A Preliminary Study on the Accounting Treatment of Data Assets of E-commerce Enterprises under the C2C Model

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Abstract: *Since the 18th CPC National Congress, the central government has paid great attention to the rise of the digital economy and clearly emphasized in the 4th Plenary Session of the 19th Central Committee that data resources constitute one of the new factors of production, and that the practice of actively promoting the implementation of the digital economy has been elevated to a key strategic position at the national level. The rise of the digital economy has revolutionized traditional economic thinking, making data resources increasingly critical in people's daily lives. The era of big data brings opportunities as well as great challenges to enterprises, which need to update their development concepts and strategic layouts in a timely manner. Therefore, at the micro level, how to rationally account for enterprise data assets has become the primary issue of the development of the digital economy urgently needs to be resolved. This paper is based on China's Internet e-commerce platform, based on the C2C business model to explore the accounting methods of data assets, in order to improve the financial disclosure of data assets in China to provide reference.*

Keywords: *Data assets, Accounting treatment, E-commerce enterprises, C2C model*

1. Introduction

E-commerce enterprises are able to obtain a large number of data resources by means of collecting, aggregating, integrating and evaluating in their management process, and further rely on these information resources to strengthen the quality of their services. Such enterprises usually use data resources more frequently than other companies, have a greater demand for data resources in specific industries, and have relatively frequent transactions with data trading platforms or between different enterprises on data resources. It is for this reason that this paper explores in depth the recognition and measurement of data assets of e-commerce enterprises in accounting, aiming to provide substantive suggestions for the accounting treatment of data assets.[1]

2. Overview of the meaning, characteristics and relevant theories of data assets

2.1. Meaning of data assets

As a unique new concept in the digital era, the theoretical study of data assets is still in the stage of "groping and practicing", both domestically and abroad. At present, the definition of data assets is mostly centered on "data resources" and "data sets", which forms the mainstream view of the concept of data assets in the current academic community.

Data assets have been formed under the impetus of the changes in data science and technology, and such assets are a collection of numerous, structurally diverse and varied data.[2]From an overall perspective, for one thing, the gradual development of data trading is based on theoretical exploration in the field of big data. Secondly, the fundamental premise of data trading as a business activity is the clear division of property rights. Data is a rare new type of business asset, which contains huge social value and economic benefits. In a data trading environment based on the theory of property rights and market concepts, data should be considered a crucial asset, and it should be emphasized that the data owner has unquestionable ownership over it. Therefore, data should be quantifiable and measurable. Only then can

we transform data into a commodity that can be effectively traded and circulated in the marketplace. Data can be transformed from a monetary form to a capital form, thus forming a new economic category - data assets. Today, data is universally accepted in the academic and business worlds for its core attribute of quantifiability, which makes money the primary unit of measurement for the exchange of data asset values and allows for the accurate recognition, measurement, and reporting of financial flows resulting from data transactions.

2.2. Characterization of data assets

Intangibility: Data assets are intangible, unlike physical assets that can be seen and felt. Data assets exist in electronic devices and are stored digitally and cannot be directly observed. In addition, data assets need to be stored on servers, and its mining, collection and application depend on the support of computer hardware and software, so the quality and quantity of related hardware and software will have a certain impact on the development and utilization of data assets by enterprises.

Reproducibility: Data can be easily copied and distributed without reducing the value of the original data material. Reproducibility allows organizations to utilize data assets multiple times in different places and at different times. Data assets are more widely used and their users can be all types of businesses.

Variability: Data assets can change over time and in response to changes in the environment. Data can be updated, modified, cleaned, and processed, thus allowing the value of the data asset to change as it does. For example, as our country advances rapidly in the economic and technological fields, the information content within the data asset is updated accordingly.

