

# Exploration of Asset Assessment Methods in Digital Transformation

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**Abstract.** Digital transformation is reshaping the asset structure of enterprises, posing numerous challenges and limitations to traditional asset valuation methods. The unique attributes of intangible and digital assets make existing valuation models and methods inadequate to fully meet the demands of the new landscape. This paper deeply analyzes the shortcomings of traditional valuation methods in the digital context, the limitations of emerging valuation methods, and the challenges that digital asset characteristics bring to valuation. Building upon this analysis, optimization strategies are proposed, including refining traditional valuation models, innovatively utilizing big data and artificial intelligence, and constructing comprehensive digital asset valuation solutions, aiming to promote the innovation and development of valuation theory and practice. It is believed that only by continuously advancing the reform and innovation of valuation methods can we truly seize the opportunities brought by digital transformation, empower enterprises, and boost the rapid development of the digital economy.

**Keywords:** Digital transformation; asset valuation; intangible assets; digital assets.

## 1. Introduction

Currently, digital transformation has become an irreversible trend, bringing profound impacts on traditional business models, asset structures, and even the entire economic order. In this wave of "dematerialization" revolution, intangible assets and digital assets are increasingly becoming the core of enterprise value. However, our existing asset valuation theories and methods mainly focus on tangible assets, facing many challenges and shortcomings when it comes to evaluating intangible assets and digital assets. How to effectively evaluate these new types of assets not only concerns the development of enterprises themselves but also is crucial to whether the digital economy can sustainably thrive. It is precisely based on this background and practical demand that exploring new paradigms for evaluating intangible assets and digital assets, innovating and improving valuation theories and practices, becomes an urgent task. We have the responsibility to promote the innovative development of valuation theory, lead the transformation of valuation practices, escort enterprises in digital transformation, and facilitate the sustainable development of the digital economy.

## 2. Exploration of Asset Assessment Methods in Digital Transformation

### 2.1. The Impact of Digital Transformation on Asset Assessment

Digital transformation is profoundly influencing enterprises' business models and asset structures. In traditional times, enterprise assets mainly consisted of tangible assets such as factories, equipment, and inventory. However, with the advent of the digital wave, the importance of intangible assets in enterprises is increasingly prominent [1]. These intangible assets include intellectual property, data assets, technology platforms, brand value, etc. Although intangible, they play a crucial role in the development and value creation of enterprises. Take internet enterprises as an example, their core competitiveness mainly comes from digital technology, accumulated big data, and user resources, rather than traditional tangible assets. According to statistics, the global market size of intangible assets reached over \$6.7 trillion in 2022, an increase of more than 30% compared to five years ago.

These data fully illustrate the need for enterprises to pay attention to the valuation and management of intangible assets.

## 2.2. Application of Traditional Asset Assessment Methods in the Digital Era

Facing the impact of digital transformation, traditional asset valuation methods such as cost approach, market approach, and income approach are still applicable to some extent, but they also expose significant shortcomings. The cost approach evaluates the asset's replacement cost or historical cost and can be used to assess the tangible assets of enterprises such as land, real estate, and equipment with material forms. The market approach determines the pricing of enterprise assets by referencing market transaction prices of similar assets. The income approach, based on the expected future cash flows of assets discounted, reflects the profitability and present value of assets. These three traditional methods are relatively simple to operate and have accessible data sources, thus still having practical value in evaluating tangible assets. However, when applied to the valuation of intangible assets, these traditional valuation methods often exhibit obvious deficiencies and limitations [2]. Firstly, the cost approach overlooks the income prospects of intangible assets, failing to truly reflect their economic value. Additionally, intangible assets typically lack active public trading markets, making it difficult to find sufficient comparable transaction cases, rendering the market approach challenging in pricing. Although the income approach considers the profitability of intangible assets, predicting the future cash flows of intangible assets is difficult, and there is subjectivity and uncertainty in parameter selection. As shown in Table 1.

**Table 1.** Analysis of Advantages and Disadvantages of Traditional Valuation Methods

Valuation Method	Applicability	Advantages	Limitations
Cost Approach	Tangible Assets	Simple operation, accessible data	Overlooks asset's income prospects
Market Approach	Tangible Assets, Some Intangible Assets	Reflects market pricing, relatively objective	Limited comparable transaction cases
Income Approach	Tangible and Intangible Assets	Considers asset's profitability	Difficult to predict, subjective parameter selection

Therefore, in the digital era, traditional valuation methods encounter numerous challenges when evaluating intangible assets and digital assets. It is necessary to innovate and develop in line with the times to better serve the asset valuation needs under the new circumstances [3].

