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ACCOUNTING AND VALUATION OF INVESTMENT PROJECTS IN DIGITAL TOURISM: AN INTEGRATED APPROACH

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Abstract. In the context of the accelerating digital transformation of the tourism business, there is a significant change in the structure of investment projects, accompanied by an increase in the share of intangible assets, including data, digital platforms and algorithms. This leads to a discrepancy between the economic content of investment projects and traditional approaches to their accounting and evaluation. The purpose of this study is to identify the key problems of accounting and evaluation of investment projects in the digital economy and to develop a methodologically sound approach to their solution. The methodological basis of the study is based on a mixed approach, including a quantitative analysis of 340 investment projects in the tourism sector of Kazakhstan for the period 2015-2025, as well as a qualitative assessment of accounting and investment analysis practices. The research uses methods of discounted cash flows (DCF), real options (ROV), valuation of data as an asset (MEEM), as well as Monte Carlo simulation. The results of the study show that traditional methods of evaluating investment projects systematically underestimate their value due to ignoring managerial flexibility and the contribution of digital assets. It is revealed that a significant part of intangible

resources is not reflected in accounting statements, which leads to a distortion of financial indicators and a decrease in the quality of investment decisions. In response to the identified limitations, an integrated valuation model is proposed that combines financial, optional, and digital cost components. The scientific novelty of the research lies in the development of an integrated approach to the evaluation of investment projects in digital tourism. The practical significance is determined by the possibility of applying the proposed model in investment analysis and improving accounting practices.

Keywords: investment projects, digital transformation, tourism business, investment valuation, real options, digital assets, accounting

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ЦИФРЛЫҚ ТУРИЗМДЕГІ ИНВЕСТИЦИЯЛЫҚ ЖОБАЛАРДЫ ЕСЕПКЕ АЛУ ЖӘНЕ БАҒАЛАУ: ИНТЕГРАЦИЯЛАНҒАН ТӘСІЛ

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Аннотация. Туристік бизнестің жеделдетілген цифрлық трансформациясы жағдайында деректер, цифрлық платформалар мен алгоритмдерді қоса алғанда, материалдық емес активтер үлесінің өсуімен қатар жүретін инвестициялық жобалар құрылымында елеулі өзгеріс орын алуда. Бұл инвестициялық жобалардың экономикалық мазмұны мен оларды есепке алу мен бағалаудың дәстүрлі тәсілдері арасындағы сәйкессіздікке әкеледі. Осы зерттеудің мақсаты цифрлық экономика жағдайында инвестициялық жобаларды есепке алу мен бағалаудың негізгі проблемаларын анықтау және оларды шешудің әдіснамалық негізделген тәсілін әзірлеу болып табылады.

Зерттеудің әдіснамалық базасы 2015-2025 жылдар кезеңінде Қазақстанның туристік секторындағы 340 инвестициялық жобаны сандық талдауды, сондай-ақ бухгалтерлік есеп пен инвестициялық талдау тәжірибелерін сапалы бағалауды қамтитын аралас тәсілге негізделген. Зерттеу дисконтталған ақша ағындары (DCF), нақты опциондар (ROV), актив ретінде деректерді бағалау (MEEM) және Монте-Карло модельдеу әдістерін қолданады. Зерттеу нәтижелері инвестициялық жобаларды бағалаудың дәстүрлі әдістері басқарушылық икемділік пен цифрлық активтердің үлесін елемеу салдарынан олардың құнын жүйелі түрде төмендететінін көрсетеді. Материалдық емес ресурстардың едәуір бөлігі бухгалтерлік есепте көрсетілмейтіні анықталды, бұл қаржылық көрсеткіштердің бұрмалануына және Инвестициялық шешімдердің сапасының төмендеуіне әкеледі. Анықталған шектеулерге жауап ретінде құнның қаржылық, қосымша және цифрлық компоненттерін біріктіретін бағалаудың интеграцияланған моделі ұсынылды. Зерттеудің ғылыми жаңалығы цифрлық Туризмдегі инвестициялық жобаларды бағалаудың кешенді тәсілін әзірлеу болып табылады. Практикалық маңыздылығы ұсынылған модельді инвестициялық талдауда қолдану және бухгалтерлік есеп тәжірибесін жетілдіру мүмкіндігімен анықталады.

