Research and Analysis of Electronic Commerce in Network Platforms with Mathematical Model and Cloud Computing

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Abstract. With the rapid development of science and technology in the world today, the development of the Internet is even more remarkable. Especially under the stimulation of continuous breakthroughs in the computer field, the network economy, as an important part of the knowledge economy, is growing rapidly and has become a new driving force for world economic growth. In order to meet the needs of the development of the network economy, traditional enterprises should implement e-commerce to be able to quickly respond to customer needs, improve business processes with customer relationships, provide personalized services, shorten sales cycles and sales costs, increase revenue, and develop markets, to enhance the competitiveness of enterprises.

1. Introduction
In recent years, Southeast Asian countries have experienced financial crises in succession, while the US economy in the northern hemisphere has developed at a rapid rate of 4% over the same period. Faced with such a rapid increase in GDP, people can't help but ask what the US has paid. We know that according to the traditional market economy theory, such a high economic growth rate will inevitably trigger an inflation rate of 5% within 3 years. The United States has created a miracle in economics: maintaining an unemployment rate of only 4%, 3% inflation rate (the first quarter of this year fell to 1%). The main reason, in the final analysis, is the effect of the scale effect produced by the network economy.

The informatization and networking of international trade has not only brought about a major revolution in trade methods, but also led to profound changes in the main body of international trade operations, and the emergence of "virtual companies" relying on the Internet, Intranet and Extranet. Modern information and communication technology connect many companies into a group network of companies through the core technology that a single company has in their respective professional fields, completes the market function that a single company cannot undertake, and can provide goods and services to the market more effectively. This new form of enterprise organization does not have the power to force each company to make contact in capital relations, but because a certain company has undertaken certain information collection, processing and transmission functions, thus connecting a series of related enterprises into a collaboration community. The strategic alliance of multinational companies is the main manifestation of this "virtual company". It seeks resources and alliances through an open system of dynamic network combinations and implements "virtual management" to adapt to the rapidly changing economic competition environment and consumer demand. The trend of
diversification. E-commerce generally refers to the use of the Internet and business activities carried out on the Internet, its main technical feature is the use of network technology to transfer and process business information. With the help of e-commerce, helping enterprises to transform rapidly in the era of network economy is a research hotspot [1].

2. Overview of related theories

2.1. Internet Economy
Network economy refers to a new economic form driven by the development of the Internet and related industries in the era of information networking, which is represented by economic activities such as production, exchange, distribution, and consumption of economic life, as well as producers, consumers, and finance the behaviors of economic entities such as institutions and government functional departments are closely related to the information network. Not only do we have to obtain a large amount of economic information from the network, but also rely on the network for forecasting and decision-making, and many transactions are conducted directly on the information network. The broad network economy mainly includes three parts: The first part is the network-related infrastructure, such as the development of various network-related software and hardware and the construction of the Internet system. The second part is the transaction of various tangible goods on the network, such as online shopping and financial transactions; the third part is the intangible services provided on the network, such as the online delivery of music, games and the provision of paid materials. Figure 1 shows the basic model of network economic development.

![Figure 1. Basic model of network economic development.](image)

2.2. E-commerce
E-commerce is a new type of business operation mode that realizes online shopping of consumers, online transactions between merchants and online electronic payment in the Internet environment. Internet e-commerce can be divided into three aspects: information service, transaction and payment. The main contents include: electronic business advertisements, electronic purchases and transactions, exchange of electronic transaction vouchers, electronic payment and settlement, and after-sales online services. There are two types of transactions (B to B mode). Figure 2 shows the difference between the two methods.
Figure 2. B to C mode and B to B mode.