Value-added: By analyzing and mining data, valuable information and insights can be extracted from data assets to create value for the enterprise. The value-added nature of data assets is reflected in their ability to help organizations make smarter decisions and improve business performance. Utilizing data mining techniques, companies can make accurate predictions about business opportunities, and data is a major driver of business growth. Unlike the wear and tear of assets such as inventory and fixed assets, some data assets can be used over and over again and continue to gain new value. Moreover, as companies continue to grow in size and technology continues to innovate, the size of the data will continue to grow and the value that can be drawn from it will continue to increase. Data assets are valuable assets that organizations can leverage to support business operations, innovation and decision-making, and to enhance their competitiveness.

2.3. Theoretical foundation

Theory of fiduciary duty concept: The concept of fiduciary duty refers to the beliefs that fiduciaries are expected to follow when assuming their duties, which implies that fiduciaries have a responsibility to ensure that their actions are directly related to the beliefs of their principals. It generally includes: the concept of responsibility, the concept of sustainability, the concept of fairness and the concept of respect. The fiduciary duty view believes that users of statements are more concerned about the past operating conditions of the enterprise, and therefore accounting information should be more reliable and reflect the true operating performance of the enterprise that occurred in the past, which in turn believes that the use of the measurement attribute of historical cost to make accounting measurements is more in line with the reliability of accounting information.

Information Asymmetry Theory: Under the trend of digital economy, data and information have become the core competitiveness of enterprises, and a large amount of useful information is undoubtedly a powerful development aid for enterprises. If there is a serious asymmetry of information in the market, it will cause "bad money to drive out good money", which makes it ineffective. In addition, the theory also brings great inspiration to the field of accounting, financial reporting is designed to provide statement users with true and reliable information about the operation of the enterprise, in order to avoid investors due to asymmetric information caused by decision-making errors, the management of the preparation of financial statements must meet the reliability and relevance of the quality of accounting information requirements and to ensure that the data are true and reliable. And other important information that cannot be expressed in figures in the notes to the statements should be fully revealed in text, charts and other ways, as far as possible, to ensure that investors, creditors and other stakeholders receive sufficient and reliable information to assist them in making correct decisions. Therefore, it is particularly important for enterprises to recognize and measure data assets in a way that is more standardized and in line with the current situation.

3. The C2C mode of e-commerce business data asset accounting treatment analysis

In the process of consumer shopping, data resources play a crucial role, they create economic value for the e-commerce platform through a variety of different ways of value presentation, and have turned into an indispensable economic asset in the field of Internet e-commerce. As a special type of asset, data is characterized by its non-physical form and difficult to measure, which has caused a great impact on traditional financial accounting theories and methods.[4]In order to meet the relevance and materiality requirements of the Accounting Standards for the quality of accounting information, companies should include more key information about data assets in their financial reports to better reflect their business value and provide statement users with higher-quality decision-making information.

3.1. Introduction to the C2C model and sources of data assets

3.1.1. Introduction to the C2C model

At present, the business model of e-commerce platforms is mainly divided into the C2C model represented by Taobao, the B2C model represented by Jingdong, and the C2M model represented by Jinduoduo.

A C2C (Consumer to Consumer) model e-commerce business is an e-commerce model that allows direct transactions between individual consumers on an online platform. Under the C2C model, the platform provides an online marketplace where individual consumers can post information about goods, purchase goods, or conduct transactions with other consumers. e-commerce businesses in the C2C model act as platforms that provide online marketplaces for consumers to conduct transactions. The platform usually provides services such as infrastructure for transactions, payment systems, and trust mechanisms to help consumers conduct transactions. Under the C2C model, an individual consumer can act as a seller, posting information about his or her goods through the platform and transacting with other consumers. Individual sellers can be clearing out unused items, homemade handicrafts, second-hand goods and so on. Individual consumers can also act as buyers on C2C platforms, browse commodity information posted by other individual sellers, choose to buy and conduct transactions with sellers.C2C platforms usually establish trust mechanisms, such as evaluation systems, complaint handling mechanisms, etc., to help consumers assess the credibility of sellers, and to increase the safety and reliability of transactions.E-commerce enterprises in the C2C mode usually provide a variety of payment methods, including online payment, cash-on-delivery, etc., to facilitate consumers' transactions.C2C platforms usually provide customer service support to help solve problems encountered by consumers during the transaction process and provide after-sales service, etc.

