleteness and increase rates of purchase.
- Live streaming e-commerce has provided rural farmers with a larger stage and more opportunities to be seen and heard, which helps to spread rural culture and improve confidence.
- Live streaming e-commerce can generate more job opportunities, which in turn can help to reduce the urban exodus of rural youth and curb rural unemployment.
- Live streaming enables farmers to obtain information and feedback more directly from consumers, which can help to guide their production plans.

Live streaming e-commerce has become one of the primary channels for selling agricultural and food products in China, especially from counties where poverty is prevalent, which contributes to the national strategy of sustainable poverty alleviation.

According to the data released by Ali Research Institute in 2019, more than 100 000 new rural live streamers joined Taobao Live, hailing from more than 2 000 counties from 31 provinces, autonomous regions and municipalities across the country. During this time, 22 rural live-stream bases were established nationwide. Taking Taobao's Live's Rural Livestream Program as an example, since its start in 2019, there have been some 1.4 million live stream sessions broadcast through the programme and more than 500 county leaders have used the channel to promote their local products.

3.2.2 The Duoduo farming system

In 2019, to promote targeted poverty alleviation, Pinduoduo launched the 'Duoduo Farming' project in Nujiang, Baoshan, Wenshan and Lincang City of Yunnan Province, after signing strategic cooperation agreements with local governments, as demonstrated by the Report on upward development of agricultural products (Pinduoduo, 2020). This initiative is based on building a complex value chain that integrates cultivation, processing and selling, incorporating members of registered impoverished households¹² in production and management and targeting characteristic produce. The system has created a reliable channel for production and marketing, ensuring product standardization and large-scale output, and opening up e-commerce channels for coffee, yacon, tea and other produce in Yunnan Province.

With funds from Pinduoduo, the project has established cooperatives, recruiting registered impoverished households among its members, and working together with major agricultural research institutions to improve production and quality (see Figure 3.1), as demonstrated by the Report on upward development of agricultural products (Pinduoduo, 2020).

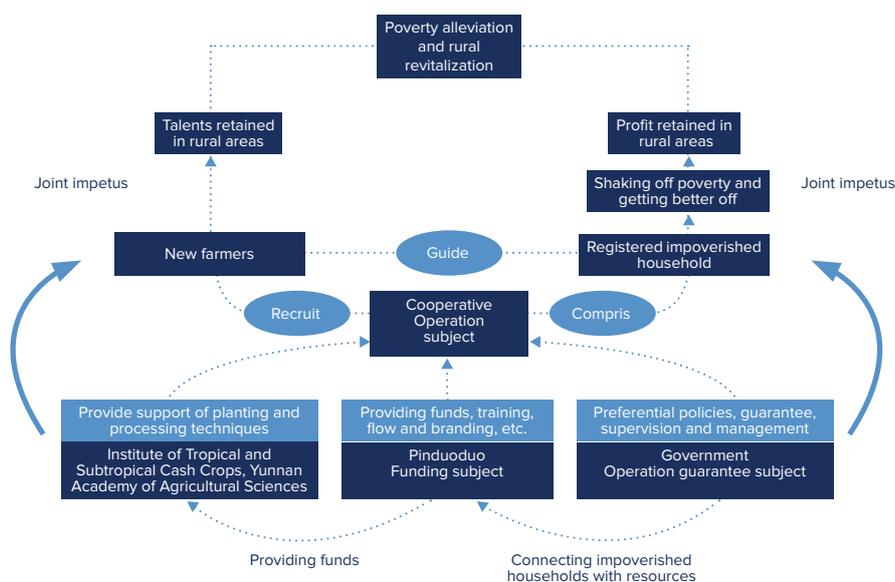
As part of the initiative, Pinduoduo has provided cooperatives with funds, training, marketing platforms and skills. Cooperatives¹³ – the management body of the projects – consist of registered impoverished households from project areas and are led by elected farmers. Their major responsibility is to purchase produce from registered impoverished households, build and promote brands, sell produce on Pinduoduo and distribute profits to their members. They also organize centralized purchasing of modern agricultural equipment, and promote advanced production technologies and modernized, large-scale agricultural production activities with funds from Pinduoduo. Local governments provide supportive policies, while agricultural research institutions provide guidance on crop planting, fertilizer and processing, to enhance product

quality, yield and added value, and to help farmers to increase revenues. They have also worked with Pinduoduo to build standardization systems for production and processing in project areas.

Registered impoverished households – the projects’ core actors – are not only produce growers and processors, but also prime beneficiaries, sharing in funds from Pinduoduo, selling products to cooperatives, and receiving dividends from cooperative profits. While increasing their income, they have also developed new capacities and strengthened self-organization, with positive implications for their long-term livelihoods.

In the next 5 years, Pinduoduo will launch 1 000 ‘Duoduo Farming’ projects in 8 provinces and autonomous prefectures, including Yunnan, forming a new business model covering 2 major regions in south-west and north-west China. Among them, 100 ‘Duoduo Farming’ projects will be launched in Yunnan, cultivating 5 000 local rural e-commerce talents, and incubating and building 100 Yunnan speciality agricultural product brands (Xinhua Net, 2019).

FIGURE 3.1 Basic operation mechanism of Duoduo farming project



Source: Pinduoduo, [2020].

¹³ Cooperatives are mutually aided economic organizations that are based on rural household contracting operations, producing and managing similar agricultural products or providing and using similar agricultural production and management services, voluntary coalition and democratic management. More information available at http://www.gov.cn/jrzq/2006-10/31/content_429182.htm

4. THE IMPACT OF RURAL E-COMMERCE

Rural e-commerce is transforming not only the rural economy and the agrifood supply chain, but also lifestyles, entrepreneurship and ultimately the way that the rural sector looks in 21st century China. This section examines the main impacts that rural e-commerce has had from economic, social and environmental points of view.

