

Development of E-commerce and Innovation of Rural Small and Medium Enterprises

Na Zhang^{a,*}, Jian Yan, Li Guo

Shandong Transport Vocational College, Weifang, China

^a123337550@qq.com

*Corresponding author

Abstract: *With the continuous progress of the times, the innovation of rural SMEs (small and medium-sized enterprises) is increasingly valued. Improving the independent innovation ability of enterprises is a top priority in implementing the strategy of building an innovative country. The innovation of rural SMEs can provide assistance for rural development, so it is very important to study how rural SMEs innovate. This article studies the development of e-commerce and innovation in rural SMEs, aiming to enable rural SMEs to innovate through e-commerce technology. This article investigates the economic improvement of 100 small and medium-sized rural enterprises that have used e-commerce through experiments. From the experimental data, it can be found that the economy of these enterprises has increased by 10% to 20%, which proves that e-commerce has been very successful in innovating rural SMEs and can achieve economic benefits.*

Keywords: *Electronic Commerce, Small and Medium-Sized Enterprises, Enterprise Innovation, Rural Enterprises*

1. Introduction

In the strategy of building an innovative country, it is necessary to prioritize enhancing the innovation capabilities of rural SMEs. Rural SMEs are an important economic pillar in the construction of a new socialist countryside. Therefore, it is necessary to take rural SMEs as the research object, study the problems faced by rural SMEs in the development process, analyze the problems they face in the development process, and then propose countermeasures and suggestions to enhance the independent innovation ability of rural SMEs.

There is a lot of contemporary research on rural SMEs, and McElwee G believes that e-commerce provides assistance for improving local business development, and e-commerce should become a component of rural enterprise development policies [1]. AlBar A M believes that it is crucial to conceptualize and study rural innovation. Although people still do not understand the importance of innovation, it must be acknowledged that there are some issues with people's views on rural innovation [2]. Hota P K believes that small businesses and farms are striving to find an innovative solution to cope with the globalized market and challenging society. In different aspects, small businesses, especially those in rural areas, need to tailor innovative solutions [3]. Although the development of rural SMEs is very rapid, continuous innovation is still needed.

Nowadays, in the context of economic globalization and regional economic integration, facing increasingly fierce market competition, rural enterprises must enhance their independent innovation capabilities. People need to embark on a path of new and harmonious industrialization, accelerate the adjustment of product structure, and thus improve economic development level and core competitiveness [4-5]. Rural middle and lower level enterprises need to build a modern industrial system in order to win in international market competition [6-7]. This article focuses on the development of e-commerce and innovation in rural SMEs. Through experimental research on the economic level improvement of rural SMEs after using e-commerce, it is found that there is a good improvement in economic level, proving that the compatibility between e-commerce and innovation in rural SMEs is still very high.

2. E-commerce Development and Innovation of Rural Small and Medium-Sized Enterprises

2.1. Problems in Innovation of Rural Small and Medium-Sized Enterprises

The problem with innovation in rural SMEs lies in their weak innovation awareness. Most rural enterprises have a weak innovation awareness and lack confidence in their innovation capabilities, believing that they have poor conditions, high innovation risks, and no innovation conditions [8].

The problem is also reflected in the lack of an internal innovation incentive mechanism within the enterprise. Firstly, most rural enterprises lack effective incentives for managers, who lack the internal motivation to continuously innovate, take risks, and become bigger and stronger; Secondly, there is a lack of innovative training for technical personnel. Although most companies offer certain rewards to innovative talents to some extent, these rewards do not fully stimulate the work enthusiasm and creativity of innovative talents [9-10].

The problem also lies in the extensive mode of economic development, and rural enterprises generally face problems such as extensive production and operation models, low resource utilization efficiency, prominent environmental pollution and safety issues. Some rural enterprises have weak competitiveness, mainly relying on advantages in price, labor, resources, environment, and other aspects. However, their technical and management qualities are poor, making it difficult to win market competition.