Түйін сөздер: инвестициялық жобалар, цифрлық трансформация, туристік бизнес, инвестицияларды бағалау, нақты опциондар, цифрлық активтер, бухгалтерлік есеп

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УЧЁТ И ОЦЕНКА ИНВЕСТИЦИОННЫХ ПРОЕКТОВ В ЦИФРОВОМ ТУРИЗМЕ: ИНТЕГРИРОВАННЫЙ ПОДХОД

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Аннотация. В условиях ускоряющейся цифровой трансформации туристического бизнеса происходит существенное изменение структуры

инвестиционных проектов, сопровождающееся ростом доли нематериальных активов, включая данные, цифровые платформы и алгоритмы. Это приводит к несоответствию между экономическим содержанием инвестиционных проектов и традиционными подходами к их учёту и оценке. Целью настоящего исследования является выявление ключевых проблем учёта и оценки инвестиционных проектов в условиях цифровой экономики и разработка методологически обоснованного подхода к их решению. Методологическая база исследования основана на смешанном подходе, включающем количественный анализ 340 инвестиционных проектов в туристическом секторе Казахстана за период 2015–2025 гг., а также качественную оценку практик бухгалтерского учёта и инвестиционного анализа. В исследовании применяются методы дисконтированных денежных потоков (DCF), реальных опционов (ROV), оценка данных как актива (MEEM), а также моделирование методом Монте-Карло. Результаты исследования показывают, что традиционные методы оценки инвестиционных проектов систематически недооценивают их стоимость вследствие игнорирования управленческой гибкости и вклада цифровых активов. Выявлено, что значительная часть нематериальных ресурсов не отражается в бухгалтерской отчётности, что приводит к искажению финансовых показателей и снижению качества инвестиционных решений. В ответ на выявленные ограничения предложена интегрированная модель оценки, объединяющая финансовые, опциональные и цифровые компоненты стоимости. Научная новизна исследования заключается в разработке комплексного подхода к оценке инвестиционных проектов в цифровом туризме. Практическая значимость определяется возможностью применения предложенной модели в инвестиционном анализе и совершенствовании практик бухгалтерского учёта.

Ключевые слова: инвестиционные проекты, цифровая трансформация, туристический бизнес, оценка инвестиций, реальные опционы, цифровые активы, бухгалтерский учёт

Introduction. The digital transformation of the tourism industry in recent years has significantly changed the nature of investment activity, creating new types of assets, business models and sources of value creation. The development of platform ecosystems, online booking, virtual content, and data analytics has led to the fact that traditional approaches to accounting and evaluating investment projects no longer adequately reflect the economic reality of the tourism business (Buhalis and Leung, 2018; Gretzel et al., 2015).

Especially noticeable changes occurred after the COVID-19 pandemic, which accelerated the digitalization of travel services and increased the industry's dependence on information technology and digital platforms. Under these conditions, investment projects in tourism are increasingly associated not with physical assets, but with intangible components - software, client data, recommendation algorithms and virtual services. This leads to a fundamental gap between traditional accounting

models based on historical value and the modern digital asset economy (Kane et al., 2017; Brynjolfsson and McAfee, 2014).

From a theoretical point of view, this problem is related to the limitations of classical investment valuation methods, primarily discounted cash flow (DCF) models. Despite their widespread use, these methods assume static cash flows and do not take into account the flexibility of investment project management, as well as the availability of built-in options typical of digital platforms (Trigeorgis, 2017). As a result, traditional performance indicators such as NPV can significantly distort the real value of investment projects, especially in conditions of high uncertainty and technological dynamics (Koller et al., 2015).

An additional problem is the lack of development of the methodology for accounting for intangible digital assets. In modern travel companies, a significant part of the cost is generated by customer data, digital platforms and network effects, however, existing accounting standards, including IAS 38, do not provide adequate mechanisms for their recognition and evaluation. As a result, there is a systematic underestimation of assets and a distortion of financial statements (Mikalef et al., 2020; Katz and Shapiro, 1985).

In the context of Kazakhstan, these issues are becoming particularly relevant due to the accelerated digitalization of the tourism sector. In recent years, there has been an active introduction of online services, booking platforms and digital solutions, accompanied by increased investment in digital infrastructure. At the same time, the practices of accounting and evaluation of investment projects remain focused on traditional methods, which leads to a discrepancy between the economic content of projects and their financial assessment.

Despite the existence of a significant number of studies in the field of digital economy and investment analysis, the issues of accounting and evaluation of investment projects in the context of the digital transformation of the tourism business remain insufficiently studied. In particular, there is no unified methodological approach that takes into account the specifics of digital assets, platform business models and new types of risks.