4.1 Economic impact

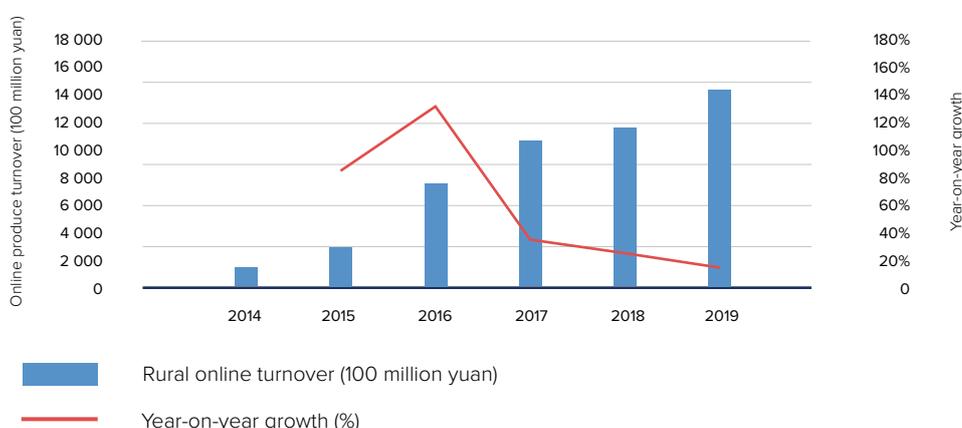
Rural e-commerce is proving a powerful engine for rural economic development in China. Since 2014, online turnover in rural areas has steadily increased year-on-year. As shown by *E-commerce in China 2019* (MOFCOM, 2020), from 2014 to 2019, rural e-commerce turnover grew from CNY180 billion (USD27.5 billion) to CNY1.7 trillion ((USD262 billion), increasing by 8.4 times. In 2019, it accounted for 16.1 percent of China's online turnover, slightly higher than in 2018. With a year-on-year growth of 19.1 percent, it is growing at a rate of 2.6 percentage points higher than that of China's overall online turnover (see Figure 4.1). Rural online turnover accounted for a total CNY0.8 trillion (USD0.12 trillion) as of June 2020.

Some of the areas where rural e-commerce has had an economic impact in recent years in China include the following.

4.1.1 Accelerating the transformation of agricultural markets

In China, the development of rural e-commerce is helping to transform rural markets and accelerate agricultural industrialization. As rural e-commerce develops, 'e-commerce counties', 'e-commerce towns' and 'e-commerce villages' are booming. By connecting sellers to buyers, e-commerce is widening market access for rural producers. This not only supports sales in large volumes of standardized labour-intensive products, such as clothing and shoes, but also facilitates the development of niche products to meet consumer demands in the long-tail market – the market composed of those products with low demand or poor sales. In many cases, e-commerce has expanded the market for goods whose sales had been languishing, including traditional cultural products, and opened new doors for perishable fruits and vegetables. It allows entrepreneurs to connect with consumers remotely through improved website design, establishing a brand and tailoring products to specific demands. However, while the contribution of rural e-commerce to supporting the development of poor villages is undeniable, improvements in human capital, infrastructure and the business environment are crucial prerequisites (World Bank, 2019b).

FIGURE 4.1 Rural online turnover from 2014 to 2019



Source: Ministry of Commerce of the People's Republic of China, [2020].

4.1.2 Helping farmers to raise production efficiency and lower costs

Rural e-commerce is providing a new tool for farmers, giving them access to real-time market information, so that they can organize production, avoid losses and reduce the risk of agricultural production. E-commerce platforms can also link farmers to buyers, as well as to suitable business partners for produce distribution. In addition, farmers are offered guidance for decision-making, on production and other critical issues. Cloud computing, artificial intelligence and other new technologies are constantly applied to agricultural production. A case in point is smart orchard management, with farmers using smartphones to record watering, fertilizer and pesticide application. Cloud computing analyses historical data to guide sowing and fertilizer requirements, and provide optimal decisions (Ali Research, 2018).

4.1.3 Activating entrepreneurship and creating employment

Data from a range of sources confirm the role of e-commerce as a driving force for rural entrepreneurship. According to the *Report on the development trend of rural e-commerce 2019* (CAITEC, 2019), Taobao Villages, mainly sustained by Alibaba, have led to rural revitalization, encouraging emigrants to return home as ‘new farmers’ – a phenomenon also witnessed as a result of the ‘produce pooling’ strategy launched by Pinduoduo. E-commerce platforms encourage educated youth and women to remain in or return to rural areas (FAO, 2020).

Knowledge gaps in expertise are being filled through the Internet. For instance, service providers, designers and engineers in Alibaba’s service market for merchants can provide a range of online tools and services, helping rural entrepreneurs to acquire skills in marketing, selling and customer services. Other services are offering technical support to improve production and quality.

Rural e-commerce not only creates a large number of entrepreneurial jobs for the national poor counties, but also provides opportunities for the central and western regions to sell agricultural products and handicrafts, forming a new breakthrough in poverty alleviation. According to the *White Paper on China’s Digital Economy Development and Employment* (CAICT, 2019), the number of jobs in China’s digital economy in China

reached 191 million in 2018, accounting for nearly 25 percent of the total employment in the whole year, with a year-on-year growth of 11.5 percent. The number of jobs driven by rural e-commerce in China is expected to exceed 30 million.

4.1.4 Fostering market exchange and increasing farmers’ income

The development of rural e-commerce is not only conducive to the rapid dissemination of commodity information, but also to breaking the imbalance of regional economic development, overcoming the geographical limitations of the tangible market, changing the traditional sales mode, and broadening the sales market of agricultural products. By integrating the supply and marketing information of agricultural products in the market through the e-commerce platform, poor farmers can decide their production and sales behavior according to the market demand, improve the market competitiveness of agricultural products, and improve market linkage/ access of farmers.

For consumers, e-commerce offers the opportunity to choose products more freely, according to their requirements, and unlimited by location or time. Consumers can look up prices and compare products online, and then buy offline. For producers and suppliers, it also breaks down geographical and time constraints, expanding the customer base, increasing sales prospects for start-ups and small businesses, and significantly increasing the income of farmers.