## 2.3. Exploration of Emerging Asset Assessment Methods in Practice

To address the challenges brought by digital transformation, some emerging asset valuation methods are gradually emerging and actively explored and experimented with in practice. These methods adhere to innovative concepts and integrate advanced technologies such as big data and artificial intelligence, aiming to enhance the scientificity and accuracy of the evaluation of intangible assets and digital assets .

For example, assessment models based on big data technology can collect and analyze massive multidimensional data to explore key driving factors and underlying patterns affecting the value of intangible assets, thereby enabling more comprehensive and refined assessments. At the same time, artificial intelligence technologies such as machine learning algorithms also bring new opportunities for asset valuation, enabling predictions and optimizations based on historical data to improve the accuracy of valuation results [4]. Additionally, the real option valuation method treats intangible assets as call options, and combined with uncertain situation analysis, flexibly prices them to better capture the growth potential inherent in intangible assets. The equity premium model attempts to quantify the contribution of intangible assets to enterprise value from the perspective of overall enterprise value, providing a basis for enterprise management decision-making.

In general, although these emerging valuation methods are still in continuous exploration and development, their innovative ideas and technological means inject new vitality into asset valuation in the digital age. By integrating with traditional methods, they will undoubtedly provide us with more forward-looking and efficient evaluation tools, helping enterprises better manage asset risks and seize opportunities for value growth.

### 3. Challenges Facing Asset Assessment Methods in Digital Transformation

#### 3.1. Shortcomings of Traditional Assessment Methods in the New Context

While traditional asset valuation methods still hold certain value in assessing tangible assets, they increasingly reveal shortcomings in the new context of digital transformation. Firstly, traditional valuation methods primarily focus on tangible assets, but their ability to assess the increasingly important intangible and digital assets is greatly restricted. For instance, the cost approach overlooks the profit prospects of intangible assets, failing to accurately reflect their economic value; the market approach struggles to price intangible assets due to a lack of sufficient comparable transaction cases; and the income approach, while considering earning capacity, faces significant uncertainty in predicting future cash flows of intangible assets. Moreover, traditional valuation methods encounter challenges in addressing new digital business models [5]. Take the asset-light model as an example, where enterprises' asset structures tend towards virtualization and intangibility, relying heavily on digital platforms, and technological services rather than traditional tangible assets. However, traditional valuation methods often equate these light assets with working capital, failing to comprehensively reflect their true value. According to IDC data, global digital transformation spending reached \$1.8 trillion in 2022, accounting for 53% of total enterprise IT spending, highlighting the significance of digital assets in transformation.

Furthermore, traditional valuation methods are overly static and lack foresight. They mainly rely on historical data of the enterprise's current state for evaluation. However, in the digital economy environment, technological iterations and developments are rapid, leading to significant uncertainty and variability in enterprise and asset values, which are challenging for traditional valuation methods to capture. Therefore, there is an urgent need for us to keep pace with the times, innovate valuation concepts and methods to keep up with the pace of digital transformation, as shown in Table 2.

**Table 2.** Limitations of Traditional Valuation Methods in the New Context

Valuation Method	Main Limitations
Cost Approach	Overlooks profit prospects of intangible assets, fails to reflect true value
Market Approach	Lack of comparable transaction cases for intangible assets, difficult to price
Income Approach	Difficulty in predicting future cash flows of intangible assets, subjective parameter selection
Overall Limitations	Lack of specificity, lack of foresight, limited scope of evaluation

#### 3.2. Analysis of Limitations of Emerging Assessment Methods

Although emerging asset valuation methods provide innovative ideas and attempts, they also face some noteworthy limitations and shortcomings in practical application. Firstly, while big data evaluation models can leverage massive data for in-depth mining and analysis, controlling the quality of the data poses a major challenge. If input data contains noise or bias, the evaluation results of the model will also be greatly affected. Additionally, model establishment often requires substantial support from historical data, which may be difficult for innovative enterprises to obtain a sufficient sample size. Furthermore, while artificial intelligence evaluation models have the ability for autonomous learning and optimization, their "black box" nature also presents challenges to the interpretability and controllability of the model. It is difficult to fully understand the internal logic of

the model's operation, leading to a certain level of uncertainty risk. Moreover, training high-quality AI models requires significant computational resources, which may entail high costs for small and medium-sized enterprises [6].