The shopping process of consumers in C2C mode is mainly divided into browsing stage, payment stage and delivery stage. In the browsing stage, the e-commerce platform collects data on consumers' browsing behavior and builds consumer profiles. E-commerce platforms can target consumers through clear consumer profiles to push products to them, and improve the conversion rate from traffic to orders. In the payment stage, the payment software of e-commerce platforms can provide credit ratings for customers through the collection and analysis of consumer payment behavior data. The result of credit rating can be used to determine the credit limit of other lending business on its payment software, thus reducing the risk of enterprise's payment not being recovered. In the distribution stage, the e-commerce platform first collects customer distribution information, and then categorizes them according to the region so as to improve the distribution network around the world, improve distribution efficiency, and thus save distribution costs.[3]

3.1.2. Sources of data assets in the C2C model

3.1.2.1. Browsing phase

Users can visit the website or download the program to register user information and can register for an exclusive account. In case the customer is not clear, the shopping center will offer products according to the customer's preferences. Click on an item and then enter a keyword in the search bar. In this process, specific types of data assets have been formed, including browsing history, browsing time, number of clicks, etc.

3.1.2.2. Payment stage

After confirming the payment, there will be an option to "Pay Now", and you can also fill in the recipient's name, address, and contact information. Among them, the choice of third-party payment tools, the number of installments, etc. are data assets.

3.1.2.3. Distribution phase

Once the third-party payment platform receives the payment notification, it sends the appropriate information to the merchant. After verifying the authenticity of the goods, the goods will be delivered, and then the shortest path will be calculated using various algorithms, big data and other technologies. In the process of delivery, the user's personal information, such as the delivery address and cell phone number, is also a data asset.

3.2. Conditions for recognition of data assets of e-commerce enterprises

3.2.1. Compliance with the definition of assets

An "asset" is a resource that arises from past transactions or events of an enterprise, is owned or controlled by the enterprise, and generates economic benefits for the enterprise.

Arising from past transactions or events. The Ministry of Finance clearly categorizes data assets into two categories: internal and external sources. From a business perspective, for the purposes of compliance with accounting standards, a business may view this as an intangible asset, whereas data assets that are used in day-to-day operations with the eventual intention of being sold are viewed as inventory. Therefore, data that is either used internally or sold externally by an enterprise would not be considered a future transaction or event.

Ability to be owned or controlled by the business. E-commerce companies typically digitize all or part of a company's assets as evidence that they own or control the property, such as data information. In the process of confirming whether a certain asset exists or not, the most crucial factor is whether the asset is owned or under the control of the company. From the above analysis, we can clearly see that the data resources available to an e-commerce company, apart from the fact that they can be purchased directly, mainly come from the daily collection and extraction within the company.

Expected to bring economic benefits. Data assets have become a new core competency in the Internet age. Considering data resources as valuable assets, one of the core assumptions is that these resources can bring economic returns to companies in the future. Based on data mining techniques, data assets bring economic benefits to e-commerce companies. This technique mines information that is beneficial to the company and utilizes it to assist in its future strategic planning, which in turn generates marketable data products and generates revenue.

After fully recognizing the data resources of the e-commerce enterprise, we can see that the data assets of the e-commerce enterprise have already possessed property rights and meet the basic conditions of assets, so it is necessary to recognize them for accounting purposes.[5]

3.2.2. Account attribution of data assets

Assets can be categorized into a number of broad groups, including assets such as fixed assets, intangible assets and long-term equity investments. Data assets are intangible, non-physical assets that do not fall into the category of tangible assets. However, it has identifiability, non-monetary and uncertainty at the same time, similar to intangible assets. In this paper, we believe that data assets should be categorized under the item "intangible assets", and a new line item "data assets" should be added to "intangible assets".