4.1.5 Advancing poverty alleviation

E-commerce is proving an important approach to poverty alleviation in rural China. The China E-commerce Poverty Alleviation Alliance, set up under the guidance of the Ministry of Commerce, with recipients in 351 impoverished counties, encourages enterprises to carry out the certification of ‘pollution-free produce, green food, organic produce and geographical indications’ for produce in poverty-stricken areas, enhance produce branding and standardization, and thus make progress in produce e-commerce (Wang, Lu and Yuan, 2019). The branding and collective certification of agricultural products can help to use and develop natural resources in villages, so as to promote the value-added of rural natural capital. This approach gradually shifts the scope of e-commerce from simple sales of agricultural products to rural-based activities such as tourism,

fishing, water tourism and other service areas, with the potential to build integrated villages based on agricultural tourism and business. With the continuous strengthening of the application, scope and depth of e-commerce, the role of e-commerce in improving the income level of poor areas and eliminating the income gap is becoming more and more prominent. In the first half of 2020, the online turnover of impoverished counties was CNY68.48 billion (USD10.4 billion), with year-on-year growth of 13.3 percent – 8.3 percentage points higher than the growth rate of the online turnover in rural China, as shown in the *China rural e-commerce development report (2019–2020)* (CIECC,2020).

In addition, the development of tourism through e-commerce in rural areas can help to build fair, inclusive, resilient and sustainable communities, especially in the case of the sustainable development of indigenous tourism, which can alleviate poverty and improve indigenous communities' well-being and generate new business opportunities (UNWTO, 2020).

4.1.6 Supporting rural skills and cultivating new farmers

The development of rural e-commerce is helping to transform traditional farmers into more modern ones. The e-commerce model has proved effective in upgrading many farmers' expertise, equipping them with the new production skills required for modern agriculture, while providing entrepreneurship training for producers and service providers in areas that include online store operations, packaging, design and marketing.

4.2 Social impact

Rural areas face increasing demographic challenges, particularly depopulation, lower income levels, a digital divide, a decline in traditional economic activities and a lack of economic diversity, plus poor infrastructure, services and transport connectivity. Rural youth are one of the most vulnerable groups due to the lack of employment and entrepreneurial opportunities in agriculture and related rural economic sectors. At the same time, this group is crucial to addressing rural development. Nearly 1 billion of the world's 1.2 billion young people

aged 15–24 years live in developing countries and 88 percent of youth in developing countries live in rural areas; 75 million of them are unemployed (UNWTO, 2020).

4.2.1 Contributing to building liveable new villages

The development of rural e-commerce can promote the return of migrant workers to their home villages, while the development of e-commerce-based entrepreneurship catalyses ecological construction, as returnees yearn for a better life, living in beautiful rural constructions. Already, some e-commerce demonstration villages are becoming prosperous places to live, with wealthy farmers paying more attention to the maintenance of their natural environment (Wei, 2018).

E-commerce can also contribute to comprehensive digital health-care solutions and further input in rural health services, helping to secure farming households' health and improve their well-being.

4.2.2 A boost for rural culture

Rural e-commerce has brought new ideas to shape, promote and renovate traditional rural cultures, while also introducing fresh concepts and mindsets based on management philosophies and teamwork. The arrival of the Internet to remote rural areas has also led to the adoption of new digital education methods and online learning opportunities, helping to enrich rural life and narrow the urban-rural digital divide.

4.2.3 Modernization of rural governance

The demographic structure in rural areas has changed as a result of more returning entrepreneurs, with an influx of young people endowed with new thinking and skills, and fewer older people living alone. This trend is helping to instill new vitality into rural environments, making it easier to apply digital approaches to rural governance, which in turn can lead to improved services.

4.3 Environmental impact

The development of rural e-commerce brings both opportunities and challenges for environmental preservation and revitalization.

4.3.1 Promoting sustainable rural development

Rural e-commerce can lead to savings of land and space. It can be said that e-commerce makes full use of existing rural resources, and that the improvement of rural transport infrastructure, coupled with the development of express logistics and the widespread use of the Internet, make rural green development more possible.

The emergence of a new Internet + agriculture mode, based on social networking, a community economy, Internet crowd financing and online adoption, has in many cases made agriculture more environment-friendly. For example, direct contact and trust between rural producers and urban consumers has led to a reduction in the use of pesticides and fertilizers (Wei, 2018).

The digital management method used in e-commerce can lead to reductions in stocking and paper-based advertising, with potential savings in waste and damage to the environment. Taking jd.com as an example, its JD Logistics uses information technology to replace traditional purchasing methods, supported by a JD cloud warehouse business. According to a recent news report on JD.com's financial statements released by Zhanglian (2021), the result is reduced resource consumption in the production, sales and advertising process.

In terms of logistics, the 'last kilometre' issue in villages has also been relieved through rural e-commerce. A structure chart of rural residents' consumption preference can be drawn up by using big data, so that products with a stronger purchasing history are placed in the closest distribution stations.

By strengthening cooperation between suppliers and consumers, rural e-commerce can organically combine purchasing, production and sales to form an integrated production and sales system.

The result can be less waste in agricultural production, helping to shape more sustainable rural development, though research is still lacking in this area.

4.3.2 Environmental conservation solutions

However, e-commerce logistics generate large volumes of packaging waste, as well as agricultural carbon emissions. As digital consumption soars, the environment is paying the price of its convenience.

Expedited shipping – same-day, bullet-speed or express deliveries – produce almost 0.75 kg of carbon dioxide equivalent per shopper – more than twice that of regular delivery methods. In China, quick deliveries account for more than 10 percent of overall deliveries, fueled by the falling cost of shipping. Thousands of delivery trucks – mostly powered by fossil fuels – are also needed to transport the sheer volume of packages from warehouses to consumers. The World Economic Forum predicts that emissions from urban last-mile deliveries will increase by more than 30 percent in 100 cities around the world, as more delivery vehicles are dispatched to meet rising e-commerce demand (Zein, 2021).

Data from the State Administration for Market Regulation indicate that China's courier industry produces around 1.8 million tonnes of plastic waste and more than 9 million tonnes of paper waste each year. In response to this serious environmental problem, many e-commerce enterprises have taken measures to reduce the consumption of express packaging materials, and China's Ministry of Commerce recently issued a notice requesting e-commerce enterprises in key areas to gradually stop using non-degradable plastic bags and disposable woven bags, and reduce the use of non-degradable plastic sticky tapes (People's Daily Online, 2021).

5. CASE STUDIES AND ANALYSIS

The progress of the Internet and e-commerce, including the traditional e-commerce platform model and social e-commerce platform model, has created opportunities to empower the transformation of agriculture and rural areas. This section shares four typical cases in China, as well as several individual success stories.