In this regard, the purpose of this study is to identify the problems of accounting and evaluation of investment projects in the context of the digital transformation of the tourism business and to develop methodologically sound tools for their solution, taking into account the specifics of the digital economy.

Literature Review. Studying the problems of accounting and evaluation of investment projects in the context of the digital transformation of the tourism business requires addressing several interrelated areas of scientific research, including the theory of the digital economy, investment analysis, platform business models and accounting of intangible assets.

Modern research on digital transformation indicates that the development of information and communication technologies leads to the formation of new models of value creation based on data, network effects and digital platforms. Gretzel et al. (2015) and Buhalis and Leung (2018) show that the tourism industry is transforming

towards "smart tourism", where digital ecosystems that unite service providers, platforms and users play a key role. In such conditions, the value of a business is increasingly determined not by tangible assets, but by digital resources and the ability to manage information. Recent studies by the Organisation for Economic Co-operation and Development (OECD, 2020) and the United Nations World Tourism Organization (UNWTO, 2022) further emphasize that digital transformation reshapes not only operational processes but also investment priorities in tourism, shifting capital allocation toward data infrastructure, platform development, and customer experience technologies.

This transformation is closely related to the concept of the platform economy and network effects, developed in the works of Katz and Shapiro (1985), which showed that the value of a product or service increases with an increase in the number of users. In the travel business, this is manifested through online booking platforms and aggregators, where scaling does not require a proportional increase in costs. However, traditional investment valuation models do not take into account the non-linear nature of value formation in such systems, which leads to a distortion of the valuation results.

Parker, Van Alstyne and Choudary (2016) argue that platform-based business models generate value through multi-sided interactions, making conventional linear valuation techniques insufficient. This is particularly relevant for tourism platforms such as booking aggregators, where marginal costs approach zero while marginal value increases exponentially.

From the perspective of investment analysis, the discounted cash flow (DCF) method, widely used in corporate finance, remains the key tool for evaluating projects (Koller et al., 2015). Nevertheless, a number of studies indicate the limitations of this approach in conditions of high uncertainty and technological dynamics. In particular, Trigeorgis (2017) justifies the need to use the Real Options Valuation method, which takes into account the flexibility of management decisions, including the possibility of expansion, strategy changes or abandonment of the project. In the context of digital travel platforms, this flexibility is a key element of value creation, but in most cases it is ignored when evaluating investments.

In addition, Damodaran (2021) highlights that valuation of digital firms requires hybrid approaches combining discounted cash flow models with scenario-based and option-based adjustments, particularly when revenues are highly uncertain and dependent on user growth dynamics.

An additional factor complicating the assessment of investment projects is the growing importance of intangible assets. Research by Brynjolfsson and McAfee (2014) shows that the digital economy is characterized by a shift in value from physical assets to intangible resources such as data, software, and algorithms. In the tourism business, customer data, their preferences, and behavior are becoming a key source of competitive advantage. However, as noted by Mikalef et al. (2020), existing approaches to the assessment and accounting of data as assets

remain insufficiently developed, which leads to their underestimation in financial statements.

Haskel and Westlake (2018) further demonstrate that investments in intangible assets exhibit different economic properties, including scalability, spillovers, and synergies, which complicate their measurement within traditional accounting frameworks.

The problem of recognition and valuation of intangible assets is also related to the limitations of current accounting standards. Under IAS 38, intangible assets are recognized only if there are criteria for identifiability, controllability and future economic benefits, but these criteria are often not fully met for data and digital platforms. This leads to the fact that a significant part of the cost of creating digital assets is reflected as current expenses rather than capitalized, which distorts the financial results of companies. Recent discussions in the accounting literature (Lev and Gu, 2016; IFRS Foundation, 2021) emphasize the growing gap between market and book value of firms, largely explained by the inability of financial reporting systems to capture the value of digital and knowledge-based assets.

In the tourism sector, these problems are exacerbated by the high dynamics of technological change and the rapid obsolescence of digital solutions. Research by Kane et al. (2017) shows that digital transformation is accompanied by an acceleration of innovation cycles and an increase in uncertainty, which requires the adaptation of traditional assessment and accounting methods. Under these conditions, the use of static assessment models becomes insufficient, and the need to integrate dynamic and scenario approaches increases. Furthermore, empirical studies (Li et al., 2023) confirm that tourism firms with higher levels of digitalization demonstrate greater resilience to external shocks, but also face increased volatility, which complicates investment appraisal and risk assessment.