The so-called network marketing is the process of using the Internet as a means of communication to meet the needs of consumers and businesses through circular marketing communication to the market. In the agricultural economy, sellers (producers) design, produce, and provide products or services for buyers (specific consumers) for products or services. At that time, the customer directly inspected the goods in the producer's shop and made a request for the producer to the manufacturer. The producer customized products for the customer according to the customer's requirements and the exchange conditions negotiated by the parties on the transaction conditions. In this way, each product is customized for a specific customer. In the early days of industrial production, because of the shortage of novel industrial products, they were in the seller's market stage. Producers advocated the production concept of selling whatever they produce. With the continuous evolution of production methods and economic development leading to the emergence of the buyer's market, "target marketing" and "market positioning" based on market segmentation have become the core content of modern marketing. This management method is based on the homogenous demand of a group of consumers is used to design and produce products. The number of consumers in this group depends on the degree of subdivision of the homogenous demand of the enterprise. However, the minimum subdivision limit must be at least in line with the production volume at which the enterprise can obtain an average profit, so "target marketing" cannot fully meet the specific needs of individual consumers, but "target marketing" can compare the "thick line" When meeting the homogenous needs of consumers, it can also take into account the production economy required by the industrial economy, so it has gradually developed into the "ideal" marketing method in the industrial society. But this "ideal" can only be for producers, not consumers. The emergence of the Internet has re-straightened the relocation of production routes in the industrial economy, allowing consumers to directly face the producers' requirements for the required products or services, thus combining the large-scale industrial production methods of the industrial economic era with agricultural economy Time's "customized" manual production methods to meet specific customer needs are perfectly combined. Internet marketing is a brand-new marketing concept that combines rigid production marketing with flexible production marketing. First, the customer queries or finds the manufacturer's information of the product he needs through the computer information network, and directly negotiates the purchase, and puts forward the requirements and ideas for the product or service; second, the enterprise aggregates all customer orders, and the final product is based on different customers I like to use flexible production methods to assemble the colors and accessories specified by customers. Finally, the enterprise delivers the packaged products to customers through the
distribution network system. In this way, companies can use lower costs and prices to provide customers with customized products that fully meet the customer's personality requirements, and truly achieve target marketing from the perspective of consumer demand.

2.3. E-commerce of traditional enterprises
The e-commerce of traditional enterprises is to use information technology to integrate the original production, warehousing, transportation, sales and management resources of traditional enterprises, and to create an infinite information highway through the connection of international web browsers and servers and databases. The connection between the peripheral industry and the upstream and downstream manufacturers of the enterprise is not only closer, but also exerts real-time information query and interaction functions. Traditional enterprises moving towards e-commerce have the following advantages: First, the products sold by e-commerce are developed and produced by companies dedicated to traditional enterprises, and they can directly face consumers and retailers through the Internet, the intermediate links are shortened, and finally have price advantage. Second, traditional companies have accumulated brand and popularity. The long-established brand image and popularity are not something that Internet companies can catch up with in a short period of huge advertisements. At the same time, they can save a lot of money through Cross-promotion while selling traditional products Advertising costs, greatly reducing the cost of advertising costs. Third, when a traditional enterprise enters the network market, expenses can be included in the cost of operation of the entire enterprise. Fourth, some large enterprises have their own product distribution channels.

3. Economic reasons for vertical separation under the network economy

3.1. Cause analysis

3.1.1. Shortening of product life cycle and increased risk of large-scale investment. With the shortening of the product life cycle and the emergence of the Internet, the speed of response to the market is required to accelerate, and the drawbacks of large-scale production of individual enterprises have begun to appear: the acceleration of market fluctuations makes this vertically integrated production method unable to keep up with the market the uncertainty of demand also increases the risk of such large-scale investment. In order to diversify the risk and respond quickly, the corporate organization has a phenomenon of vertical separation and horizontal separation.