3.3. Measurement attributes of data assets of e-commerce enterprises

3.3.1. Selection of measurement attributes

From the accounting point of view, the data assets of the e-commerce platform belong to intangible assets, so the choice of measurement attributes for the data assets can refer to intangible assets. Currently there are three main methods for assessing the value of intangible assets: market method, income method and cost method.

At its core, the market approach assesses the value of data assets based on the latest traded prices of similar or comparable assets in the market, and this valuation methodology is based on the fact that these assets must be traded in an environment where they are frequently traded. In the process of data asset trading, the market price of data assets can provide investors with a more accurate expectation of returns due to its high liquidity and easy information disclosure. Nevertheless, China's data asset trading market has not yet entered a highly active stage and lacks a well-developed and organized trading process, which makes it quite difficult to determine data asset market prices. Furthermore, due to the business

dependency and scale of data assets, which makes it difficult to find similar or identical assets in the market, fair value is not suitable as a measurement attribute for data assets under the market approach.

The income approach is a method of assessing the value of an asset based on the present value of its future inflows of economic benefits. When an enterprise chooses to use present value as a measurement attribute for a data asset, it must have a clear understanding of the three core indicators of the data asset's future economic inflow, discount rate and expected useful life. Since data assets are not yet fully in circulation in the market, it is difficult for enterprises to accurately assess their economic value and expected useful life in practice, thus making the use of present value as a measurement attribute for data assets somewhat limited.

The value of the cost approach is assessed primarily by calculating and summing up all the input costs of the enterprise in constructing the data asset. When an enterprise collects, processes, stores and analyzes data, it incurs certain costs. These past costs form the basis of the value of the data asset, and they are based on real transactions or events, so they are highly reliable. E-commerce platform data assets are an emerging data type, so this study believes that it is appropriate to adopt historical cost as a measurement attribute for e-commerce companies' data assets.[6]

3.3.2. Initial measurement

The initial measurement amount of an e-commerce platform's data asset should consist of the necessary expenditures incurred before the data reaches its intended state of use. In this process, data assets can be categorized into two types according to whether they are produced entirely by the enterprise independently: one type is data created by the enterprise alone. [7]For example, user transaction information generated by the enterprise in the course of its operations, etc. This type of data generation mainly consists of four stages: collection, storage, processing and analysis. The other category is that enterprises directly purchase relevant data through transactions, and then continuously process the data to finally form data assets. For example, e-commerce enterprises purchase resources from data trading centers.

3.3.2.1. Individually created data assets

For fully self-produced data assets, enterprises will invest a lot of human and material resources and other costs in them, such as the price of purchased data-processing equipment, expenditures on renting or purchasing patents and payable employee compensation for technical staff. Therefore, e-commerce enterprises should divide the creation process into two categories: development and research. E-commerce enterprises have to collect relevant data, and then organize and categorize them, which may not necessarily be needed by the enterprise, and the value of their use is uncertain and it is difficult to estimate what kind of benefits they are expected to bring to the enterprise, so out of prudent considerations, expenditures in this area should be treated as expenses and included in the account of "research and development expenditures-expensed expenditures "The research stage is based on the collected data, and after the screening of the previous step, the data in this step is likely to bring economic benefits to the enterprise, so the expenditures in the research stage should be capitalized and accounted for as "R&D expenditures - capitalized expenditures". When the data asset reaches its intended state of use, the expensed portion is transferred to the "Administrative Expenses" account, and the capitalized portion is added to the initial measurement cost of the data asset.

3.3.2.2. Data assets acquired through outsourcing

Data assets acquired by outsourcing are classified into two categories according to whether they need to be processed or not. For data assets that can be directly used by the enterprise after purchase, their recorded value is the purchase price, related handling fees, etc., and are directly recorded in the account of "Intangible Assets - Data Assets"; for data assets that need to be processed subsequently, the subsequent expenditures incurred should be fully capitalized and transferred to the cost of data assets when the data assets reach their intended useable state. The subsequent expenditures incurred for those data assets that need to be reprocessed shall be capitalized and transferred to the cost of the data assets when the data assets reach their intended useable state.