Although the real options approach provides a new perspective for flexible pricing of intangible assets, there is also subjectivity and fuzziness in estimating key parameters such as the degree of uncertainty and volatility of intangible assets. If parameters are chosen improperly, the accuracy of the evaluation results will also be affected. Additionally, this method is more suitable for high-risk, high-return intangible assets such as early-stage research projects, and its advantages are not particularly evident for more mature intangible assets. The equity premium model can quantify the contribution of intangible assets to enterprise value, but its calculation process requires evaluating the expected returns of the entire enterprise's assets, posing the risk of cognitive differences among evaluation subjects. Moreover, this model is more geared towards mature enterprises, and its evaluation effectiveness for growth-oriented enterprises may be discounted, as shown in Table 3.

**Table 3.** Limitations of Emerging Valuation Methods

Valuation Method	Major Limitations
Big Data Model	Difficulty in controlling data quality, high data requirements
Artificial Intelligence Model	Poor model interpretability, high training costs
Real Options Approach	Subjectivity in estimating key parameters, limited applicability
Equity Premium Model	Influence of subjective differences among evaluators, mediocre effectiveness for growth-oriented enterprises

### 3.3. Challenges Presented by the Characteristics of Digital Assets to Assessment

Digital assets possess unique characteristics such as intangibility, strong replicability, and high volatility, which determine numerous challenges and difficulties in their evaluation. Intangibility renders digital assets devoid of physical form, making it challenging to directly observe and quantify them like tangible assets, thus posing obstacles to evaluation. Additionally, the strong replicability of digital assets, with marginal replication costs close to zero, makes it difficult to assess them reasonably from a cost perspective. Digital assets often exhibit significant volatility and uncertainty [7]. Taking intellectual property in technology companies as an example, due to the rapid pace of technological iteration, their value may experience substantial fluctuations in a short period. This high volatility poses significant challenges to traditional valuation methods, as they often assume relative stability in value. Effectively capturing and quantifying the value in flux is an urgent problem to address.

Digital assets are also influenced by factors such as network effects and economies of scale, wherein their value largely depends on external conditions such as adoption rates and user base size, rather than inherent properties of the assets themselves. For instance, the value of a popular social media application is directly correlated with its user base and activity level; the larger the user base, the higher the value. However, this indirect value is prone to being underestimated or overlooked. Furthermore, digital assets often possess a certain degree of non-exclusivity and non-rivalry, being both private property and public goods. However, existing evaluation methods primarily target private property, leaving exploration of accurate evaluation methods for digital assets under different ownership forms as a topic worth investigating.

## **4. Strategies to Optimize Asset Assessment Methods in Digital Transformation**

### **4.1. Enhancing Traditional Assessment Models to Meet Digital Requirements**

In the face of the challenges posed by digital transformation, we cannot completely abandon traditional asset valuation models. Instead, we should optimize and refine them to better suit the demands of the digital age. Firstly, traditional valuation models still hold advantages in assessing tangible assets. We can retain their rational factors while making necessary improvements and extensions when evaluating intangible and digital assets. For instance, when applying the cost approach, in addition to considering asset replacement costs or historical costs, we should also incorporate intangible asset development and maintenance costs to more comprehensively reflect their value composition [8]. Additionally, the cost approach can be combined with the strong replicability characteristic of digital assets to dynamically assess them based on their marginal replication costs. Regarding the market approach, due to the limited market for intangible asset transactions, we can broaden the search scope to include relevant industry mergers and acquisitions cases, intellectual property transfer cases, etc., to provide more references for intangible asset pricing. When evaluating digital assets using the market approach, attention should also be paid to factors such as network effects influencing value.

As a commonly used method for assessing intangible assets, the income approach also faces challenges in predicting cash flow uncertainty in digital transformation. To address this, we can introduce quantitative methods such as scenario analysis and Monte Carlo simulation to simulate and conduct sensitivity analysis on future cash flows under different scenarios, thereby reducing prediction biases. Additionally, enhancing traditional models should also be combined with the enterprise's digitalization process, with timely updates to assessment parameter algorithms. For example, in asset-light models, the weighting of intangible assets needs to be increased. According to IDC data, global digital transformation investment is projected to reach \$2 trillion by 2023, accounting for 56% of enterprise IT spending. This underscores the importance of promptly adjusting assessment models to adapt to changing circumstances [9].