5.1 Rural e-commerce in action

The following is a selection of four case studies spread over a wide geographical area in China, illustrating the scope of impacts that can be

achieved through e-commerce. The first case of Shuyang, Jiangsu locates in the east of China and is famous of exchanging flowers and trees through livestreaming e-commerce. The second case of Caoxian, Shandong is in the northern China, where the majority of the residents is doing online business on Alibaba platform. The third case of Longnan, Gansu is in the west, which has achieved poverty alleviation through e-commerce. The last one, Yuanyang of Yunnan, is in the southern China and stands for a successful practice of GIAHS, e-commerce and e-tourism.



5.1.1 Shuyang – a county of high-value agricultural products (flowers and trees) transformed by live streaming

FIGURE 5.1 Live streaming bonsais: Jiang Aihua's live streams give customers a tour of the garden, interacting with them and instructing them how to nurture the plants



‘Compared with posting photos of the products online, live streaming is a more effective way of selling,’ said Jiang Aihua, who lives in Shuyang, a county with substantial flower and tree producing areas. In 2007, she left her low-paid job to start a bonsai business, and after several years decided to promote her products by live streaming.

Jiang was the first bonsai seller in the town to sell her plants in this novel way. She catches her audience’s eye by taking them to her bonsai garden virtually, and with her persuasive introduction to her garden, managed to sell bonsais worth CNY3 million (USD458 000) in the first half of 2018 (Ma, 2018).

Shuyang, an underdeveloped county in northern Jiangsu Province, is now ranked as one of the top 100 counties in China and one of the top 10 typical cities and counties for rural e-commerce in 2020. E-commerce has played a major role in its transformation.

Between 2000 and 2006, farmers in Shuyang were introduced to a new and vast online market as a result of connection to a broadband Internet network and online marketing

platforms, such as Taobao. From 2007 to 2012, more farmers joined up as e-commerce entrepreneurs. From 2013 onwards, several towns in Shuyang were selected as finalists to become Taobao Villages, with the country going on to host the largest cluster of Taobao Villages in China.

The e-commerce turnover of Shuyang in 2019 reached CNY33.6 billion (USD5.3 billion), with 291 million deliveries dispatched. Taking a vibrant approach to ‘mass entrepreneurship’, e-commerce in Shuyang has now extended to almost every household in three major towns – Xinhe Town, Yanji Town and Miaotou Town.

Nearly every household is now a ‘small e-commerce workshop’, based on self-production, self-operation and self-marketing, where each family member plays a different role: the elder generation, which comes from a long tradition of market gardening, is responsible for planting and propagating, as well as quality control, while the younger family members are in charge of online store operations and product packaging (Guo, Qu and Zeng, 2016).

5.1.2 Caoxian County – rural entrepreneurs embrace online trading

‘Taobao online stores have become popular, fashionable and practical for wedding costumes in our village. Parents hope their children can become rich by running them.’ Ren Qingsheng, 48, is a former farmer from Dinglou, Daji Town, Caoxian County, who now owns an online store with annual sales of CNY8 million (USD1.2 million) (Zhao, 2019).

An agricultural county with a weak industrial foundation and the largest impoverished population in Shandong Province, Caoxian County has seen its fortunes change as a result of e-commerce. It all started at the end of 2010, when three households opened online stores on Taobao. Their efforts met with immediate success and they soon discovered new business opportunities in online markets for performance and photography costumes –

a tradition in this area – leading to a rapid expansion of costume production and an increase in the number of new online stores.

In 2013, the county government set up the Daji Town Taobao Industrial Development Office to create a landscape of ‘everyone talking about online shopping and every household opening an online store with the support of enterprises and government’. Driven by villagers’ entrepreneurship and support from the county government, Daji Town has now embraced online selling on a grand scale. Annual sales of stage costumes generated from Taobao online stores run by villagers in Dinglou have surpassed CNY500 million (USD76 million) and annual net income has exceeded CNY80 000 (USD12 000) per capita.

FIGURE 5.2 Ren Qingsheng, Party secretary of Dinglou Village, Daji Town, Caoxian County, arranges performance costumes at his warehouse for sale on his Taobao online store





FIGURE 5.3 Workers transport olives to the factory

5.1.3 Longnan – achieving poverty alleviation through e-commerce

Longnan, a poor county in Gansu Province, is making progress towards poverty alleviation through e-commerce for agricultural products, backed by local government policies and other support (Wang, 2020).

‘Nobody had tried planting olive trees in my village in 2012, but I believed the business could be profitable as it was promoted by the Government,’ says Jia Zhao, a young migrant worker who has now returned to his rural home in Longnan. ‘I can make about CNY100 000 (USD15 490) a year from planting olive trees, and I have used the profits to expand the cultivation area.’ He adds that local olive oil producers buy all his fruit, to supply growing demand for high-quality agrifood products from Chinese consumers.

Every year, Jia hires at least ten people from poor families to work on his farm. Although they only work for about 20 days, helping to control weeds

and pick fruit, they earn a combined wage of more than CNY60 000 (USD9 000) (Hou, 2021).

Located at the junction of Shaanxi, Gansu and Sichuan Provinces, Longnan has poor transport facilities. With 830 000 people registered as impoverished, it has a 30 percent rate of poverty. However, progress achieved in poverty alleviation through e-commerce for three years has earned Longnan the ‘National Demonstration City of Poverty Alleviation through E-commerce’ award.

Longnan’s experience with e-commerce dates back to June 2013, when the secretary of Cheng County committee renamed his Weibo account and sold walnuts on the platform. The local government began to include e-commerce in development strategies in December the same year, helping to organize e-commerce forums, attended by experts in the field, as well as study visits to other places with experience in the sector.

A 'five-in-one' strategy implemented over a three-year period helped to drive e-commerce in Longnan. First, the local government gave support and supervision; second, markets and enterprises began functioning; third, local people were widely mobilized to start businesses; fourth, associations provided services, with suppliers, e-merchants and service providers working in close collaboration; and fifth, new

media were used for marketing and green agricultural products were widely promoted.

The transformation of this once isolated town is continuing, through a mix of online and offline e-commerce platforms, which rely on mass entrepreneurs and enterprise giants as a means for expanding the government strategy of achieving 'poverty alleviation through e-commerce'.