3.3.3. Subsequent measurement

3.3.3.1. Amortization and amortization method

For the amortization of data assets of e-commerce enterprises, the useful life should first be determined. Since data assets are new assets without physical nature, it is necessary to subjectively determine the useful life, which requires enterprises to comprehensively consider a number of factors in

order to arrive at an accurate result. If there is an agreement or another agreement, the period of the agreement will be used as the expected useful life of the data assets, and the amortization amount of the data assets will be credited to the account of "Accumulated amortization". Data assets with indefinite useful lives are not subject to amortization, but are subject to at least one impairment test at the end of each year.

Since the data assets are formed based on the accounting treatment of intangible assets, the choice of amortization method can be referred to intangible assets, i.e., the straight-line method is used for amortization. On the one hand, C2C mode e-commerce enterprises have a large amount of user data, which is much larger compared with traditional assets, and the straight-line method is a simple and intuitive amortization method with simple calculations that are easy to understand and implement. The average sharing of the cost of assets and the relatively stable annual amortization expense are conducive to long-term planning and budgeting for e-commerce enterprises. On the other hand, the straight-line method is a common and recognized amortization method in many countries' accounting standards, which meets the requirements of accounting standards. And it enables assets to be reasonably amortized over their expected useful life, in line with the principle of gradual decrease in asset value.[8]

3.3.3.2. Subsequent expenditures

Given the volatility of the value of an e-commerce company's data assets, it is necessary for companies to continuously increase their investments to ensure that data can be updated and maintained in real time. When weighing whether the costs incurred subsequently should be included in the cost of the asset or in the current profit and loss, the main assessment criterion is whether these costs can bring significant economic benefits to the company. Where the value of the data assets is significantly affected by the costs of data mining, collation and analysis, etc., consideration should be given to capitalizing them in the cost of the data assets; where the costs incurred do not bring about actual functional changes to the data assets, for example, costs of maintenance and storage, they should be expensed, i.e., debit: administrative expenses, credit: R&D expenditures-expensed expenditures.

3.3.3.3. Impairment

Due to the complexity of the operating environment of e-commerce enterprises as well as the high transparency of data, when the external environment changes or the encrypted data of e-commerce enterprises is released, it is very likely that they will lose the original value of the data, so e-commerce enterprises must assess the value of their data assets. Data assets are highly time-sensitive, so it is particularly important to treat them for impairment. If there are signs of impairment, the company must conduct an impairment test, record the corresponding impairment through the "intangible asset impairment provision" account, and reflect the amount of impairment in the balance sheet. On the basis of the principle of robustness, enterprises must conduct regular impairment tests on assets during their useful life to understand the changes in their value, and carry out accounting recognition and measurement in a timely manner to ensure that their value is correctly reflected in the financial report.

3.3.3.4. Disposal

Sale: When an e-commerce enterprise transfers control of its data assets, the data assets should be derecognized for accounting purposes. The book value of the data assets should be written off, and the corresponding amounts in the accounts of "Accumulated amortization" and "Provision for impairment of intangible assets" should also be written off, and the difference should be credited to the account of "Gain or loss on disposal of assets". The difference is recorded in the "Gain or Loss on Disposal of Assets" account.

Destruction or scrapping: In the actual operation of e-commerce enterprises, data assets will encounter various problems, such as destruction of physical carriers or clouds, loss and irrecoverability of data due to human errors, and so on. In this case, the e-commerce enterprise should destroy the data assets. When the enterprise writes off the data assets, it should also write off the corresponding amounts in the "accumulated amortization" and "intangible asset impairment provision" accounts. In addition, labor costs, destruction of storage carriers and other disposal costs should also be considered, and the difference should be charged to "non-operating expenses".

