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**Астана, Казахстан**



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## COMPARATIVE ANALYSIS OF TOURISM PRODUCTS IN AZERBAIJAN AND IN THE WORLD AND OPPORTUNITIES FOR DIVERSIFICATION

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Tourism (in English)

**Summary.** The article provides a comparative analysis of the development features of tourism products in Azerbaijan and the world. The theoretical foundations of the tourism product are examined, its structural components and types are determined. Based on the experience of developed tourism countries, the current state of the tourism sector of Azerbaijan is assessed and diversification opportunities are identified. During the study, scientific literature and statistical indicators of recent years were analyzed. It was determined that although cultural and recreational tourism predominates in Azerbaijan, there is a wide potential in the directions of ecotourism, agrotourism and digital tourism. The article puts forward practical proposals for increasing the competitiveness of tourism products and ensuring their sustainable development.

**Keywords:** tourism product, diversification, ecotourism, agrotourism, competitiveness, sustainable tourism.

## AZƏRBAYCANDA VƏ DÜNYADA TURİZM MƏHSULLARININ MÜQAYISƏLİ TƏHLİLİ VƏ ŞAXƏLƏNDİRMƏ İMKANLARI

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**Xülasə.** Məqalədə Azərbaycan və dünyada turizm məhsullarının inkişaf xüsusiyyətləri müqayisəli şəkildə təhlil edilir. Turizm məhsulunun nəzəri əsasları araşdırılır, onun struktur komponentləri və növləri müəyyənləşdirilir. İnkişaf etmiş turizm ölkələrinin təcrübəsi əsasında Azərbaycanın turizm sektorunun mövcud vəziyyəti qiymətləndirilir və şaxələndirmə imkanları müəyyən olunur. Tədqiqat zamanı son illərin elmi ədəbiyyatı və statistik göstəricilər təhlil edilmişdir. Müəyyən edilmişdir ki, Azərbaycanda əsasən mədəni və istirahət turizmi üstünlük təşkil etsə də, ekoturizm, aqroturizm və rəqəmsal turizm istiqamətlərində geniş potensial mövcuddur. Məqalədə turizm məhsullarının rəqabət qabiliyyətinin artırılması və davamlı inkişafının təmin olunması üçün praktiki təkliflər irəli sürülmüşdür.

**Açar sözlər:** turizm məhsulu, şaxələndirmə, ekoturizm, aqroturizm, rəqabət qabiliyyəti, davamlı turizm.

## СРАВНИТЕЛЬНЫЙ АНАЛИЗ ТУРИСТИЧЕСКИХ ПРОДУКТОВ АЗЕРБАЙДЖАНА И МИРА И ВОЗМОЖНОСТИ ДИВЕРСИФИКАЦИИ

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**Аннотация.** В статье представлен сравнительный анализ особенностей развития туристических продуктов в Азербайджане и мире. Рассмотрены теоретические основы туристического продукта, определены его структурные компоненты и типы. На основе опыта развитых стран в сфере туризма оценено текущее состояние туристического сектора Азербайджана и выявлены возможности диверсификации. В ходе исследования

*проанализированы научная литература и статистические показатели последних лет. Установлено, что, несмотря на преобладание культурно-развлекательного туризма в Азербайджане, существует широкий потенциал в направлениях экотуризма, агротуризма и цифрового туризма. В статье предложены практические рекомендации по повышению конкурентоспособности туристических продуктов и обеспечению их устойчивого развития.*

**Ключевые слова:** туристический продукт, диверсификация, экотуризм, агротуризм, конкурентоспособность, устойчивый туризм

**INTRODUCTION.** In modern times, tourism is considered one of the fastest growing sectors of the world economy. Globalization processes, the expansion of international transport links and the development of digital technologies have significantly changed the geography and structure of tourism. Tourism is no longer just a means of recreation, but also acts as a strategic sector that plays an important role in the socio-economic development of countries. The concept of a tourism product is complex and includes the joint provision of various services - transportation, accommodation, nutrition, excursions, entertainment and other services. A tourism product is a synthesis of tangible and intangible elements, forming the overall experience offered to the tourist (Alirzayev, 2022). In this regard, the quality and diversity of the tourism product directly affect the competitiveness of the country. The strengthening of the competitive environment in the world tourism market encourages countries to diversify tourism products and implement innovative service models. In developed tourism countries, various directions such as thematic tourism, ecotourism, agrotourism, health tourism and digital tourism are successfully implemented. This allows for an increase in tourism revenues and a reduction in the problem of seasonality. Azerbaijan has also been paying special attention to the development of the tourism sector in recent years. Within the framework of state programs and strategic roadmaps, important steps have been taken to renew the infrastructure, organize international events, and increase the tourism potential in the regions. However, the limited diversity of tourism products and the seasonality factor still remain one of the main problems. In this regard, comparative analysis of tourism products in Azerbaijan and the world and investigation of diversification opportunities are of urgent scientific and practical importance. The purpose of the article is to analyze the current state of tourism products, study international experience, and put forward proposals for more effective development of the tourism sector of Azerbaijan.

**MAIN PART.** Tourism product as an economic category is complex in nature and is formed from the unity of tangible and intangible elements. Unlike traditional products, tourism product is consumed at the place of production and its main feature is service orientation. Tourism product expresses the overall experience gained by the tourist during the trip and includes transportation, accommodation, nutrition, excursions, entertainment, information and other services (Alirzayev, 2022).

In the scientific literature, the structure of the tourism product is classified into three main components:

1. Basic services - accommodation, transportation and nutrition;
2. Additional services - excursions, entertainment, sports and health services;
3. Emotional and image component - cultural heritage, nature, safety, hospitality and country brand.

At the modern stage, the competitiveness of a tourism product is determined not only by material infrastructure, but also by the quality of the experience provided. In this regard, innovation, digitalization and personalized service models are of particular importance (Cooper & Fletcher, 2020).

Tourism products in the global tourism market are developing in different directions. The main types are as follows:

- Cultural tourism
- Leisure (recreational) tourism
- Ecotourism

- Health and medical tourism
- Business (MICE) tourism
- Agrotourism
- Winter and mountain tourism
- Digital and innovative tourism

For example, the Spanish model is mainly built on mass beach and cultural tourism. This model is characterized by a high tourist flow and developed infrastructure. However, in the long term, problems of environmental load and seasonality arise.

The Turkish model is based on the “all-inclusive” system. Although this model provides comfort and a stable price policy for tourists, it is distinguished by the standardization of services and creates risks such as weakening integration with the local economy.

The Swiss model is distinguished by high-quality mountain and health tourism. This model is aimed at a high-income tourist segment and is based on service quality. The principles of sustainable development are considered the main priority here.

This comparison shows that in order to succeed in the world tourism market, it is important to diversify tourism products and adapt them to specific market segments.