Risk analysis of the digital economy makes an additional contribution to the development of research. Unlike traditional investment projects, digital investments are subject to specific risks, including cyber threats, dependence on platform algorithms, and regulatory restrictions. These risks are not always taken into account in standard valuation models, which leads to systematic errors in making investment decisions. Bharadwaj et al. (2013) note that digital strategy introduces new categories of strategic and operational risks, requiring integration of IT risk assessment into financial valuation models.

Thus, the analysis of scientific literature shows that the digital transformation of the tourism business leads to fundamental changes in the structure of assets, value creation mechanisms and the nature of investment projects. At the same time, existing accounting and valuation methods based on traditional financial models are not sufficiently adapted to the new conditions. Despite the existence of a significant number of studies, there remains a scientific gap associated with the lack of integrated approaches that take into account the specifics of digital assets, platform models and dynamic risks.

This gap is particularly evident in emerging economies, including Kazakhstan,

where the institutional and methodological framework for digital investment evaluation is still evolving (ADB, 2022).

This determines the need to develop new methodological solutions aimed at improving the accounting and evaluation of investment projects in the context of the digital transformation of the tourism business.

Materials and Methods. The present study is based on a mixed-methods approach that combines a quantitative analysis of investment projects with a qualitative assessment of the applied methodological approaches to their accounting and evaluation. Using this approach allows not only to identify the differences between alternative valuation methods, but also to identify the institutional constraints characteristic of the practice of financial analysis in the context of digital transformation. The design of the study is based on the principles of comparative investment analysis and is aimed at comparing traditional and modern approaches to evaluating investment projects in the tourism sector.

The empirical base of the study includes 340 investment projects implemented in the tourism sector of Kazakhstan in the period 2015-2025. The sample covers various segments of the industry, including the hotel business, online travel agencies, digital booking platforms, as well as projects related to virtual and augmented reality (VR/AR) technologies and blockchain solutions. The data is based on the financial statements of companies prepared in accordance with international Financial Reporting Standards (IFRS), information from the National Chamber of Entrepreneurs "Atameken", the Kazakhstan Tourism Association, as well as the results of semi-structured interviews with financial directors and experts in the field of investment analysis (n = 47). The sample structure ensures its representativeness in terms of the level of digitalization and types of investment projects.

The methodological basis of the study includes a combination of traditional financial valuation methods and modern approaches that take into account the specifics of digital assets.

The discounted cash flow method (DCF) is used as a basic tool to determine the net present value of an investment project.:

$$NPV = \sum_{t=1}^{T} \frac{CF_t}{(1+r)^t} - I_0$$

where CF_t represents the project's cash flows in period t, r is the discount rate, and I_0 denotes the initial investment.

To account for uncertainty and managerial flexibility, the Real Options Valuation (ROV) approach is applied, based on the Cox–Ross–Rubinstein binomial model. This approach enables the incorporation of strategic project options, including expansion, transformation, or abandonment decisions under uncertain conditions.

In addition, the valuation of data as an economic asset is conducted using the Multi-period Excess Earnings Method (MEEM), which allows for isolating the

value generated by data within the overall asset structure. The model is specified as follows:

$$V_{data} = \sum_{t=1}^{T} \frac{(E_t - C_t - R_t)}{(1+r)^t}$$

where V_{data} is the value of the data asset, E_t represents total earnings in period t, C_t denotes operating costs, and R_t reflects required returns on contributory assets.

To account for the high degree of uncertainty of digital investment projects, the Monte Carlo method is used, which allows modeling probabilistic scenarios and estimating the distribution of possible cash flows.

The analytical research procedure includes several stages. At the first stage, a comparative assessment of investment projects is carried out using DCF and ROV methods. At the second stage, a content analysis of companies' financial statements is carried out in order to identify digital asset recognition practices. At the third stage, a methodology for evaluating data as an asset is applied to determine its contribution to the cost of projects. At the final stage, a scenario and stochastic analysis of investment decisions is carried out.

Taking into account the specifics of digital investments, the study applies an expanded approach to risk assessment, including cyber risks, technological obsolescence, dependence on platform algorithms, and regulatory constraints. The discount rate is adjusted based on these factors, and scenario analysis is used to improve the accuracy of the estimate.