Leasing: E-commerce enterprises can lease their data assets to the outside world, however, this activity is not the core business of the e-commerce enterprises, so the income generated by the leasing process should be accounted for through the "other business income" account; if the data assets leased to the outside world have a definite useful life, they should also be amortized over the lease period.

3.4. Presentation and disclosure of data assets

3.4.1. Data asset presentation requirements from an accounting information quality perspective

The requirements for accounting treatment of data assets under the perspective of accounting information quality can be divided into four dimensions: firstly, while meeting the requirements of traditional accounting information quality, it is extended by combining the characteristics of data assets' value volatility, diversity, dependence and plasticity, so as to achieve the goal of optimizing the information application environment; secondly, it is to strengthen the awareness of prudence in corporate information management through the influence of data assets on the accuracy of enterprise value assessment. Thus, the investment and financing opportunities can be grasped. Third, through the information asymmetry theory, the core problem of resource allocation can be explored, and the data assets can be used as an important engine for optimizing resource allocation, providing reliable data support for the digital central station and helping to achieve the goal of cost reduction and efficiency increase. Fourth, the dilemma of uncertainty in the timeliness, scenario, and value realization of data assets can be broken in order to safeguard comparability, objectivity, and relevance of the presented data and strengthen the intensive data management.

3.4.2. On-balance sheet recognition and off-balance sheet disclosure of data assets

Recognized in the balance sheet. Data assets satisfy the three main characteristics of intangible assets: no physical form, non-monetary and identifiable, and should therefore be presented on the enterprise's balance sheet as a second-level account of intangible assets, "data assets". For data assets that have a definite useful life, the company should allocate the cost over a predetermined period of time and record the cost in "accumulated amortization". For data assets that do not have a definite useful life, the company must ensure that at least one impairment test is conducted at the end of each year, and that the relevant amount is recorded in "Intangible asset impairment" when there is an impairment of assets. In the event of asset impairment, the company must record the relevant amount in the "Provision for impairment of intangible assets" accounting item. As a result, the carrying value of a company's data assets can be reflected in three accounts: "Intangible assets - data assets", "Accumulated amortization" and "Provision for impairment of intangible assets".[9]

Off-balance sheet disclosure. E-commerce platforms usually have ownership and usage rights of data assets, and enterprises should first make detailed public disclosure of ownership of data assets in the notes section of the financial report. In the C2C transaction model, the e-commerce platform owns the ownership of the data in the browsing phase and has the right to use the data in the payment and delivery phases. Enterprises should explain in detail in the notes section the source and application of data assets as well as the specific ways of presenting their value. At the same time, enterprises need to determine the specific scope of use of data assets and formulate corresponding data protection strategies according to their own operation and management characteristics in order to realize the rational use of data assets. When an enterprise chooses to use the historical cost method for the initial measurement of data assets, it should explain in detail in the notes the reasons for choosing the historical cost measurement, how to judge the useful life in the subsequent measurement, the choice of amortization method and the specific description of the signs of impairment. When there is a change in the amortization period or method of a data asset, according to ASBE, enterprises must clearly elaborate the reasons for the adjustment and its possible subsequent impact. In addition, in order to avoid changes in profits caused by changes in data assets, enterprises must also disclose relevant information.[10]

4. Conclusion

Compared with traditional elements, there are differences in the way data exist and the method of value creation, which brings certain challenges to its accounting treatment, and there is still room for in-depth research on the specific application of data assets in different types of enterprises. At this stage, along with the rapid development of the digital economy and the popularization of information processing technology, China has issued the Interim Provisions, which fully recognizes the core position of data in the economy. Therefore, e-commerce enterprises must make preparations in advance for the establishment of a data asset management system in order to facilitate their transformation to digitalization; in order to deal more clearly with accounting aspects such as the recognition and measurement of data assets, it is necessary for policymakers to accelerate the improvement of the detailed provisions of the relevant accounting standards.

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