Diversification is of great importance in the tourism sector in terms of reducing risks, minimizing seasonality and increasing revenues. Studies show that the diversity of tourism products has a positive impact on the country's position in international rankings (UNWTO, 2024).

The main directions of diversification are as follows:

- Creation of new tourism routes
- Involvement of regions in tourism turnover
- Application of digital platforms
- Development of thematic and experience-based tourism
- Application of sustainable and ecological models

Thus, from a theoretical point of view, the tourism product is a dynamic and multifaceted economic category. World experience shows that in order to gain a competitive advantage, countries should not be satisfied with only traditional tourism destinations, but should form new and innovative products.

Azerbaijani tourism has been developing rapidly in recent years and has become one of the strategic sectors of the economy. The country is distinguished by its geographical location, rich historical and cultural heritage, various climatic and relief features, which allows for the diversity of tourism products (Huseynov, 2023).

The number of tourists visiting the country increased annually in 2010–2024 and reached approximately 3.5 million in 2023 (Naghiyev, 2024). Tourism revenues are mainly generated by cultural, recreational and health tourism. However, in some areas – ecotourism, agrotourism, digital tourism – the potential has not yet been fully exploited.

Azerbaijani tourism products differ by region:

**Table 1. Regional structure of tourism products**

<b>Region</b>	<b>Main Type of Tourism</b>	<b>Features</b>
Baku and Absheron	City and Event Tourism	International exhibitions, festivals, conferences, cultural attractions
Gabala, Shahdag	Winter and Mountain Tourism	Ski resorts, mountain trails, eco-tourism opportunities
Naftalan	Health Tourism	Therapeutic oil baths, spa services
Guba, Qusar, Shamakhi	Agro-tourism and Village Tourism	Farming experiences, rural lifestyle, nature-based activities
Karabakh Region	Historical and Cultural Tourism	Restored historical sites, cultural heritage, eco-tourism potential

**Source:** Compiled by the author

This distribution shows that the Azerbaijani tourism product is mainly concentrated in a few dominant directions and product diversity across regions is not yet fully ensured.

The following main problems are noted in the Azerbaijani tourism sector:

- Seasonality – Beach and mountain tourism are seasonal in nature, which prevents year-round income.
- Weak product diversity – Most regions have developed only in one or two types of tourism.
- Lack of marketing and promotion – Limited availability of a detailed and attractive database for foreign tourists.
- Infrastructure problems – Roads, guest houses and service facilities for rural tourism and agrotourism routes are not sufficiently developed.
- Low level of digitalization – Lack of reservations, information and services on online platforms.

There are a number of potential opportunities for diversification of the Azerbaijani tourism product:

- Ecotourism – Caspian coast, mountain and forest zones, national parks.
- Agrotourism – Experiences focused on agriculture and rural life.
- Digital tourism – Mobile applications, virtual tours and online booking systems.
- Thematic and cultural tourism – Historical monuments, festivals, culinary routes.
- Tourism in the Karabakh region – Reconstructed historical sites, ecotourism and health resorts.

This analysis shows that Azerbaijani tourism has significant potential for both the domestic and foreign markets, but product diversification and the introduction of innovative services are necessary to increase its competitiveness.

World experience shows that countries that have achieved success in the tourism sector give priority to product diversity, service quality and innovative management mechanisms. Tourism in these countries is based not only on natural resources, but also on proper planning and marketing strategies (UNWTO, 2024).

Spain has been one of the leading tourist countries in Europe for many years. Along with beach tourism, cultural tourism has also been widely developed here. Barcelona, Madrid and other cities are distinguished by both historical and cultural heritage and modern tourism infrastructure. Product diversity allows the country to receive tourists all year round.

Turkey is widely known for its “all-inclusive” system in the tourism sector. Mass beach tourism has been developed in the Antalya region, thematic and adventure tourism in Cappadocia, and cultural and urban tourism in Istanbul. This model is considered effective in terms of integration of tourism products and regional balancing.

The Swiss tourism model is built on high-quality service, environmental sustainability and mountain tourism. In addition to winter tourism, health and spa tourism is also widespread here. The main advantage is high service standards and brand image.

The following table summarizes the comparative analysis:

**Table 2. Comparative Analysis of Tourism Products: Azerbaijan vs. Developed Countries**

<b>Indicator</b>	<b>Azerbaijan</b>	<b>Developed Countries</b>
Product Diversity	Moderate level	High level
Seasonality	High	Low
Digitalization	Developing stage	Advanced
Share of Ecotourism	Increasing	Widely developed
Marketing Strategy	Limited and evolving	Strong and systematic
Service Quality Standards	Improving	Highly standardized
Brand Positioning	Emerging	Globally recognized

**Source:** Compiled by the author based on comparative analysis (2024).

The conducted comparative analysis shows that the main problem in the tourism sector of Azerbaijan is the limited product diversity and the seasonality factor. World experience proves that diversification of tourism products increases economic sustainability, stimulates the development of regions and strengthens international competitiveness (UNWTO, 2024).

Azerbaijan's agricultural potential creates favorable conditions for the development of agritourism. Farms and village houses in the Guba, Gusar, Shamakhi, Ismayilli and Lankaran regions can be involved in the tourism cycle.

Agrotourism has the following advantages:

- Reduction of seasonality
- Increasing employment in the regions
- Expanding sales of local products
- Tourists gain an authentic experience

The agritourism model is successfully applied in the experience of Turkey and Italy, and this model is also considered suitable for the regions of Azerbaijan.

The reconstruction of the Karabakh region creates new opportunities for the diversification of tourism products. Restoration of historical and cultural monuments, creation of ecological tourism routes and organization of health tourism can contribute to the development of the region.

In this direction:

- Preservation of historical heritage
- Application of the concept of "Smart tourism"
- Organization of international festivals
- Creation of green energy-based tourism facilities