The problem also includes a weakened industrial structure, with some rural industrial enterprises having smaller scales, a single product structure, and insufficient prominence in their main business. Rural enterprises are not prominent enough in areas such as division of labor and cooperation, labor-intensive industries, etc; in highly concentrated industries such as resource development and raw material production, there are too many rural enterprises involved. For example, in the coal mining industry, the proportion of rural coal mining exceeds 96%; in the construction materials industry, 80% of outdated technologies come from rural areas.

2.2. Suggestions for Improving the Innovation Capacity of Rural Small and Medium-Sized Enterprises

It must adhere to the path of innovation with Chinese characteristics, such as "original innovation" and "integrated innovation", and regard improving innovation capabilities as the core of development strategy, adjusting industrial structure, and transforming economic growth mode. Accelerate the construction of a technology innovation system with enterprises as the main body and market orientation. By increasing investment, establishing enterprise technology centers, or collaborating with research institutes to establish research and development institutions, enterprises can truly become the main body of research and development investment and independent innovation.

It must follow the path of rural industrial development with Chinese characteristics, with industrial upgrading as the driving force and industrial structure adjustment as the core, to promote the development of rural industries. From relying on the growth of material resources in the past to relying on technological progress, improving the quality of workers, and innovating management now. Develop a modern industrial system, promote the integration of informatization and industrialization, transform traditional industries with advanced and applicable technologies, and eliminate outdated production methods.

Increase investment in technological transformation, and the design of new products should also rely on advanced equipment to enhance their technical value. Therefore, it is necessary to strengthen the technological transformation of the company to improve the quality of its production equipment and strive to compete with the advanced level of other countries in the world.

It is necessary to establish a service system that is conducive to enterprise innovation, as shown in Figure 1:

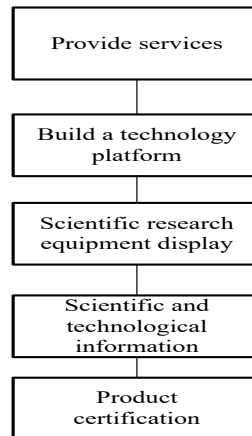


Figure 1: Service system of enterprise innovation.

(1) Rural enterprises provide services in information, design, research and development, technology transfer, and technical talent cultivation, promoting the commercialization and industrialization of scientific research achievements. (2) Build a universal technical support platform to provide technical support for rural enterprises. In industrial clusters with a large number of rural enterprises and strong industrial advantages, public technology platforms should be established to provide technical support for rural enterprises. (3) Carry out public display of scientific research equipment. Encourage universities, research institutions, and large enterprises to open their research equipment to rural areas. All relevant departments should closely cooperate to jointly build equipment resource libraries and timely transmit information on equipment resources to rural areas. (4) Strengthen scientific and technological intelligence work. Relevant government departments should establish a comprehensive information service network and strengthen technical exchanges with local scientific research institutions. On this basis, gradually build a professional technical service system for network technology information, technical consultation, and offline network, to enhance the timeliness of technical services. (5) Increase the certification of new products and strengthen the standardized management of enterprises. Relevant government departments should closely monitor changes in industrial technology standards, assessment procedures, and inspection procedures, and monitor technical trade measures that rural enterprises may encounter when exporting products, providing early warning services. It needs to provide certain guidance and assistance for the application of new products and the formulation of industry standards.

2.3. Overview of E-commerce

E-commerce refers to all kinds of commercial activities carried out by people through the integration of electronic information, office equipment and the Internet, such as mobile phones, personal digital assistant and office computers [11]. The main service content includes website services, advertising, product ordering, electronic payments, house sales, housekeeping services, product delivery, as well as a series of business activities such as consumer research and investigation, financial settlement, and product security [12]. E-commerce has entered various fields of society and become an important symbol of socio-economic and technological progress. E-commerce is not only an important tool for a company in the market, but also the basis for the survival of an enterprise. Only by mastering it, can an enterprise occupy a high-end market, gain Lebensraum and achieve extraordinary development in a complex and changing market environment.