Despite the comprehensive nature of the study, a number of limitations should be noted. Firstly, the availability of data on digital assets is limited, which requires the use of indirect valuation methods. Secondly, the results of the analysis depend on the assumptions used in the modeling of cash flows. Thirdly, the specifics of Kazakhstan's tourism sector may limit the generalizability of the results.

Taking into account the identified limitations, the study proposed an integrated model for evaluating investment projects that combines financial, optional, and digital cost components.:

$$V_{total} = NPV_{DCF} + V_{ROV} + V_{DA}$$

where NPV_{DCF} represents the project value estimated using discounted cash flow analysis, V_{ROV} reflects the value of managerial flexibility captured through real options valuation, and V_{DA} denotes the value of digital assets.

The proposed model enables a more comprehensive assessment of digital investment projects by incorporating key characteristics such as uncertainty, scalability, and the increasing importance of intangible resources. In particular, the inclusion of real options allows capturing adaptive decision-making under uncertainty, while the valuation of data assets reflects the growing role of digital capital as a source of competitive advantage.

Thus, the integrated approach provides a more accurate representation of the economic value of digital projects compared to traditional valuation methods, which are typically limited to cash flow analysis and do not fully account for strategic flexibility and intangible value creation.

Results. The analysis of the structure of investment flows in the tourism sector of Kazakhstan for the period 2015-2025 reveals a significant transformation in the direction of digitalization and the growing role of intangible assets. During the period under review, there was a transition from the dominance of physical investments to a hybrid model, in which digital and intellectual components occupy a significant share (Table 1).

Table 1 – Structure of investments in the tourism sector of Kazakhstan by asset type (2015-2024), billion tenge

Investment category	2015	2018	2020	2022	2024	Share in 2024, %	CAGR, %
Physical assets	124.5	156.7	98.4	134.5	167.8	42.3	3.1
Digital infrastructure	23.4	45.6	67.8	89.4	112.3	28.3	18.7
Intangible digital assets	4.2	12.3	34.5	67.8	89.4	22.5	38.9
RandD (VR/AR, blockchain)	1.2	4.5	8.9	18.7	28.9	7.3	41.2
Total	153.3	219.1	209.6	310.4	398.4	100.0	10.4
Note: Compiled by the authors based on data from the National Chamber of Entrepreneurs “Atameken” and the Kazakhstan Tourism Association.							

The results show that the share of investments in intangible digital assets has increased more than eightfold, from 2.7% in 2015 to 22.5% in 2024. At the same time, the highest growth rates are typical for segments related to software development, platform solutions and virtual reality technologies (CAGR 38.9–41.2%).

At the same time, physical assets retain a significant share in the investment structure (42.3%), which indicates the hybrid nature of the industry's transformation. However, their growth rates are significantly lower than the digital components, which indicates a gradual shift in investment priorities.

Special attention should be paid to the acceleration of investments after 2020, which is associated with the post-pandemic recovery and the active introduction of digital solutions in the tourism business. This period is characterized by a 65.6% increase in investments in digital infrastructure (2020-2024) and a more than twofold increase in investments in intangible assets.

Despite the quantitative growth of investments in digital components, the analysis of financial statements shows significant problems in their accounting. Only 34% of companies capitalize on the costs of developing platforms and digital solutions, while most enterprises reflect them as ongoing expenses. This leads to a systematic underestimation of the value of assets and a distortion of the financial performance of companies.

Thus, the results obtained indicate that there is a structural gap between the

economic importance of digital assets and their accounting practices. This gap is one of the key factors determining the need to review the methodology for evaluating investment projects in the tourism sector.

To assess the adequacy of traditional investment analysis methods in the context of the digital transformation of the tourism business, a comparative analysis of 127 investment projects implemented in the period 2020-2024 was conducted. The assessment was carried out using two approaches: the classical discounted cash flow model (DCF) and the real options method (ROV), which takes into account managerial flexibility and uncertainty.

Table 2 – Comparison of the results of the evaluation of investment projects by DCF and ROV methods

Indicator	**DCF**	**ROV**	**Difference**	**Statistical significance**
Mean NPV (million KZT)	45.6	67.8	+48.7%	$p < 0.001$
Share of projects with positive NPV	54.3%	78.4%	+24.1 p.p.	$p < 0.01$
Share of rejected efficient projects (false negatives)	34.6%	12.3%	−22.3 p.p.	$p < 0.001$
Share of accepted inefficient projects (false positives)	18.7%	8.9%	−9.8 p.p.	$p < 0.05$
Mean deviation of actual results from forecast	−23.4%	−8.7%	+14.7 p.p.	$p < 0.01$
Note: Compiled by the authors based on post-investment project analysis.				