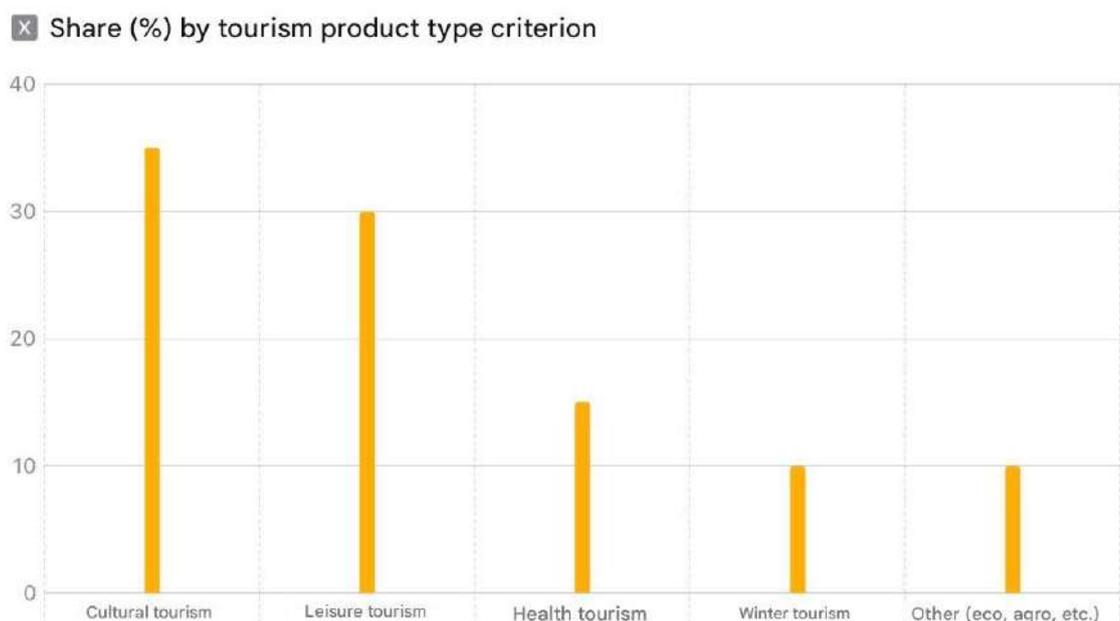
are considered appropriate.

Diversification of tourism products can lead to the following results:

- Increase in tourism revenues
- Creation of new jobs
- Socio-economic development of regions
- Reduction of seasonality
- Increasing Azerbaijan's position in international tourism ratings

Thus, diversification is an important factor ensuring sustainable development not only of the tourism sector, but also of the national economy as a whole.

**Graph 1. Share of tourism products in Azerbaijan**



The graph above shows the share distribution of tourism products in Azerbaijan (%).

The statistical analysis of the graph is as follows:

- Cultural tourism (35%) – has the highest share. This indicates that the historical and cultural heritage of Azerbaijan plays a dominant role in the tourism structure.
- Recreational tourism (30%) – is in second place and is mainly associated with recreation areas in Baku, Absheron and the regions.
- Health tourism (15%) – is especially associated with Naftalan and spa centers.
- Winter tourism (10%) – is associated with Shahdag and other mountain resorts, but is seasonal in nature.
- Other directions (10%) – ecotourism, agrotourism and alternative tourism types are still at the development stage.

Statistical indicators show that the Azerbaijani tourism product is mainly formed on traditional directions. The share of alternative tourism types is low, which confirms the relevance of the diversification policy. The conducted comparative analysis shows that the main problem in the tourism sector of Azerbaijan is the limited product diversity and the seasonality factor. World experience proves that diversification of tourism products increases economic sustainability, stimulates regional development and strengthens international competitiveness (UNWTO, 2024).

**CONCLUSION.** The comparative analysis conducted shows that tourism products are dynamic and complex in the modern economic system. World experience proves that product diversity, service quality, innovation and effective marketing strategy are the main conditions for achieving competitive advantage in the tourism sector (Cooper & Fletcher, 2020). The experience of countries such as Spain, Turkey and Switzerland shows that diversification of tourism products allows for reducing seasonality, increasing tourism revenues and forming a sustainable position in the international market (UNWTO, 2024). In these countries, tourism is not only a recreational activity, but also acts as an important locomotive of economic growth. Azerbaijani tourism has been in a dynamic development stage in recent years and has rich natural, geographical and cultural potential. However, the concentration of tourism products mainly in traditional directions and the seasonality factor limit the sustainable development of the sector. The comparative analysis showed that there are wide opportunities for diversification of tourism products in Azerbaijan.

The following areas can be considered priorities:

- Development of agrotourism and rural tourism;
- Expansion of ecotourism routes;
- Creation of digital tourism platforms;
- Implementation of a sustainable and innovative tourism model in the Karabakh region;
- Formation of thematic and experience-based tourism products.

Thus, diversification of tourism products will not only increase the competitiveness of Azerbaijan in the international tourism market, but will also have a positive impact on the socio-economic development of the regions. Public-private sector cooperation, innovative approaches and the application of sustainable development principles should determine the main directions of future development of the tourism sector.

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## AZƏRBAYCANIN YAŞIL İQTİSADİYYAT SİYASƏTİ: STRATEJİ İSTİQAMƏTLƏR VƏ İNKİŞAF PERSPEKTİVLƏRİ

**RUHİYYƏ MƏNTİQ QIZI QƏMBƏROVA**

Dosent

Azərbaycan Dövlət Aqrar Universiteti

Magistr - **AFAQ FƏRRUX QIZI YUSUBOVA**

**Xülasə:** Məqalədə Azərbaycanın yaşıl iqtisadiyyat siyasətinin formalaşması, əsas strateji istiqamətləri və inkişaf perspektivləri təhlil olunur. Qlobal iqlim dəyişiklikləri və davamlı inkişaf çağırışları fonunda ölkənin bərpa olunan enerji mənbələrinin inkişafı, ekoloji təhlükəsizliyin təmin edilməsi və karbon emissiyalarının azaldılması sahəsində həyata keçirdiyi tədbirlər araşdırılır. Tədqiqat nəticəsində yaşıl iqtisadiyyat siyasətinin Azərbaycanın uzunmüddətli sosial-iqtisadi inkişaf strategiyasında mühüm yer tutduğunu müəyyən edilmişdir.

**Açar sözlər:** yaşıl iqtisadiyyat, davamlı inkişaf, bərpa olunan enerji, ekoloji siyasət və s.

### Giriş

Müasir dövrdə iqlim dəyişiklikləri, ekoloji tarazlığın pozulması və təbii resursların tükənməsi qlobal miqyasda ciddi problemlər yaradır. Bu problemlərin həlli üçün yaşıl iqtisadiyyat konsepsiyası aparıcı inkişaf modeli kimi qəbul edilir. Yaşıl iqtisadiyyat iqtisadi artımın ətraf mühitin qorunması və sosial rifahla uzlaşdırılmasını nəzərdə tutur (UNEP, 2011). Azərbaycan da bu qlobal tendensiyaya uyğun olaraq iqtisadi siyasətində yaşıl inkişaf prinsiplərini ön plana çıxarmışdır. Belə ki, Azərbaycan Respublikası da beynəlxalq çağırışlara uyğun olaraq öz milli inkişaf strategiyalarında yaşıl iqtisadiyyat prinsiplərinə xüsusi yer ayırmışdır.