2.4. The Impact of E-Commerce on Daily Life

E-commerce has changed the traditional way of trade. In the era of e-commerce, people do not need to go to great lengths to find the goods they need in the market, and buyers and sellers do not need to sit at the negotiation table and engage in verbal negotiations. People can not only see various goods with their own eyes and complete transactions, but also receive online services. For example, in e-commerce, not only can they purchase products such as cars and home appliances, but also digital products such as information, audio and video, and databases. In addition, various services such as online healthcare and remote education can also be obtained [13-14]. Electronic trade would no longer be limited by factors such as time, space, region, and climate, but would have more open,

comprehensive, and all day characteristics [15-16]. E-commerce has changed the business model of enterprises. The company has opened an online store to showcase its products to customers for selection. Online communication with suppliers is very convenient for using online finance, payment, and other services. Communication with government departments and peers is also very convenient. The business connections established on the internet are changing the way companies operate in various aspects [17].

In addition, e-commerce has also changed people's payment methods. Shopping online allows consumers to travel from place to place without leaving their homes, and at the same time, they can easily complete their transactions, greatly increasing their satisfaction with the service.

E-commerce, as a commercial activity, would bring about an unprecedented transformation. Its impact would far exceed that of commerce itself, affecting the production and management of associations, the survival and employment of people, the law, education, and culture. E-commerce would truly enable people to enter the information age [18].

2.5. Application Models of E-commerce in Rural Small and Medium Enterprises

The application mode of e-commerce in rural SMEs is shown in Figure 2:

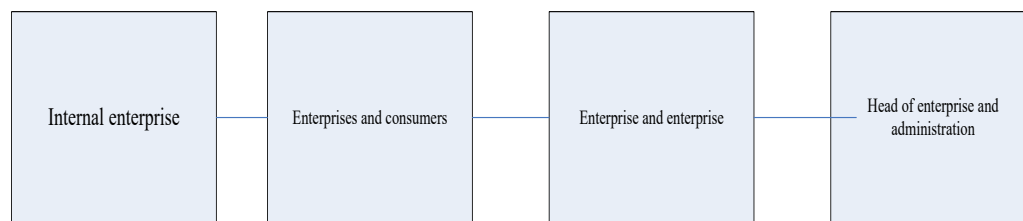


Figure 2: Application mode of electronic commerce in rural SMEs.

The internal business model of rural SMEs: With the continuous deepening of refined management of enterprise business, the material flow, fund flow, and various business transactions between various departments within the enterprise are established through internal local area networks to establish fast and safe communication channels between departments and employees, and effectively manage resource sharing and automatically promote business processes [19].

The business model between rural SMEs and consumers: Enterprises and consumers can cross various logistics, wholesale, warehousing, transportation and other links, and can conduct direct trade on the internet, just like various virtual stores and companies on the internet, providing sales of various goods and related services. These transactions and services are all completed online.

The e-commerce model: Enterprises can use the Internet or other networks to complete the entire process from procurement, sales to settlement, as well as negotiate, sign contracts, ship, settle, and solve other problems that occur in the trade process, such as claims, etc. [20]. In e-commerce, when the relationship between enterprises is not very close, electronic forms can be used to connect the key relationships between enterprises, forming a virtual joint enterprise.

The e-commerce model: The daily affairs between enterprises and banks, taxation, industry and commerce, pricing, technical supervision, and other industries, as well as the daily and complex work of settlement, declaration, registration, annual inspection, etc. between administrative departments, would be obtained through network platforms, and checked, inspected, analyzed, evaluated, and supervised at the same time.

2.6. Basic Conditions for the Implementation of E-Commerce

Suitable operating systems and applications need to be installed: Based on the actual situation of the enterprise, appropriate applications should be selected, including sales management software, online tax reporting management software, bank transaction and settlement management software, company accounting management software, etc.

Suitable terminal equipment: the company shall, according to the actual situation, equip a computer suitable for the company, or a personal digital assistant, a notebook computer and other terminal equipment, as well as appropriate modem, printer, video recorder and other equipment.