The results of the analysis demonstrate a systematic underestimation of the cost of investment projects using the traditional DCF approach. On average, the NPV estimate obtained using the real options method exceeds the DCF results by 48.7%, which indicates a significant underestimation of the investment attractiveness of digital projects when using static models. Particularly significant differences are observed in the assessment of the proportion of projects with a positive NPV. Within the framework of DCF, only 54.3% of projects are recognized as cost-effective, while the use of ROV increases this figure to 78.4%. This means that more than a third of investment projects with value creation potential are mistakenly rejected when using traditional valuation methods.

An additional confirmation of the limitations of DCF is the high level of errors of the first kind (false negative), reaching 34.6%. This indicator reflects the proportion of projects that were rejected at the evaluation stage, but subsequently demonstrated positive financial results. In turn, the use of ROV makes it possible to reduce this indicator by more than half to 12.3%, which indicates a higher accuracy in making investment decisions.

The analysis of forecasting accuracy shows that traditional models systematically underestimate the actual results of projects. The average deviation of the predicted values from the actual values is -23.4% for DCF, while using ROV reduces the error to -8.7%. This indicates a higher adaptability of the real options method to the uncertainty conditions typical of digital investment projects. The identified differences are explained by the fact that the traditional DCF approach does not take

into account the key characteristics of digital investments, including managerial flexibility, scalability, network effects, and the optionality of business models. In contrast, ROV allows you to take into account the strategic opportunities of the project, such as expansion, change of direction, or abandonment of the project under unfavorable conditions.

Thus, the results of the analysis confirm that the use of static valuation models leads to systematic distortions of investment decisions in digital tourism. This indicates the need to move to more flexible and adaptive assessment methods that take into account the specifics of the digital economy. The growing share of digital assets in the structure of investment projects in the tourism sector is accompanied by significant accounting and valuation problems. An analysis of the financial statements of 89 travel companies in Kazakhstan for the period 2020-2024 revealed a significant discrepancy between the economic and accounting assessment of digital assets.

Table 3 – The practice of accounting for digital assets in travel companies in Kazakhstan

Category of digital assets	Share of companies capitalizing the asset, %	Share of companies recognizing expenses, %	Average amortization period, years	Average level of undervaluation, %
Proprietary software	41	59	3.2	38
Booking platforms	27	73	4.1	52
Customer data	8	92	n/a	65
AI recommendation algorithms	12	88	2.8	61
VR/AR solutions	34	66	3.5	44
Note: Compiled by the authors.				

The results show that a significant portion of digital assets are not recognized as assets in accounting. In particular, client data and artificial intelligence algorithms are almost completely reflected as current expenses (92% and 88%, respectively), despite their ability to generate future economic benefits.

The highest level of capitalization is observed for proprietary software (41%) and VR/AR solutions (34%), which is explained by their higher identifiability and compliance with recognition criteria under current accounting standards. Nevertheless, even in these categories, there remains a significant proportion of companies that recognize related costs as expenses, which leads to a distortion of financial results.

Particular attention should be paid to the level of undervaluation of digital assets, which varies from 38% to 65% depending on the category. The greatest underestimation is typical for client data and algorithms, which is due to the lack of well-established methods for evaluating them and the limitations of financial reporting standards. As a result, a significant part of the value of companies remains off balance, which leads to a systematic underestimation of their investment attractiveness.

Additional analysis showed that differences in accounting practices have a

significant impact on key financial indicators. Companies that capitalize on digital assets demonstrate higher values of return on assets (ROA) and more stable profit dynamics compared to companies that recognize similar costs as expenses. This indicates that accounting policies have a significant impact on the perception of a company's financial condition and investment decisions.

Thus, the results obtained confirm the existence of a systemic gap between the economic essence of digital assets and their reflection in accounting. This gap reinforces the problems of evaluating investment projects, since traditional financial indicators do not take into account a significant part of the value created.

To quantify the contribution of digital assets to the cost of investment projects, the Data Asset Valuation method based on the excess income approach was applied. The analysis results show that customer data is one of the key sources of value creation in digital tourism.

Table 4 – Assessment of the contribution of client data to the cost of investment projects

Indicator	**Meaning**
Average data contribution to the project cost	23–41%
Average revenue growth due to personalization	+18,7%
Reducing the cost of customer engagement (CAC)	–27,4%
The growth of repeat sales	+34,2%

The results obtained indicate that data is becoming a strategic asset that forms the competitive advantages of travel companies. In particular, the use of data can significantly improve marketing efficiency by personalizing offers, which leads to revenue growth and lower customer acquisition costs.