Davamlı inkişaf məsələlərində əsasən ekoloji iqtisadiyyat və “yaşıl iqtisadiyyat” anlayışı tez-tez birgə istifadə olunur. Ekoloji iqtisadiyyat dedikdə, iqtisadiyyat elmində insan tərəfindən həyata keçirilən təsərrüfat fəaliyyətinin təbii komponentlərə, yəni ekosferə təsirlərini nəzərdə tutan və inteqrasiyasını təmin edən idarəetmə və elm paradigması başa düşülür. “Yaşıl iqtisadiyyat” isə bu paradigmaya əsaslanaraq aşağı karbon emissiyasını, resurs səmərəliliyini və sosial inklüziv inkişafı əsas götürür. Qeyd olunanları nəzərə alaraq belə qənaətə gəlmək olar ki, davamlı inkişaf konsepsiyası və onun həyata keçirilməsi ekoloji balansın təmin olunmasına imkan verən “yaşıl iqtisadiyyat” sayəsində mümkündür. (V.Ə.Qasımlı, 2022. Yaşıl iqtisadiyyat)

Elmi ədəbiyyatda yaşıl iqtisadiyyat aşağı karbonlu, resurs səmərəli və sosial inklüziv iqtisadi model kimi xarakterizə olunur (Pearce, Markandya & Barbier, 1989). Bu model ekoloji risklərin azaldılması ilə yanaşı yeni iqtisadi imkanların yaradılmasını da hədəfləyir. Dövlət tənzimlənməsi isə yaşıl iqtisadiyyatın formalaşmasında əsas institusional mexanizm kimi çıxış edir. Azərbaycan iqtisadiyyatında bu yanaşma xüsusilə enerji sektorunun şaxələndirilməsi və ekoloji davamlılığın təmin olunması baxımından aktualdır.

Azərbaycan Respublikasında yaşıl iqtisadiyyat siyasəti bir sıra strateji sənədlərə əsaslanır. Ölkənin milli inkişaf strategiyalarında dayanıqlı inkişaf, ekoloji təhlükəsizlik və enerji səmərəliliyi prioritet istiqamətlər kimi müəyyən edilmişdir. Azərbaycan beynəlxalq səviyyədə BMT-nin Dayanıqlı İnkişaf Məqsədlərinə və iqlim dəyişikliyi üzrə qlobal təşəbbüslərə qoşulmaqla ekoloji öhdəliklərini gücləndirmişdir (UNDP, 2020). Azərbaycan Respublikasında yaşıl iqtisadiyyat siyasətinin hüquqi əsasları bir sıra mühüm sənədlərdə əks olunmuşdur. “Azərbaycan Respublikasının ətraf mühitin mühafizəsi haqqında” Qanunu ekoloji təhlükəsizliyin təmin edilməsini dövlət siyasətinin prioriteti kimi müəyyən edir.

Bununla yanaşı, “Azərbaycan 2030: sosial-iqtisadi inkişafa dair Milli Prioritetlər” sənədində “təmiz ətraf mühit və yaşıl artım ölkəsi” strateji məqsəd kimi təsbit edilmişdir. Bu sənəd yaşıl

iqtisadiyyatın milli inkişaf modelində əsas istiqamətlərdən biri olduğunu göstərir (Azərbaycan Respublikası Prezidentinin Sərəncamı, 2021).

Azərbaycanın yaşıl iqtisadiyyat siyasətində bərpa olunan enerji mənbələrinin inkişafı xüsusi yer tutur. Günəş və külək enerjisi potensialının reallaşdırılması enerji təhlükəsizliyinin möhkəmləndirilməsinə və karbon emissiyalarının azaldılmasına xidmət edir. Azad edilmiş ərazilərin “yaşıl enerji zonası” elan edilməsi regionun ekoloji baxımdan dayanıqlı inkişafına yönəlmiş strateji addım kimi qiymətləndirilir (IEA, 2022). Xüsusilə Qarabağ və Şərqi Zəngəzur iqtisadi rayonlarının “yaşıl enerji zonası” elan edilməsi dövlətin ekoloji yönümlü inkişaf strategiyasının bariz nümunəsidir. Bu təşəbbüs həm regional inkişafı sürətləndirir, həm də karbon emissiyalarının azaldılmasına töhfə verir.

Qeyd etmək lazımdır ki, enerji səmərəliliyinin artırılması yaşıl iqtisadiyyatın əsas komponentlərindəndir. Azərbaycanda sənaye, nəqliyyat və məişət sektorlarında enerji qənaətinin təşviqi ekoloji yükün azaldılmasına imkan yaradır. Bu yanaşma həm iqtisadi səmərəliliyin yüksəldilməsinə, həm də ətraf mühitin qorunmasına müsbət təsir göstərir (World Bank, 2019). Həmçinin qeyd edək ki, enerji resurslarından səmərəli istifadə Azərbaycanın yaşıl iqtisadiyyat siyasətinin əsas istiqamətlərindən biridir. Enerji səmərəliliyi üzrə dövlət proqramları sənaye və məişət sektorlarında enerji itkilərinin azaldılmasına yönəlmişdir. Eyni zamanda tullantıların idarə olunması və ekoloji monitorinq mexanizmlərinin təkmilləşdirilməsi ətraf mühitə mənfi təsirlərin minimuma endirilməsinə xidmət edir (Ekologiya və Təbii Sərvətlər Nazirliyi, 2022).