3.1.2. Reduction of international trade transaction costs and transaction links. The emergence of all-round information technology in international trade is represented by the development of e-commerce and the innovation of trade methods. Various international organizations have developed different types of implementation plans for international e-commerce. Among them are the construction of the United Nations global trade network and its purpose. It is to simplify and improve the procedures of international trade, with the help of modern information and communication technology, to establish new trade procedures around the world, thereby saving transaction time, reducing transaction costs, and improving transaction efficiency. Promote the expansion of the international division of labor network, which enables SMEs to participate in the international division of labor, and multinational companies transfer part of its production links to SMEs in other regions through investment and outsourcing.

3.1.3. Network effects of cross-border division of labor. The Internet economy, that is, the Internet economy, refers to economic activities conducted through the Internet, and transactions are conducted at lower transaction costs. According to Smith's proposition, market capacity determines division of labor, and market capacity is determined by the size of the division network. The network economy shows that when a manufacturer makes a decision on the division of labor, the size of the division of labor network plays a decisive role. The network effect refers to everyone's network decision not only affecting his own productivity, but also affecting the market of other people's products and thus
affecting others. Productivity. Therefore, each person's productivity is not only related to his personal efforts, but also to the number of people participating in the network (network size), which in turn is determined by everyone's network decisions. Everyone chooses a career and chooses which product to buy or self-sufficient which product decision is a typical network decision, which determines the division of labor network of the whole society. When the transaction cost is reduced, if a certain production link reaches the minimum production scale, the manufacturer will choose the division of labor, so that the division of labor network will become larger [2].

3.2. Analysis of the transaction cost model of vertical separation

The author has constructed a vertically separated production model. Suppose there is an enterprise in country A that produces the final product \( y \). The production factors used are domestic labor and many intermediate products \( x \), \( x =\{x_1,x_2,\ldots, x_n\} \) from abroad. Let \( q(x_i) \) denote the quantity of intermediate product \( x_i \). Every producer of intermediate products specializes in producing an intermediate product. It is further assumed that there is only one producer for each intermediate product at equilibrium. The total labor force is \( N \), and the final product will be consumed by all those involved in production. The production function of the final product is:

\[
y = 1^{1-a}\left(\sum_{i=1}^{n} a(x_i)^{a/\beta}\right)^{a/\beta} \tag{1}\]

Among them, \( l \) is the labor input directly used in the production of final products, let \( Q =\left(\sum_{i=1}^{n} a(x_i)^{a/\beta}\right)^{1/\beta} \), which can be regarded as an input compounded by \( n \) intermediate products. And this compound method means that \( Q \) is a form of CES production function with constant substitution elasticity and constant returns to scale. Figure 3 shows the analysis of transaction cost model.

![Figure 3. Analysis of transaction cost model.](image-url)

Assume that technology requires only one unit of labor to produce one unit of intermediate goods. Producers of final products can either produce intermediate goods themselves or purchase them from producers who specialize in producing intermediate goods. If the final product producer produces intermediate goods at the same time, it is assumed that the cost of producing \( q(x_i) \) intermediate goods \( x_i \) is \( (1+\mu)q(x_i) \). The implicit economic meaning is that it takes only one labor to produce a unit of
intermediate goods professionally, and it is possible to produce the intermediate goods together. It is because of the existence of coordination costs that the production unit intermediate goods need to increase 1-unit labor. Assumption \((1 + \mu) \geq \frac{1}{\beta} \geq 1\), the assumption is to ensure the existence of equilibrium.

For ease of analysis, the final product is used as a pricing unit. Let \(w\) be the wage rate measured by the final product; \(p(x_i)\) is the price of the intermediate product \(x_i\). Without loss of generality, it is assumed that intermediate product \(x_j, j = 1, 2, ..., k\) is specialized production and intermediate product \(x_s, s = k + 1, k + 2, ..., n\) is produced by the final product producer in its enterprise. Therefore, the goal of the producer of the final product is

\[
\max \left\{ 1^{1-a} \left( \sum_{i=1}^{k} a(x_i)^{a/\beta} \right)^{\alpha/\beta} - \sum_{i=1}^{k} p(x_i) q(x_i) - \sum_{i=k+1}^{n} (1 + \mu) \right\}
\]

(2)

Among them, the first item is the profit of the final product, the second item is the cost of purchasing the intermediate products that are professionally produced, the third item is the cost required to produce a part of the intermediate product, and the last item is directly used for the final product labor cost.