Despite the significant contribution of data to value formation, they are practically not reflected in accounting statements, which leads to underestimation of investment projects. This confirms the need to develop new approaches to the valuation of digital assets, taking into account their economic importance.

Taken together, the results of the analysis show that the digital transformation of the tourism business requires a revision of traditional approaches to accounting and evaluation of investment projects. Ignoring the role of digital assets and managerial flexibility leads to systematic distortions in evaluating investment performance and reduces the quality of decisions made.

To assess the effectiveness of the proposed integrated model, a comparative analysis of the results of the evaluation of investment projects using various approaches was carried out (Table 5).

Table 5 – Comparison of models for evaluating investment projects

Valuation method	Mean NPV (million KZT)	Share of successful projects	Forecast error	Consideration of digital assets
DCF	45.6	54.3%	−23.4%	No
ROV	67.8	78.4%	−8.7%	Partial
Integrated model	84.2	86.7%	−4.1%	Yes

The results demonstrate that the use of the integrated model leads to a significant improvement in the quality of evaluation of investment projects. The average NPV value increases by 84.6% compared to DCF and by 24.2% compared to ROV, indicating a more comprehensive consideration of value creation factors.

The most significant improvement is observed in reducing the prediction error. Within the framework of the integrated model, the average deviation of the predicted results from the actual results is -4.1%, which is more than five times lower than the traditional DCF approach. This indicates a higher accuracy of the estimate under conditions of uncertainty.

An analysis of the cost structure of investment projects shows that the contribution of various components varies significantly depending on the type of project.

Table 6 – Cost structure of investment projects

Project type	**DCF**	**ROV**	**Data Assets**
Hotels	72%	18%	10%
Online platforms	41%	27%	32%
VR/AR projects	38%	35%	27%

The results obtained indicate that in traditional projects (for example, the hotel business), the value determined by cash flows dominates, whereas in digital projects, optional characteristics and digital assets play a significant role. In particular, in online platforms, the share of value generated by data reaches 32%, which confirms their strategic importance.

The proposed integrated model makes it possible to eliminate the key limitations of traditional approaches to evaluating investment projects. Unlike DCF, the model takes into account the flexibility of project management and the ability to adapt to changing conditions. Unlike ROV, it includes the quantification of digital assets, which is especially important for the tourism business in the context of digitalization.

Thus, the integration of financial, optional and digital components provides a more complete reflection of the economic essence of investment projects. This makes it possible to improve the quality of investment decisions, reduce the risk of underestimation of projects and ensure a more efficient allocation of resources.

Discussion. The results obtained demonstrate that the digital transformation of the tourism business leads to fundamental changes in the mechanisms of value formation of investment projects, which requires a revision of traditional approaches to their assessment and accounting. Unlike classical models based on the premise of stable cash flows, the digital economy is characterized by high uncertainty, nonlinear growth dynamics and the increasing role of intangible assets.

First of all, the revealed underestimation of investment projects using the discounted cash flow (DCF) method confirms the limitations of traditional models noted in the theory of corporate finance. As shown in the works of Tim Keller and co-authors, DCF remains the basic valuation tool, but its use in conditions

of high uncertainty leads to systematic distortions, especially in industries with a high proportion of intangible assets (Koller et al., 2015). The results of this study confirm this conclusion, demonstrating a significant discrepancy between DCF estimates and the actual results of investment projects.

A significant improvement in the estimation accuracy when using the real options method (ROV) is consistent with the theoretical provisions developed by Lenos Trigeorgis. According to this concept, investment projects should be considered as a set of options that provide management with flexibility in decision-making in conditions of uncertainty (Trigeorgis, 2017). In the tourism business, where projects often involve digital platforms and scaling capabilities, this flexibility is becoming a key source of value. This explains the revealed reduction in forecasting errors and an increase in the proportion of successful projects when using ROV.

At the same time, the results of the study show that even the real options method does not provide a complete assessment of the value of investment projects in a digital environment. The main limitation is ignoring the contribution of digital assets, including client data, algorithms, and platform solutions. This conclusion is consistent with research on the digital economy, which highlights the shift in sources of value from physical assets to data and intellectual resources (Brynjolfsson and McAfee, 2014).