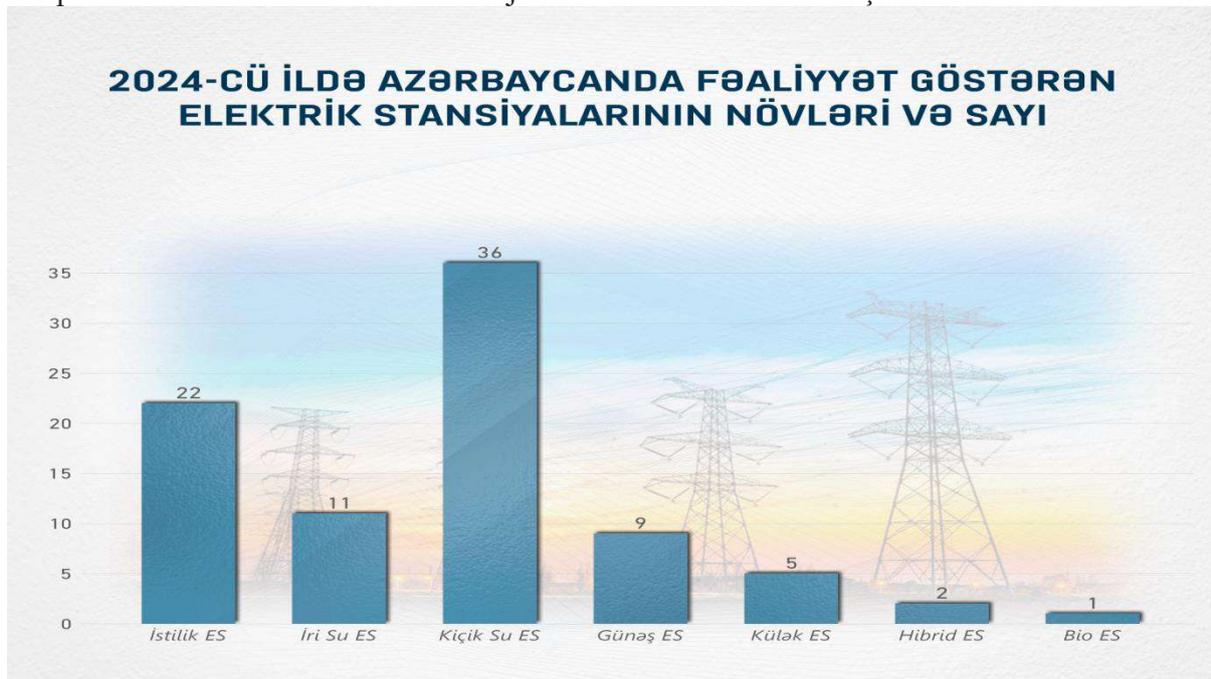
Tullantıların idarə edilməsi, ekoloji dayanıqlığın və əhalinin sağlamlığının qorunmasında mühüm rol oynayır. Bu proses ekosistemlərə və insanların rifahına mənfi təsirləri minimuma endirmək üçün tullantı materiallarının təşkili və nəzarətini nəzərdə tutur. Tullantıların səmərəli idarə edilməsinin əsas məqsədi tullantıların əmələ gəlməsini azaltmaq, təkrar emal və təkrar istifadə yolu ilə resursların bərpasını optimallaşdırmaq və təkrar emal oluna bilməyən və təhlükəli tullantıların təhlükəsiz utilizasiyasını təmin etməkdir. Geniş tərkibə malik bu proses tullantıların toplanması, daşınması, emalı və son utilizasiyası kimi müxtəlif tədbirləri əhatə edir. Effektiv tullantıların idarə edilməsi yanşmalarının tətbiqi çirklənmənin azaldılması, təbii ehtiyatların qorunması və dövri iqtisadiyyatın təşviqi üçün çox vacibdir.

#### Tullantıların idarə olunması və ətraf mühitə təsirləri

Göstərici	Təsviri	Ətraf mühitə mənfi təsiri
Məişət tullantılarının həcmi (min ton/il)	Əhali və müəssisələr tərəfindən yaranan tullantıların ümumi miqdarı	Torpaq çirklənməsi, landşaftın pozulması
Sənaye tullantılarının həcmi (min ton/il)	İstehsal prosesləri nəticəsində yaranan tullantılar	Torpaq və su ehtiyatlarının çirklənməsi
Təkrar emal olunan tullantıların payı (%)	Yenidən emal edilən tullantıların ümumi tullantılara nisbəti	Təbii resursların qorunması (mənfi təsirin azalması)
Poliqonlara göndərilən tullantılar (%)	Basdırılan tullantıların payı	Metan qazı emissiyası, torpaq və yeraltı suların çirklənməsi
Təhlükəli tullantıların həcmi (ton/il)	Kimyəvi, tibbi və digər riskli tullantılar	İnsan sağlamlığı üçün risk, ekosistemlərin zədələnməsi
Yandırılma yolu ilə zərərsizləşdirmə (%)	Yandırılan tullantıların payı	Hava çirklənməsi, CO <sub>2</sub> və toksik qaz emissiyaları
Tullantı idarəetmə infrastrukturunu (obyekt sayı)	Poliqonlar, çeşidləmə və emal zavodları	Effektiv idarəetmə olmadıqda çirklənmənin artması
Qeyri-qanuni tullantı sahələri (say)	Nəzarətsiz tullantı yığılma yerləri	Torpaq, su və biomüxtəlifliyə ciddi zərər

Mənbə: Müəllif tərəfindən tərtib edilmişdir.

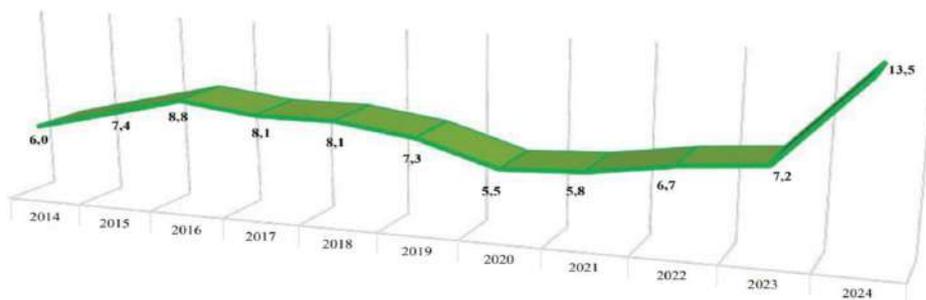
Qeyd etmək lazımdır ki, ölkəmizdə 9 günəş, 5 külək və 1 bio elektrik stansiyası elektrik enerjisi hasil edir. Bundan başqa Azərbaycanda 2 hibrid elektrik stansiyası da var ki, külək, günəş və bioqazdan istehsal olunan elektrik enerjisi hibrid formada elektrik şəbəkəsinə ötürülür.



Mənbə: **MTM-in (Media Təhlil Mərkəzi) Dövlət Statistika Komitəsinin, Energetika Nazirliyinin və Bərpa Olunan Enerji Mənbələri Dövlət Agentliyinin rəsmi internet sahifəsi.**

Aparılan araşdırmalardan məlum olur ki, Azərbaycanın elektrik enerjisi istehsalında bərpa olunan enerji mənbələrinin payı iki dəfədən çox artmışdır. Belə ki, Azərbaycan Dövlət Statistika Komitəsinin məlumatına əsasən, 2020-ci ildə 5,5% təşkil etdiyi halda, 2024-cü ildə 13,5%-ə yüksəlmişdir.

Bərpa olunan enerji mənbələrindən alınan elektrik enerjisinin ümumi elektrik enerjisi istehsalında xüsusi çəkisi, faizlə  
 Share of electricity generated from renewable sources in total production of electricity, in percent



Mənbə: Azərbaycan Dövlət Statistika Komitəsinin məlumatları.