2.7. Human Machine Interaction Technology in E-Commerce

The clustering algorithm of human-computer interaction technology would be used in the innovation of in e-commerce. The use of clustering algorithm is to set the initial data set to y, and then divide the data set into b categories according to the needs, so that the needs are in the b categories, and each group of data z has a membership degree m_{xz} corresponding to a cluster center x, then set such a FCM clustering function and its constraint function as shown in Formula 1 and Formula 2:

$$Z = \sum_{x=1}^b \sum_{z=1}^n m_{xz}^a ||y_x - b_x||^2 \tag{1}$$

$$\sum_{x=1}^b m_{xz} = 1, z = 1, 2, \dots, n \tag{2}$$

From the functional relationship in formula 1 and formula 2, it can be seen that any data in formula 1 has its corresponding membership relationship and is directly related to the cluster center. A in formula 1 is the membership metric factor, also known as the metric operator. From the constraint function formula 2, it can be seen that the sum of their membership degrees for all types of dataset partitioning must be equal to 1. By linking the above conditions with the relationship between the two equations, the iterative formula for m_{xz} can be calculated, as shown in formula 3:

$$m_{xz} = \frac{1}{\sum_{x=1}^b \left(\frac{||y_x - b_x||}{||y_z - b_z||} \right)^{\frac{1}{a}}} \tag{3}$$

3. Innovation Simulation Experiment of Rural Small and Medium-Sized Enterprises under E-Commerce

E-commerce is a business activity that can drive innovation in rural SMEs and enhance their economic development. This article conducted an experimental study on the economic level improvement of 100 rural enterprises after using e-commerce. The economic level improvement is shown in Figure 3:

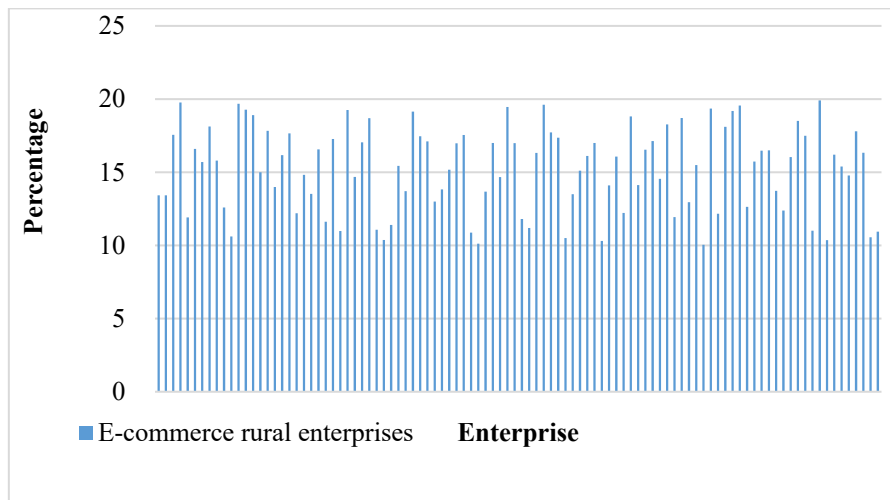


Figure 3: Economic development of SMEs in rural areas under e-commerce.

From the experimental results in Figure 3, it can be seen that the economy of small and medium-sized rural enterprises has increased by 10% to 20% after using e-commerce, which proves that e-commerce indeed has the effect of improving the economy of small and medium-sized rural enterprises, and also proves that e-commerce is helpful for the innovation of small and medium-sized rural enterprises. The key reason for economic growth is that e-commerce has changed the business model of enterprises, making their business scope more extensive, which can drive economic growth.

4. Conclusions

The innovation of rural SMEs is currently the focus of people's attention. Innovation of rural SMEs can drive rural economic development, narrow the wealth gap, and achieve common prosperity. Therefore, how to innovate rural SMEs is a problem that needs to be solved in the current era. The rapid development of electronic trade has brought new development opportunities for small and

medium-sized rural enterprises. This article studies the development of e-commerce and innovation in rural SMEs, aiming to combine e-commerce to innovate SMEs. Through experiments, this article investigates many rural SMEs that use e-commerce. The data shows that these rural SMEs have achieved certain economic development, which proves that e-commerce has a positive significance for innovation in rural SMEs. Due to space limitations, the experiments conducted in this article are still insufficient. In the future, it would actively research innovation in rural SMEs. Finally, it wish the development of rural SMEs more and more success.

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