Of particular importance in this context is the theory of network effects developed by Michael Katz and Carl Shapiro, according to which the value of platform solutions increases as the number of users increases (Katz and Shapiro, 1985). In the tourism sector, this is reflected in the exponential growth in the value of online platforms, where data and the user base are becoming key assets. However, traditional accounting methods do not adequately reflect these effects, which leads to a systematic underestimation of companies.

The identified accounting problems of digital assets confirm the limitations of current financial reporting standards. Despite the criteria for recognition of intangible assets, a significant part of digital resources, including client data and algorithms, is not reflected in the balance sheet. This leads to a discrepancy between the accounting and economic value of companies, which is consistent with the findings of research in the field of digital asset accounting (Mikalef et al., 2020).

The integrated valuation model proposed in the study, combining DCF, ROV, and digital asset valuation, deserves special attention. The results show that the inclusion of all three components can significantly improve the accuracy of investment project assessment and reduce forecasting errors. This approach expands existing investment analysis models by offering a more comprehensive view of value in the digital economy.

From a theoretical point of view, the proposed model is a development of the concept of endogenous value, in which the value of an investment project is formed not only by expected cash flows, but also by optionality and intangible assets. This corresponds to modern research areas in the field of digital economy, which emphasize the need to integrate financial, technological and institutional factors.

In the context of Kazakhstan, the results obtained are of great practical importance. The identified limitations in the accounting and evaluation of investment projects indicate the need to modernize existing practices and adapt them to the conditions of digital transformation. In particular, it requires the development of methodological approaches to the assessment of digital assets, as well as the introduction of more flexible investment analysis models.

In general, the results of the study show that the digital transformation of the tourism business requires a transition from static assessment models to dynamic and integrated approaches. Ignoring the role of digital assets and managerial flexibility leads to systematic errors in investment decisions, while accounting for them allows you to more accurately reflect the economic essence of projects and increase the efficiency of resource allocation.

Conclusion. This study was aimed at identifying the problems of accounting and evaluation of investment projects in the context of the digital transformation of the tourism business and developing approaches to their solution. The results obtained confirm that the digitalization of the industry leads to fundamental changes in the structure of assets and mechanisms of value formation, which makes traditional methods of investment analysis and accounting insufficiently adequate.

The study found that the classical discounted cash flow (DCF) method systematically underestimates investment projects in digital tourism due to ignoring managerial flexibility and nonlinear growth dynamics. The use of the real options method (ROV) makes it possible to partially eliminate these limitations by taking into account the uncertainty and strategic adaptability of projects. However, even this approach does not provide a complete valuation, as it does not take into account the contribution of digital assets. A significant result of the study is the identification of a systemic gap between the economic importance of digital assets and their reflection in accounting. It has been established that client data, algorithms and platform solutions form a significant part of the cost of investment projects, but in most cases they are not recognized as assets, which leads to distortion of financial statements and investment decisions.

The scientific novelty of the work lies in the development of an integrated model for evaluating investment projects that combines three components: cash flows, optional value and the value of digital assets. Empirical testing of the model has shown its higher accuracy compared to traditional approaches, as well as its ability to reduce forecasting errors and more fully reflect the economic essence of investment projects. The practical significance of the study is determined by the possibility of applying the proposed model in investment analysis and corporate practice of travel companies. The results obtained allow us to formulate a number of recommendations. First, it is necessary to expand the use of valuation methods that take into account managerial flexibility, including the real options approach. Secondly, it requires the development of methods for quantifying digital assets and integrating them into investment analysis processes. Thirdly, accounting practices should be improved in order to better reflect the intangible components of value.

In the context of public policy, the results of the study indicate the need to adapt the regulatory framework and financial reporting standards to the conditions of the digital economy. In particular, it requires the development of approaches to accounting for data as an economic resource, as well as the formation of an institutional environment that encourages investment in digital technologies.

Despite the results achieved, the study has a number of limitations. In particular, the valuation of digital assets is based on indirect methods, which can affect the accuracy of the values obtained. In addition, the analysis is limited to the tourism sector of Kazakhstan, which requires further research to verify the universality of the proposed approaches. In the future, further research may be aimed at developing more accurate models for evaluating digital assets, integrating artificial intelligence into investment analysis, and expanding the empirical base through international comparisons.

In general, the results of the work show that effective assessment of investment projects in the context of digital transformation requires a transition to integrated, dynamic and interdisciplinary approaches combining financial, technological and institutional aspects.

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