**Bərpa olunan mənbələrdən enerji təchizatı**

Ümumi enerji təchizatı	2020	2021	2022	2023	2024
	16642,8	17566,6	18655,4	18850,2	18480,8
Hidroenerji	92,8	109,8	137,2	151,6	258,7

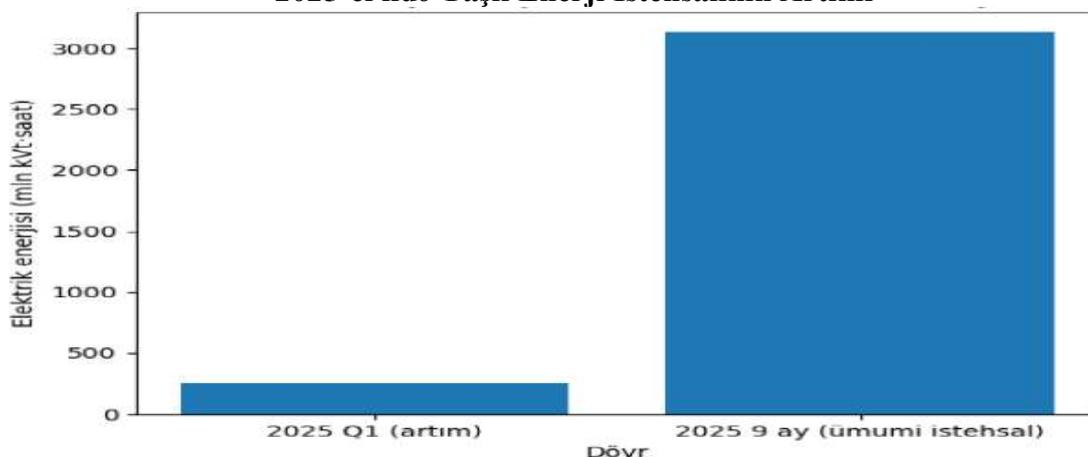
Hidroenerjinin ümumi enerji təchizatında xüsusi çəkisi,%-lə	0,5	0,6	0,7	0,8	1,4
<b>Biokütlə və tullantılar</b>	<b>108,4</b>	<b>102,6</b>	<b>96,1</b>	<b>97,9</b>	<b>101,2</b>
Biokütlə və tullantıların ümumi enerji təchizatında xüsusi çəkisi, %-lə	0,7	0,6	0,5	0,5	0,5
<b>Külək elektrik enerjisi</b>	<b>8,3</b>	<b>0,9</b>	<b>7,2</b>	<b>4,8</b>	<b>4,4</b>
Külək elektrik enerjisinin ümumi enerji təchizatında xüsusi çəkisi, %-lə	0,1	0,1	0,1	0,0	0,0
<b>Günəş elektirk enerjisi</b>	<b>4,0</b>	<b>4,8</b>	<b>5,2</b>	<b>6,9</b>	<b>47,9</b>
Günəş elektirk enerjisinin ümumi enerji təchizatında xüsusi çəkisi, %-lə	0,0	0,0	0,0	0,1	0,3
<b>Bərpa olunan mənbələrdən enerji təchizatının cəmi</b>	<b>212,7</b>	<b>225,1</b>	<b>245,7</b>	<b>261,2</b>	<b>412,2</b>
Bərpa olunan mənbələrdən enerji təchizatının cəminin ümumi enerji təchizatında xüsusi çəkisi, %-lə	1,3	1,3	1,3	1,4	2,2

**Mənbə: ADSK-nin məlumatları əsasında müəllif tərəfindən tərtib edilmişdir.**

Məlumatlara görə, elektrik enerjisi istehsalında bərpa olunan enerjinin payı 2021-ci ildə 5,8%, 2022-ci ildə 6,7%, 2023-cü ildə isə 7,2% olmuşdur. Eyni zamanda, 2024-cü ildə ümumi enerji təchizatında bərpa olunan enerjinin payı 2,2% təşkil etmişdir. Mənbələrə əsasən, bu göstəricinin 1,4%-i hidroenerjinin, 0,5%-i biokütlə enerjisinin, 0,3%-i isə günəş enerjisinin payına düşmüşdür. Onu da qeyd etmək lazımdır ki, bərpa olunan enerji mənbələrinin elektrik enerjisi istehsal mənbələrinin ümumi quraşdırılmış gücündəki payı 20,2% təşkil etmişdir.

Bundan başqa, tədqiqatın aparılmasında 2025-ci ildə yaşıl enerji istehsalının artımı üzrə məlumatlar da müşahidə edilmişdir.

#### 2025-ci ildə Yaşıl Enerji İstehsalının Artımı



**Mənbə: Azərbaycan Respublikası Energetika Nazirliyi və Azərbaycan Respublikasının Dövlət Statistika Komitəsi, "Azərbaycanın energetikası" statistik məcmuəsi.**

Diaqram göstəricilərdən məlum olur ki, 2025-ci ilin I rübü: Yaşıl enerji istehsalında 243,9 mln kVt-saat artım və ümumi olaraq, 9 ay ərzində bərpa olunan mənbələrdən 3139,1 mln kVt-saat elektrik enerjisi istehsal edilib.

Müasir iqtisadi inkişaf modelinin ekoloji baxımdan dayanıqsız olması, resursların qeyri-səmərəli istifadəsi və iqlim dəyişmələri ilə bağlı risklərin artması sübut edir ki, yaşıl iqtisadiyyata keçid qlobal və milli səviyyədə strateji zərurətdir. Azərbaycan da daxil olmaqla bir çox ölkələrdə yaşıl iqtisadiyyatın inkişafı üçün hüquqi baza mövcud olsa da, onun tətbiqi mexanizmləri və institusional koordinasiya tam yetkin deyil. Xüsusilə maliyyələşmə, innovasiya təşviqi və idarəetmə effektivliyi sahəsində boşluqlar mövcuddur. Təhlillər göstərir ki, yaşıl iqtisadiyyatın inkişafına mane olan əsas problemlər yaşıl texnologiyaların yüksək ilkin dəyəri, ekoloji məlumatlılığın məhdudluğunu, iqtisadi motivasiya mexanizmlərinin zəifliyi və s göstərmək olar. Bundan başqa, tədqiqat nəticəsində müəyyən edilmişdir ki, dövlət tənzimlənməsinin strateji istiqamətləri kimi bərpa olunan enerji mənbələrinin genişləndirilməsi, yaşıl investisiya və “ağıllı maliyyə” mexanizmlərinin tətbiqi, ekoloji standartların sərtləşdirilməsi və effektiv monitoring, yaşıl texnologiyaların tətbiqi üçün innovasiya dəstəyi aid etmək olar. Tədqiqatın yekun nəticəsi olaraq müəyyən edilmişdir ki, dövlət tənzimlənməsi yaşıl iqtisadiyyatın səmərəli inkişafı üçün əsas determinantdır və strateji yanaşmanın möhkəmləndirilməsi ölkənin uzunmüddətli davamlı inkişaf hədəflərinə çatmasını təmin edə bilər.