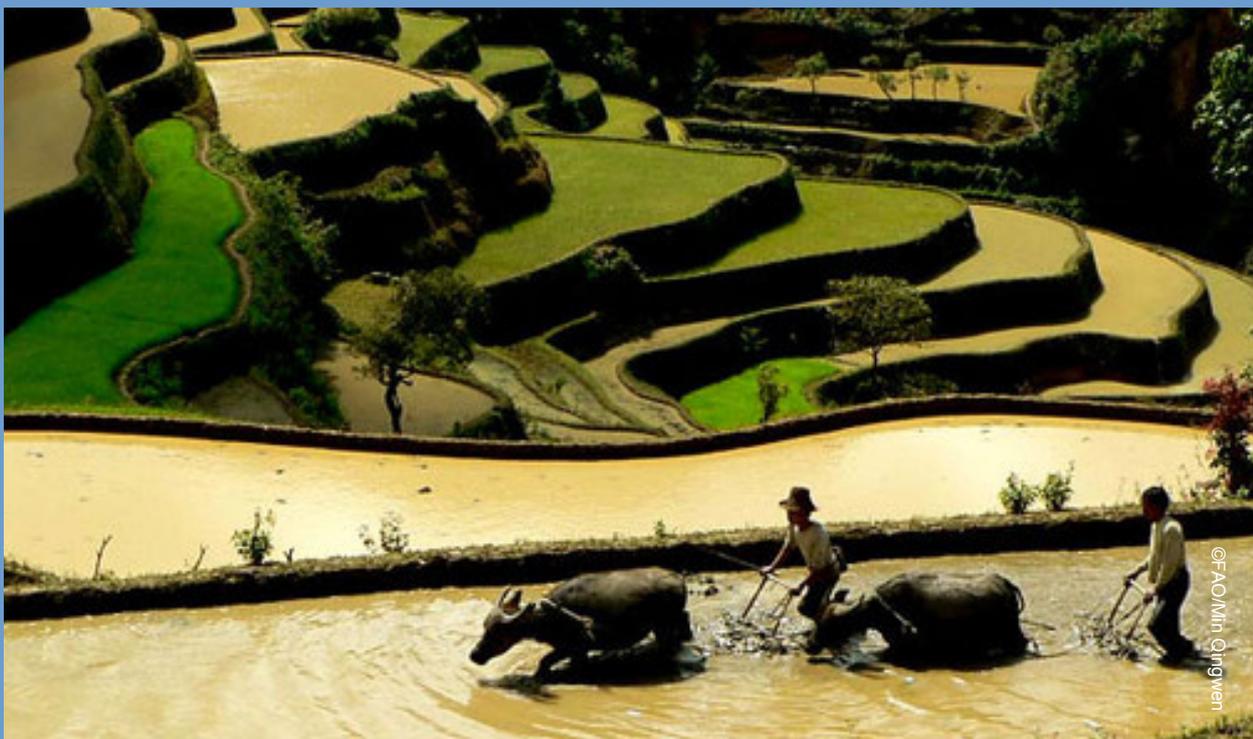
5.1.4 Hani Rice Terrace – a success of GIAHS, e-commerce and e-tourism

Hani Rice Terraces are located in the Yuanyang County, Yi Autonomous Prefecture, Yunnan Province, which is composed of forests, villages, terraces and rivers. In 2010, the terraces were recognized as a Globally Important Agricultural Heritage Systems (GIAHS) site, representing not only stunning natural landscapes for tourism but also agricultural practices that create livelihoods in rural areas while combining biodiversity, resilient ecosystems and tradition and innovation in a unique way.

Yuanyang County has since developed e-commerce service platforms such as e-commerce co-creation spaces and mobile apps, and promoted its agricultural products via other e-commerce platforms, including those operated

by Alibaba (Han, 2020). Through the development of rural e-commerce, smallholder/ family farmers can sell their agricultural products to urban consumers. The most famous brand is Hani red rice, a high-value product linked to its place of origin, whose reputation has been enhanced through food tourism. In 2019, Yuanyang County's e-commerce online transaction volume reached CNY15.23 million (USD2.34 million) (Tan, 2020). This trade is helping to increase incomes for smallholder/ family farmers, and enhance their awareness and enthusiasm for protecting their agricultural culture heritage. In 2019, the Hani rice terraces received 170 000 domestic and foreign tourists, with a total tourism income of CNY43.7 million (USD6.73 million) (Tan, 2020).

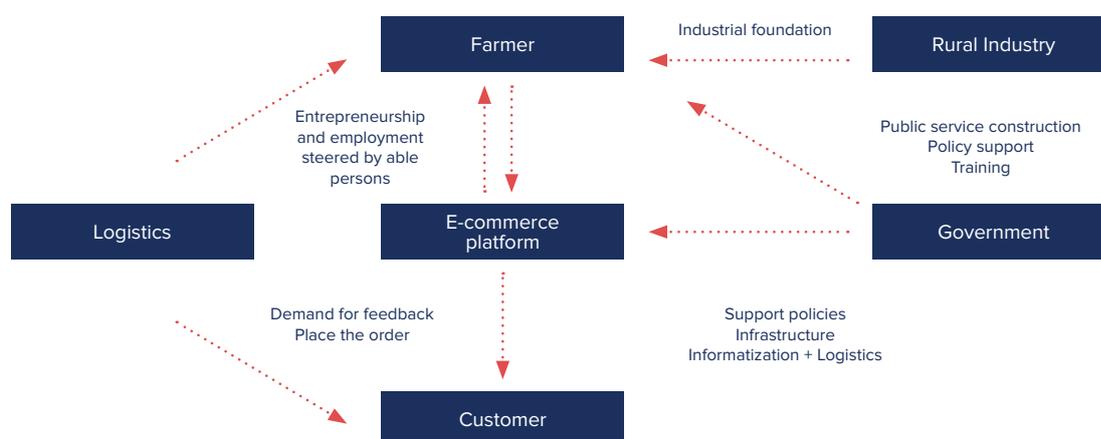
FIGURE 5.4 Hani Rice Terrace in South China's Yun Nan Province



5.2 An enabling ecosystem for rural e-commerce

Experiences in China show that the Government, e-commerce platforms (the private sector) and farmers (including farmer associations and extension workers) have played key roles in fostering an enabling ecosystem for e-commerce, which paves the way for the development of digital agriculture and digital villages. The e-commerce ecosystem is illustrated in Figure 5.5.