### **4.2. Innovative Applications of New Technologies such as Big Data, Artificial Intelligence, etc.**

In addition to optimizing traditional valuation models, we should also fully utilize emerging technologies such as big data and artificial intelligence to inject new vitality into asset valuation in the digital age. Big data technology can assist in collecting and analyzing massive multidimensional data to identify key drivers influencing the value of intangible and digital assets, providing comprehensive information support for evaluation. For example, when evaluating intellectual property, a certain e-commerce company can leverage big data technology to analyze various dimensions such as purchase data, user behavior data, and competitor data, to assess the impact of intellectual property on sales performance, user experience, market competitiveness, etc., and quantify its contribution to the company's performance value, thereby conducting more accurate assessments. According to statistics, with the aid of big data analysis, the accuracy of intellectual property evaluation for this company has increased by over 20%.

Meanwhile, artificial intelligence technologies such as machine learning algorithms can also provide strong support for asset valuation. Based on historical data, AI models can autonomously learn and optimize evaluation parameters and processes, improving the accuracy of evaluation results [10]. Taking the evaluation of brand value for a certain technology company as an example, its AI model conducts intelligent modeling of multiple factors affecting brand value by analyzing data from social media, search engines, and other heterogeneous sources, resulting in approximately a 15% improvement compared to manual evaluation. Of course, the application of big data and artificial intelligence in asset valuation requires continuous exploration and innovation. For instance, we can attempt to organically integrate the two and build an intelligent big data valuation platform to achieve automation and intelligence in the evaluation process. Additionally, issues such as data privacy

protection, algorithm interpretability, and human-machine collaboration also need to be addressed with emphasis.

### **4.3. Constructing Comprehensive Solutions for Digital Asset Assessment**

Due to the complex diversity of digital assets, a single evaluation method is insufficient to fully meet their assessment needs. Therefore, we need to break free from traditional thinking and construct a comprehensive evaluation solution that integrates various concepts and technological means to comprehensively address the challenges faced in digital asset valuation.

This comprehensive solution should first organically integrate traditional valuation models with emerging valuation methods, leveraging the complementary advantages of different approaches. For example, when evaluating intangible assets such as innovative technologies, we can initially use the real options approach to roughly estimate their potential value, then combine the strengths of big data models and artificial intelligence models for more detailed analysis, and finally quantify their profitability using the income approach for a comprehensive assessment of their value from different perspectives. This solution should also possess dynamic adaptability, automatically adjusting evaluation models, parameters, and weights based on the characteristics and development stages of the assets to provide personalized assessment schemes. For instance, for early-stage tech startups, the evaluation may focus on intangible assets such as intellectual property and may utilize approaches like the real options method, while for mature enterprises, the focus may be on assessing the contribution of intangible assets to overall value, where the equity premium model may be advantageous.

Constructing this solution requires not only technological innovation but also conceptual innovation. We should discard outdated static evaluation concepts and instead pursue dynamic systemic evaluation concepts, integrating assets with digital ecosystems, and comprehensively considering the impact of external factors such as network effects and economies of scale on asset value. In summary, building an integrated solution for digital asset valuation by synthesizing various concepts and technological means is the inevitable path in the era of digital transformation. Through the comprehensive exploration of theoretical and practical aspects, this new paradigm of evaluation is expected to generate more innovative ideas and methods, guiding and supporting enterprises in their digital transformation journey.

## **5. Conclusion**

The digital transformation has presented unprecedented challenges and opportunities for asset valuation methods. Traditional valuation models have shown significant deficiencies when dealing with intangible and digital assets, while emerging valuation methods also have certain limitations. The characteristics of digital assets such as intangibility, strong replicability, and high volatility further exacerbate the difficulties in valuation work. Therefore, there is an urgent need to improve traditional models, innovate the application of new technologies, and construct comprehensive solutions to drive the innovation of valuation methods from both theoretical and practical perspectives. Only by keeping pace with the digitalization trend can we endow appropriate value to enterprises' intangible and digital assets, thus promoting the sustainable development of the digital economy. This is undoubtedly a lengthy and arduous process, requiring joint efforts from valuation theorists and practitioners. However, we have reason to believe that a new leap forward in valuation concepts and methods will eventually be achieved.

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