### **Nəticə və təkliflər**

Tədqiqatın yekun nəticəsi olaraq müəyyən edilmişdir ki, bərpa olunan enerji mənbələrinin elektrik enerjisi istehsalında artımında Azərbaycanın bərpa olunan enerji sektoruna investisiyaların effektivliyini və yaşıl enerji siyasətinin real nəticələrini təsdiqləyir. Ümumi enerji təchizatında bərpa olunan enerjinin payı enerji infrastrukturunda yaşıl texnologiyaların artan rolunu göstərir.

Beləliklə, 2025-ci ildə yaşıl enerji istehsalının artımı 2020-ci illə müqayisədə çox böyük artım deməkdir və Azərbaycanın yaşıl enerji siyasətinin sürətlə irəlilədiyini göstərir. Enerji səmərəliliyi və karbon emissiyalarının azaldılması istiqamətində enerji səmərəliliyi tədbirləri və bərpa olunan enerji istifadəsi nəticəsində qaz istifadəsi və istixana qazı emissiyalarında nəzərəcərpacaq azalma potensialı yaranmışdır ki, bu da enerji səmərəliliyi strategiyaları həm iqtisadi baxımdan qənaət gətirir, həm də ətraf mühitin qorunmasına töhfə verir.

Dövlət siyasətinin effektivliyi istiqamətində Azərbaycanın yaşıl iqtisadiyyat strategiyası – qanunvericilik, maliyyə stimulları, bərpa olunan enerji zonalarının yaradılması, enerji səmərəliliyi proqramları və elmi-innovativ təşəbbüslər – nəticələrdə özünü göstərir. Bütün bunların nəticəsində 2020–2025-ci illər aralığında statistik göstəricilər göstərir ki, dövlətin ardıcıl və məqsədyönlü siyasəti bərpa olunan enerji istehsalını artırmış, enerji sektorunda ekoloji davamlılığa nail olmuşdur. Bundan başqa, yaxın perspektivdə əldə olunan nəticələr gələcəkdə bərpa olunan enerji payının daha da artırılacağını, enerji səmərəliliyinin yüksələcəyini və karbon emissiyalarının azaldılmasını proqnozlaşdırmağa imkan verir.

Beləliklə, aparılan təhlil göstərir ki, Azərbaycanın yaşıl iqtisadiyyat siyasəti ölkənin uzunmüddətli sosial-iqtisadi inkişaf strategiyasının mühüm tərkib hissəsidir. Bərpa olunan enerji mənbələrinin inkişafı, enerji səmərəliliyinin artırılması və ekoloji təhlükəsizliyin təmin edilməsi dövlət siyasətinin əsas prioritetləri kimi çıxış edir. Bu istiqamətlərin ardıcıl həyata keçirilməsi Azərbaycanın qlobal yaşıl iqtisadiyyat sistemində inteqrasiyasını sürətləndirir və dayanıqlı inkişaf üçün möhkəm zəmin yaradır.

Azərbaycanın yaşıl iqtisadiyyat və enerji səmərəliliyi mövzusunda aparılan araşdırma zamanı bir sıra təklifləri də qeyd etmək olar:

1. Günəş, külək və biokütlə potensialı yüksək olan ərazilərdə yeni elektrik stansiyalarının qurulması.
2. Azad edilmiş ərazilərdə yaşıl enerji zonalarının genişləndirilməsi.
3. Sənaye, tikinti və nəqliyyat sektorlarında enerji səmərəli texnologiyaların tətbiqi.
4. İstehlakçı səviyyəsində enerji qənaəti proqramlarının təşviqi, smart metering və texnologiyaların geniş istifadəsi.
5. Dövlət proqramları ilə yaşıl infrastruktur layihələrinin maliyyələşdirilməsi.
6. Yaşıl texnologiyalar üzrə elmi tədqiqatların artırılması.
7. Start-up və texnoloji inkubatorların yaşıl enerji sektoruna yönləndirilməsi.

Bütün bu kimi təkliflər Azərbaycan üçün yaşıl iqtisadiyyatın sürətli inkişafına və enerji səmərəliliyi siyasətinin effektivliyinin artırılmasına müsbət təsir edir. Onlar həm dövlət siyasətini, həm özəl sektor investisiyalarını, həm də ictimai iştirak və elmi tədqiqatları əhatə edir.

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## РАЗРАБОТКА СТРАТЕГИИ ПО СОВЕРШЕНСТВОВАНИЮ ИНВЕСТИЦИОННОЙ ПРИВЛЕКАТЕЛЬНОСТИ СЕЛЬСКОГО ХОЗЯЙСТВА

**САЙДАХМАДОВА ШАРИФГУЛ САМАДОВНА**

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**Аннотация:** В последние годы, несмотря на некоторые признаки оживления экономики сельского хозяйства, положение в инвестиционной сфере остается сложным. Не определены приоритетные сферы эффективного инвестирования, не разработана стратегия привлечения инвестиций в различные отрасли аграрного сектора. В нынешних условиях для привлечения инвестиций необходимо создать определенные условия. Поэтому возможности привлечения инвестиций в сельское хозяйство во многом зависят от того, какие условия созданы для деятельности инвесторов, влияющих на результаты инвестиционного процесса, на сколько благоприятен его инвестиционный климат.

**Ключевые слова:** Экономика, производственные фонды, финансирования, аграрные предприятия, сельское хозяйство.

**Key words:** Economy, production assets, financing, agricultural enterprises, agriculture.

Практика показывает, что многие иностранные инвесторы в Таджикистане находят интересные проекты, осуществление которых является весьма привлекательным и прибыльным. Однако все еще имеет место настороженность, опасение инвесторов потерять свои инвестиции. Вместе с тем, нам представляется, что эти опасения обусловлены и рядом субъективных причин, в том числе недостаточным знанием законов Республики Таджикистан, гарантирующих защиту интересов иностранных инвесторов. Каждое государство должно прилагать усилия для привлечения в страну инвестиций. С этой целью проводится определенная инвестиционная политика и формируется соответствующий инвестиционный климат, на который влияют наличие или отсутствие политической и экономической стабильности в стране, ее географическое положение, налоговые льготы, предоставленные инвесторам возможность свободного вывоза капитала, наличие квалифицированных кадров, соответствующих сырьевых ресурсов, развитость транспортных сетей и другие факторы. Однако, прежде всего, в стране должна существовать определенная правовая основа для инвестиционной деятельности, т.е. должны быть приняты законодательные акты и другие нормативные документы, способствующие привлечению инвестиций.

Данная работа обосновывается выводом о том, что Республика Таджикистан путем привлечения крупных иностранных инвестиций в экономику может добиться устойчивого экономического роста. В стране необходимо создать условия, которые могли бы способствовать привлечению иностранных инвестиций. Необходимо обеспечить политическую стабильность и безопасность, господства закона, проводить хорошо продуманную макроэкономическую политику, ориентированную на обеспечение стабильных цен, твердой налоговой дисциплины и устойчивого равновесия платежного баланса.