FIGURE 5.5 Chinese solutions for rural e-commerce



As part of this approach, China has taken steps to regulate e-commerce with relevant laws that stipulate the rights and duties of e-commerce operators, platform operators, consumers and third parties. These cover areas that include logistics and payment, personal information protection, intellectual property protection, import and export, cross-border e-commerce and rural e-commerce. Meanwhile, special funds and preferential policies have been created for rural e-commerce, steering social capital and venture capital into the sector, to support and stimulate its progress.

Realizing the importance of infrastructure, the Government has established the 'village connecting village' project, covering improvements to roads, power, drinking water, telephone networks, cable television networks and the Internet. This has played a crucial role in providing solutions to outstanding issues in rural e-commerce development, for example by enabling the building of logistics systems and facilitating farmers' upgrade to become e-merchants.

5.2.1 Policy support

The development of rural e-commerce – by accessing highly integrated markets via online platforms – is expected to bring significant economic advantages, not least inclusive growth, poverty alleviation and reductions in inequality. Motivated by such potential, the Government of China has allowed space for digital companies to experiment, while introducing a wide range of policies and projects to improve the country's Internet infrastructure as a foundation for e-commerce (see Table 2.2).

Constructing a rural e-commerce skills system has emerged as critical, and there is a need to provide villagers with regular free and high-quality training, and guide farmers in making use of e-commerce platforms for improved, sustainable and standardized production. Other areas requiring more attention include policies to support entrepreneurship and attract people with e-commerce skills to rural start-ups, supported by financial subsidies, and tax, housing, health and education incentives, so that their talents will be retained.

5.2.2 An industrial foundation

As part of an enabling ecosystem, it is important to plan for and guide e-commerce entrepreneurs in cluster development. Some specific measures in this direction include optimizing the spatial structure of industrial development with careful layout, better coordination among counties, promoting cluster development in villages with industrial integration, and developing multi-type and multi-mode industries to link urban and rural areas, industry and agriculture, and farmers with farmers.

In parallel, there is a need to focus on developing green industries in rural areas, polish the green standard system, enhance branding and highlight the importance of resource protection.

5.2.3 Access to markets through platforms

E-commerce platforms have given rise to new models, developing live streaming sales, social e-commerce, community e-commerce and cross-border e-commerce, as described, but also supporting retail stores in creating online markets. One result is the acceleration of both online and offline ordering methods for bricks-and-mortar retailers.

5.2.4 Logistics systems

In China, the logistics system was built on the Government's transport infrastructure and rural circulation network. However, further efforts are needed: in impoverished rural areas, top-level design of information-driven logistics should be intensified, and information-based platforms for rural e-commerce logistics set up. There is a case for incentivizing domestic and foreign enterprises to invest in building large local logistics parks and for encouraging large commercial and trade businesses to build produce logistics, distribution centres and cold chain systems. The integration of logistics resources in impoverished rural areas should be stepped up, and logistics services stations established in towns and villages. Lastly, the Internet of Vehicles should be deployed and applied (IOT, 2021), modern logistics innovated, digital rural commercial and trade logistics upgraded, and smart express boxes shared as terminals.

5.2.5 Digital capability enhancement

In the era of network information, rural e-commerce provides low-cost channels for farmers to start businesses, promoting the return of urban migrants and making a career in farming more attractive. Central to this process is the guidance of leading figures, encouraging them to start businesses, share their e-commerce knowledge and spread their experience, so that more households follow suit, creating a ripple effect and scaling out levels of affluence.

5.3 Challenges to rural e-commerce

5.3.1 Inadequate infrastructures and inefficient logistics

There is currently an insufficient road network and Internet infrastructure, which curbs the growth of e-commerce in rural areas. Existing logistics enterprises lack coordination and resource-sharing capabilities. In recent years, a variety of enterprises have begun to explore rural markets in a comprehensive way and improve logistics distribution networks. However, fierce competition among enterprises and lack of platforms for integrating and sharing information has curbed the improvement of delivery efficiency. In addition, fresh produce e-commerce cannot succeed without the guarantee of cold chain logistics technology, which has high costs, putting it beyond the reach of most rural e-merchants.

Loose connections and scarce coordination

Strong links have yet to become firmly established between farmers, agricultural enterprises and e-commerce platforms, leading to a disconnect between production and marketing. There is a need for greater coordination among all actors involved in e-commerce, such as farmers, processing enterprises, e-commerce platforms, e-commerce service enterprises, community network stations, express logistics providers and e-commerce zones; failure in this respect has led to a range of problems, including resource waste and idle capacity.

Poor produce standardization

Rural e-commerce lacks guidance, due to inadequate laws, regulations or policy rules concerning standardization (quality control). A standardization system for production, processing, packaging, sorting and classification is still a work in progress and the product traceability and quality control system is in need of improvement, resulting in a wide gap in produce quality in e-commerce markets. Relevant government departments have insufficient supervisory staff and the Government has yet to establish an upstream and downstream traceability system for quality and safety.

5.3.2 Lack of rural e-commerce capacities

Agriculture and rural areas still lag behind in digital development due to farmers' poor access to information, relatively weak IT hardware and inadequate skills to keep pace with new-generation information technologies featuring mobile Internet, big data, cloud computing and artificial intelligence.

Lack of e-commerce skills in rural areas is partly due to inadequate education in rural schools, and e-commerce training programmes that cannot meet actual needs, especially the diversity of skills required in areas such as sales, management, branding, data analysis and logistics. In addition, it is hard to attract and retain e-commerce talents. Rural areas are overshadowed by cities in terms of infrastructure, salaries and working conditions, so introducing expertise is often a challenge.

In tandem, there is an urgent need to improve the services, design and operation of platforms to tackle the incompatibility between rapid e-commerce growth and the farmers who are culturally disadvantaged and relatively limited in their capacity to embrace new technologies.

High investment threshold

Heavy set-up costs, system maintenance and long profit cycles mean that many small and medium-sized enterprises struggle in rural e-commerce. Although this model seeks to improve farmers' income through in-depth labour division and vertical value chain integration via smart technologies, the high initial investment required can favour large farms or new high-tech agricultural enterprises, at the expense of smaller-scale players.

Farmers in poor areas can be left behind

The development of e-commerce depends on an industrial foundation, policy support, platform construction and leadership. For all these reasons, farmers living in poor and fragile areas may be left out.