4. **Ways to develop e-commerce**

4.1. **Value-added mechanism of e-commerce**

The traditional value chain is a production and sales system with a single industry and a single enterprise as its core. The value chain under the network economy has broken through the restrictions of industries and enterprises, forming a larger and more complex new value chain. The business enterprises connected by this value chain have both industry competition and enterprise strategic alliances; both affect the internal structure of the enterprise and the external market that the enterprise must face; both the upstream supplier of the enterprise and the downstream distribution Merchants, as well as logistics systems and payment systems. Information commerce platform built for enterprises through e-commerce, re-integrate all parts of the value chain, strengthen those parts that can bring value-added, cut down those unnecessary intermediate links, and realize low-cost and large-scale expansion of enterprise business and efficient operation, resulting in the effect of resource integration and continuous improvement in integration. As shown in Figure 4, it is a value-added way of e-commerce.

![Figure 4. Value-added methods of e-commerce.](image-url)
4.2. The role of enterprise e-commerce

4.2.1. Save costs for traditional enterprises, increase effective output and improve efficiency. The costs associated with commodities can be divided into two categories. One type is generated during the production and marketing process, called production cost, and it is included in the company's ex-factory price; the other type is generated during the distribution and wholesale process, and is called transaction cost. Cost affects the effective output and price of a product. Effective output refers to output that maximizes profits, and is also output that can be sold. The supply of an enterprise will rise as prices rise, and costs will also rise. In a competitive market, according to the principle of maximizing profits, enterprises will increase output until the marginal cost equals the price. The transaction cost will increase with the increase in sales volume. This is because the more sales volume, the wider the reach of the product, and the more intermediate levels, the more price increases. After the transaction cost is added to the production cost, the company's marginal cost rises faster. Therefore, when the marginal cost is equal to the price, the effective output of the company will be relatively low. If traditional enterprises and the entire industry adopt e-commerce as the direct selling method of products, they can eliminate the intermediate links of circulation and reduce transaction costs to a level that can be ignored to zero. Traditional enterprises can also use e-commerce as a means of factor allocation and marketing in the production process, to reduce production costs from several aspects such as online raw material procurement, online talent recruitment, online technology introduction, online financing, and online marketing.

4.2.2. Improve the level of social material wealth and welfare. The adoption of e-commerce by traditional enterprises can basically eliminate transaction costs and reduce production costs from several aspects. It actually reduces the variable part of traditional enterprise costs. From the perspective of the entire industry, the variable costs and prices of the industry have decreased, output has increased, consumer surplus will increase, and the sum of producer surplus and consumer surplus will also increase. Since the increase in the effective output of commodities means that the level of social material wealth increases, the increase in producer surplus and consumer surplus means the improvement of social welfare levels. Therefore, e-commerce has brought about an increase in the level of social material wealth and social welfare [3].

4.2.3. Optimize the allocation of social resources. Since it is impossible for all enterprises in an industry to use e-commerce at the same time, those companies that are the first to use e-commerce will have price advantage, quantity advantage, scale expansion advantage, market share advantage, and rule-making Advantage, and the average cost of subsequent users or non-users may be higher than the average cost of the industry. In this way, social funds, human resources and material resources will work together through market mechanisms and e-commerce to remove high-cost enterprises. Flow to low-cost enterprises, from low-utilization enterprises to high-utilization enterprises, and from loss-making enterprises to profitable enterprises, so that social resources can be more rationally and optimally allocated [4].