China had more than 3 000 Taobao Villages as of October 2018, but 90 percent of them were located in economically developed areas along the eastern seaboard. In terms of e-commerce value chain in the Eastern region accounts for 49 percent of the national total; the North-east region accounts for 7 percent, the Central region accounts for 26 percent, and the Western region accounts for

18 percent. Exposing farmers from less developed areas to the advantage of e-commerce should be part of any strategy to develop this sector (Ali Research *et al.*, 2019).

Efforts should be made to diversify agriculture in line with local conditions, improve quality standard systems and extension and advisory services, strengthen protection for geographical indications and trademarks, and build representative produce brands. It is also crucial to ensure that women in impoverished areas are given special rights to access e-commerce, since this sector is particularly suited to offering them opportunities for innovation and entrepreneurship.

Pressure on transport

In China, e-commerce promotion festivals have become a key means for platforms to compete for users and increase revenue, greatly increasing the workload of farmers during that period, as well as pressure on logistics. Chinese e-commerce festivals, such as '6.18' and 'Double 11' can concentrate the sales volume of an entire month into a single day. At all times, e-commerce is placing a huge strain on freight transport, with serious implications for road and public safety, as well as the environment.

Reconciling the digital and the physical economy

The development of e-commerce shortens the sales channels of traditional industries and occupies the sales share of traditional stores by virtue of its cost advantage. On the one hand, e-commerce opens up product sales, so that the products originally limited to the local market can be sold all over the country. On the other, the traditional store retains a core function. Integrating the development of e-commerce and physical commerce, and giving full play to their complementary impact, warrants further exploration in the future.

Rural e-commerce does not automatically reduce poverty

Statistics show that in 2018, there were 3 million poor rural residents in Eastern China, 11.12 million in central China and 16.34 million in Western China. There are still a large number of poverty-stricken areas in China, including 635 poverty-stricken counties. The proportion of



poverty-stricken people in South-west China, in particular, remains high. Poverty alleviation is an arduous task, and there is a need to invest large amounts of human and material resources to effectively support economic growth and development in poor areas (CAITEC, 2019).

Despite the rapid development of e-commerce in rural China, numerous challenges remain before its potential to address rural poverty is fully realized. Poverty can have various causes, such as unfavourable geography, underdeveloped infrastructure or lack of labour and human capital. A common feature of poverty-stricken areas is weak business infrastructure, which translates into concrete obstacles to the development of e-commerce. For example, production is often uncoordinated and unstable, due to weather and other factors.

Remote locations often mean high transportation costs and low-quality Internet services. Statistics show that the cost of logistics is at least four times higher for villages in western China than for those in the coastal region. Poorer areas routinely experience a shortage of skilled labour to operate online businesses and related services, such as branding, marketing and logistics. The relatively low levels of education in these areas also make training less effective. Consequently, the income effects and positive externalities of e-commerce do not automatically lead to a reduction in poverty.

6. LESSONS LEARNED FROM CHINA'S EXPERIENCE

China's experience in rural areas shows that the benefits of digital technology are not limited to high-income countries and urban areas. Given the right conditions, digital technology can develop rapidly in developing countries and rural areas and can be a powerful tool for rural revitalization and poverty alleviation. While e-commerce is more developed in China's urban areas – nearly three-quarters of online stores and Internet users are in cities – online sales in rural areas are growing much faster than the national average. In coastal and inland areas, urban and rural areas, online shopping accounts for an increasing proportion of purchases by households, and online consumption is rising rapidly. All regions, including poverty-stricken counties, have seen an increase in online sales.

E-commerce clearly has the potential to reach consumers with limited market opportunities in less developed countries, and while it may start at a low level, it can grow rapidly once it takes hold. This section explores some of the lessons learned from China's experience with rural e-commerce.

6.1 A multi-stakeholder model

The participation of a wide range of actors has been crucial to the development of rural e-commerce in China. They include the following sectors.

Policies for infrastructure

Over the past decade, a number of government policies, development programmes and subsidies have played a key role in building the physical and digital infrastructure needed to enable people and companies to do business online and move goods efficiently.

The two key policies for the development of rural e-commerce have been:

1. 'Internet + Agriculture'. This covers the development of Internet technology (mobile, IT, cloud computing, big data and AI) to improve the efficiency of the rural

economic sector: (a) production, processing and trade of agricultural products; (b) agricultural social services (agricultural financing, precise operation of agriculture, technical services); (c) rural tourism; and (d) consumption by farmers (ADB, 2018).

2. 'Internet + logistics'. This covers the development of both the new and the traditional economy, by promoting the in-depth integration of the Internet, big data and cloud computing with logistics, so as to accelerate the upgrading of China's economy (ADB, 2017; Fan and Zhang, 2004).

Based on previous programmes and incentives, various ministries have worked to develop pilot projects aimed at increasing business investment through private sector participation.

Public-private partnerships

A strategy based on public-private partnerships has been pivotal to the establishment of e-commerce companies in rural China (Pu, 2020). Under the public-private partnership model, the Government has created supporting policies and provided public funding, while the private sector (technology companies) has provided technology and information support, introducing business models and strategies, and promoting online shops opened by rural entrepreneurs, thereby contributing to increased investment in rural areas, such as rural Taobao (Khanna *et al.*, 2019).

Through this model, different services have been developed, including free training in digital skills for villagers, and support in creating online stores, designing logos, and organizing customer services and package delivery – all delivered via a blend of government funding and private sector expertise. A key feature of the strategy has been a decision to focus on strengthening the capacities of local companies and people, rather than imposing an external model.

A large number of case studies have shown that effective public-private partnerships can encourage the use of digital technologies and e-commerce platforms to support rural poverty alleviation. To facilitate such efforts, governments should help improve the business environment and provide strategic subsidies to support e-commerce platform companies, logistics companies, farmers and individuals to participate in e-commerce. The private sector is responsible for the specific development of e-commerce, such as digital technology can improve the quality of agricultural products, e-commerce platforms can expand the online sales channels of agricultural products, and create more and better rural jobs.

Credit support

To help finance the activities of the different actors in the rural e-commerce value chain, Chinese commercial banks and other financial institutions have developed innovative business models aiming to serve small and medium-sized enterprises and farmers, so that agricultural operators, especially small-scale farmers, have access to loans to solve the financing challenges of agricultural operations. Features have included improved credit assessment tools, expanded scope for collateral, new loan repayment products and secured loans based on intellectual property or supply chain inventory (Chen and Yuan, 2021).

A focus on poverty alleviation

The development of rural e-commerce in China has been integrated into poverty alleviation projects in the country's least developed regions. Villagers have been encouraged by local government to participate in digital skills workshops, so that they can start online businesses to sell their agricultural products, while entrepreneurs have been incentivized to hire local people living below the poverty threshold. According to the statistics of China's Ministry of Commerce, the total online retail sales of 832 China's national poverty-stricken counties reached CNY301.45 billion (USD46.5 billion) in 2020, with an increase of 26 percent on figures for 2019. By the end of 2020, there were 3.07 million e-businesses in national poverty-stricken counties, an increase of 13.7 percent on 2019.

The key role of youth

Young entrepreneurs have played a pivotal role in growing e-commerce in rural China. For the past

20 years China has seen a significant shift towards urbanization, with 500 million people – many of them young – moving to cities to find work. Backed by government policies that encourage graduates to return home and contribute to poverty alleviation, the rise of rural e-commerce has helped to attract youth back to villages to become entrepreneurs and create hubs for online sales of fresh produce or goods.

A new business ecosystem

The development of rural e-commerce has helped to create an innovative ecosystem, catalysing entrepreneurship in rural areas, and shaping a new pattern where multiple complementary enterprises work together for mutual benefit. Rural e-commerce has not only helped traditional industries to develop online business models, but has also spawned new clusters, integrating e-commerce with local tourism and culture enterprises, in the process helping to advance rural revitalization.

6.2 The way forward

In China, rural e-commerce has experienced rapid development and continuous innovation, driving the flow of technology, capital, talent, jobs and materials to often isolated and underdeveloped areas. For this momentum to continue, it will be important to:

- experiment with different innovative approaches to poverty alleviation based on rural e-commerce;
- introduce safeguards to minimize potential negative effects of market power concentration;
- continue the trend towards agricultural transformation driven by consumer demand, leading to better produce quality and a sustainable rural economy;
- further develop smart logistics in rural areas, to ensure improved service quality and reduce costs;
- explore other rural e-commerce models beyond retail and wholesale – such as social and community e-commerce;
- actively cultivate innovative e-commerce skills and new farmers; and
- move towards a more sustainable model, especially focusing on environmental issues linked to packaging waste and CO₂ emissions from shipping.

7. CONCLUSION

The past few decades have seen the rapid development of e-commerce, alongside new digital technologies, innovative business models and transformative platforms. The market size of global e-commerce is expected to grow at a compound annual growth rate of 14.7 percent in the next 7 years. This dramatic trend is not only changing the way that people do business, but also the way they live, and e-commerce is becoming an increasingly important driver of economic growth, digital transformation and rural revitalization.

E-commerce has the potential to deliver significant economic, social and environmental benefits.

With respect to **economic** impacts, better trading efficiency leads to more transactions and greater trading volumes. E-commerce can streamline operations and lower costs in the value chain, while offering secure and reliable digital payment methods to protect buyers and sellers. For producers and suppliers, it can break down geographical and time barriers to widen the customer base and expand sales volumes for start-ups and small businesses. By helping to develop an enabling ecosystem, with low-cost services and efficient data on consumer demand, e-commerce can support the growth of new businesses, entrepreneurs and brands; from the consumer perspective, it offers greater convenience and choice, which in turn results in more price competition. E-commerce could also provide an enabling environment for entrepreneurship through the public-private partnership, where the younger generation will play a leading role.

In terms of **social** benefits, e-commerce has the potential to increase incomes for producers and suppliers by expanding sales and reducing production costs due to economies of scale. It can help to drive poverty alleviation in rural areas and improve the livelihoods of smallholder farmers. The advent of e-commerce is often linked to more job opportunities, especially for vulnerable groups, such as women and youth, while also helping to halt the exodus of young people from rural areas. As a knock-on effect, e-commerce can help to accelerate digital transformation in rural governance, health care and education.

E-commerce can have some positive impacts on **environmental** sustainability, due to savings in transport compared with traditional in-store shopping, and reduced inventory and waste as a result of a better match of supply and demand. However, the scale of negative environmental impacts caused by fast-paced logistics and excessive packaging should not be overlooked.

Although e-commerce could generate comprehensive benefits and positive impacts, the rise and growth of rural e-commerce are still facing nonnegligible challenges. Most rural and developing areas are at a disadvantage in infrastructure conditions, in terms of instable electricity supply, inefficient logistics and poor Internet coverage, which are fundamental elements to the development of rural e-commerce.

Another issue comes to the poor literacy level of farmers, the limited access to advanced information, and the inadequate education opportunities in rural areas. Therefore, it is difficult for farmers to acquire diverse e-commerce related skills such as management, marketing, sales and logistics, not to mention more advanced information technologies like big data analytics, smart advertising and artificial intelligence.

Since rural e-commerce usually requires substantial investment in monetary capital and human capital, it may intensify the inequality and disadvantage problem for marginalized groups like smallholder farmers, women and youth.

In addition, there are many other challenges in the forward path of rural e-commerce, such as lack of standardization and quality traceability of farm produce, exacerbation of rural and urban divide, cannibalization of traditional and physical economies, and environmental risks.

To overcome the challenges and realize the full potential of e-commerce, cooperation among multiple stakeholders, including government, the private sector and farmers, are required. Government involvement is essential to establish an enabling ecosystem for rural e-commerce. This includes investing in digital infrastructure,

supporting incubators and accelerators, offering training programmes to farmers and extension officers, and providing inclusive and innovative financing and insurance services.

The private sector will play a key role in promoting e-commerce in rural areas, through investment, expertise and skills-building. Private enterprises can help to establish critical infrastructures for e-commerce, by creating digital payment methods, building logistics networks and designing user-friendly tools to stimulate entrepreneurship on the part of small-scale farmers and other sellers.

Last but not least, it is important to help farmers and other rural actors to realize the value of digital technologies, and to create an ecosystem that enables them to take part in innovative business models such as e-commerce. Highlighting the experiences of successful rural e-merchants is one way of achieving this – using them as role models to guide and motivate farmers in taking advantage of e-commerce as a pathway to economic and social improvement.

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