5. Ways to develop e-commerce

5.1. Improving the network adaptability of trading subjects

5.1.1. Strive to cultivate a new generation of "e-commerce talents". To allow enterprises to truly see the features of e-commerce that are convenient, efficient and time-saving, to mobilize their enthusiasm to participate in e-commerce, and at the same time strive to improve the information quality and technical level of enterprises, creating a good e-commerce atmosphere in the enterprise.
5.1.2. Accelerate the training of industrial e-commerce service talents. The government should encourage educational institutions at all levels to cultivate industrial informatization talents, attract excellent talents to join the industry e-commerce work, and strengthen training to improve their ability to develop industrial information systems and their own service levels.

5.1.3. Give full play to the role of industry leading enterprises. The leading industrial enterprise is the main body of industrial industrialization management. It is connected to the enterprise at one end and the market at the other. Through the development of e-commerce, leading companies can expand the market space of products, gather decentralized enterprises, and play a role in demonstration, thereby achieving success in the entire industry.

5.2. Improve the network adaptability of trading objects

5.2.1. Accelerate the pace of product standardization. In product e-commerce, the buyer cannot intuitively obtain detailed product quality information before the transaction. Therefore, the standardization of products should be accelerated, and a product standard system should be established to facilitate the communication and contact between the two parties to the transaction and protect the interests of both parties.

5.2.2. Implement product brand strategy. Through the creation and promotion of product brands, the quality and characteristic information of the products can be transmitted to the demanders, and the hard constraints of the industry standards and the soft constraints of the product brands can enhance the trust of the demanders in the quality of products under the e-commerce model.

5.2.3. Ensure adequate supply of goods. The development of product e-commerce requires efficient product production to ensure. It is necessary to effectively adjust the product production structure, increase the promotion of high and new technologies, and strive to achieve "high yield, high quality, and high efficiency" and strive for higher economic benefits.

5.3. Strengthening the network adaptability of trading media

5.3.1. Strengthen the construction of enterprise network infrastructure. It is necessary to establish an information service network that complements the advantages of traditional media and modern information networks, promote the extension of multiple ranges of information service networks, and guide enterprises to participate in e-commerce at multiple levels and through multiple channels.

5.3.2. Improve the product logistics distribution system. It is necessary to establish and improve the product wholesale market and product circulation center, seriously consider the logistics rationalization of product sales, and establish a modern logistics distribution system that integrates warehousing, refrigeration, processing and transportation from enterprises to enterprises as soon as possible.

5.4. Improve the network adaptability of the trading environment

5.4.1. Establish and improve the social credit system. At present, China has not yet established a national personal credit system, so there are still some difficulties in collecting information on transaction subjects. Based on personal information from banks and taxation systems, special departments can be organized to collect, integrate, and process information, and start the construction of a nationwide personal integrity system.

5.4.2. Establish a secure payment system. It is necessary to improve the online payment system, accelerate the business innovation of credit cooperatives, and cooperate with other banks to provide
relatively complete electronic banking services. At the same time, it is necessary to deepen the enterprise's understanding of electronic payment methods and improve the utilization rate [5].

5.4.3. **Build a legal environment and policy environment for e-commerce**. The government should speed up the legislation on e-commerce, use laws to ensure the authenticity of online information, strengthen market supervision, and gradually establish a perfect industrial information policy and law that suits China's national conditions to ensure the effective and healthy operation of the industrial e-commerce environment.

6. **Conclusion**

On the other hand, the emergence of networking and e-commerce has also provided conditions for developing countries and a large number of small and medium-sized enterprises to participate in the international division of labor. In a vertically-separated system, in order to ensure the effective progress of cooperation, multinational companies will transfer production technology to their cooperative enterprises and train their talents to improve the technical and operational management level of the cooperative enterprises. Of developing countries are also very useful. Therefore, the use of export processing by developing countries to integrate into a vertically-separated production system is an advantageous option under the new international division of labor. This is not only because developing countries can obtain profits through product trade, but also through the integration of multinational companies with complex technologies and management systems, so as to enhance their comparative advantages, and ultimately achieve the leap and development of the national economy.

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