Исходным этапом процесса разработки стратегии повышения инвестиционной привлекательности сельского хозяйства Республики Таджикистан является анализ стратегических факторов среды, в которой функционирует сельское хозяйство. Широко используемая и наиболее известная методика SWOT-анализа нами была применена при разработке этой стратегии в сельском хозяйстве (табл.1.).

По нашему мнению, одним из важнейших факторов, влияющих на инвестиционную привлекательность сельского хозяйства республики, является государственная поддержка. В настоящее время существует нормативно-правовая база, регулирующая инвестиционную

деятельность. Анализ основных параметров нормативного правового регулирования инвестиционной деятельности показал, что в Республике Таджикистан законодательно не закреплены в соответствующем законе приоритетные направления инвестиций.

**Таблица 1.**

**SWOT-анализ повышения инвестиционной привлекательности сельского хозяйства Республики Таджикистан**

<b>Сильные стороны (S)</b>	<b>Слабые стороны (W)</b>
<ol style="list-style-type: none"> <li>1. Более высокие льготы иностранным инвесторам на весь срок окупаемости инвестиционного проекта.</li> <li>2. Выгодное экономико-географическое и геополитическое положение, и высокий туристический потенциал.</li> <li>3. Сформированная нормативно-правовая база для привлечения иностранных инвестиций отраслям национальной экономики.</li> <li>4. Богатое историческое прошлое и развитый культурный потенциал.</li> <li>5. Наличие водно-природных ресурсов.</li> <li>6. Благоприятная экологическая ситуация.</li> </ol>	<ol style="list-style-type: none"> <li>1. Низкий уровень доходов сельского населения и низкая квалификация трудовых кадров.</li> <li>2. Низкий производственный потенциал.</li> <li>3. Низкий уровень развития инфраструктурных отраслей и плохое техническое состояние имеющейся производственной инфраструктуры.</li> <li>4. Низкие государственные вложения в аграрную науку.</li> <li>5. Низкий уровень эффективности функционирования рыночных институтов, включая банковские учреждения, реальное отсутствие фондового рынка.</li> <li>6. Практически полное отсутствие вторичного рынка ценных бумаг.</li> </ol>
<b>Возможности (O)</b>	<b>Угрозы (T)</b>
<ol style="list-style-type: none"> <li>1. Развитие отраслей переработки сельскохозяйственной продукции.</li> <li>2. Активная пропаганда инвестиционной привлекательности основных и высокодоходных отраслей сельского хозяйства.</li> <li>3. Принятие закона «Об инвестиции» с учетом отраслевых характеристик сельского хозяйства, экономико-социального положения и географического расположения.</li> <li>4. Создание специального государственного органа, отвечающего за привлечением инвестиций в сельское хозяйство с четкой программой для оздоровления инвестиционного климата и эффективного управления инвестиционным процессом в аграрном секторе республики</li> <li>5. Разработка и экспертиза инвестиционных проектов направляемых в сельское хозяйство за счет государственного бюджета.</li> </ol>	<ol style="list-style-type: none"> <li>1. Основные вложения иностранных инвесторов приходятся на энергетику, промышленность, связь и услуги.</li> <li>2. Недостаток достоверных информации о сельскохозяйственных предприятиях и их инвестиционных проектах для принятия инвестиционного решения</li> <li>3. Неверно выбранные приоритеты инвестиционной политики государства могут негативно отразиться на развитии сельского хозяйства.</li> <li>4. Дальнейшая недооценка инвесторами отраслей сельского хозяйства с учетом производственно-технических, социальных и финансово-экономических рисков может привести к потере инвесторов и еще большему ухудшению инвестиционной привлекательности сельского хозяйства.</li> <li>5. Чрезмерно накопленные долги хлопководческой отрасли могут отрицательно влиять на инвестиционный климат в сельском хозяйстве.</li> </ol>

К таким приоритетам можно отнести развития перспективных отраслей сельского хозяйства, переработка сельскохозяйственной продукции товаропроизводителей, инновационная деятельность в сельском хозяйстве и другие.

До настоящего времени остается недостаточным объем инвестиции в развитии отраслей сельского хозяйства. В 2024 году общий объем инвестиции, включая кредиты банков, привлеченные в аграрный сектор республики, составляет 128,5 млн долларов. Исследованиями выяснилось, что уровень вложения инвестиций в сельское хозяйство не соответствует уровню использования. Поэтому эффективное использование инвестиций имеет непосредственное влияние на реальное повышение инвестиционной активности отраслей сельского хозяйства.

В условиях рынка необходимость привлечения инвестиций в сельское хозяйство является одной из важнейших задач на ближайшие годы, без решения которой невозможно оздоровление аграрного сектора республики. В настоящее время в сельском хозяйстве страны сохраняется ряд системных проблем. Они являются сдерживающими факторами в дальнейшее развитие отрасли и привели к снижению инвестиционной активности и создают неблагоприятный инвестиционный климат в сельском хозяйстве.

В последние годы коммерческие банки республики заинтересованы финансировать аграрный сектор. Прежде всего, это связано с ростом привлекательности некоторых отраслей сельского хозяйства и усилением системы государственной кредитной поддержки аграрного производства. Однако, долгосрочные кредиты не получили широкого распространения в сельском хозяйстве. Поэтому для восполнения этого пробела коммерческим банкам необходимо внести изменения в свою политику и увеличить объемы выдачи долгосрочного кредита сельскому хозяйству.

В условиях Таджикистана, когда отрасль хлопководство является убыточной, перспективным и приоритетным направлением может стать вложение капитала в развитие садоводства и виноградарства, которые в нашей республике имеют важное народнохозяйственное значение. Вместе с тем, практическая значимость развития этих отраслей открывают возможности роста аграрной экономики и экспортного потенциала страны. Для увеличения производства продукции этих культур и насыщения рынка качественной отечественной продукцией, необходимо оказать поддержку развитию горно-долинного садоводства через механизм предоставления бюджетных средств и за счет средств отечественных и иностранных инвесторов. Необходимо стимулировать развитие плодородства и виноградарства путем создания и модернизации имеющихся мощностей перерабатывающего комплекса, развития рынка, сбыта продукции с активным применением налоговых и ценовых рычагов.

Для дальнейшего развития сельского хозяйства и повышения качества и урожайности сельскохозяйственных культур, а также для поднятия экономики этой отрасли предлагаем принять следующие меры:

- необходимо применять на практике научные достижения и передовой опыт, которые являются одним из основных факторов повышения эффективности отраслей сельского хозяйства;

- необходимо принять первоочередные меры по совершенствованию материально-технической базы сельского хозяйства путем обновления парка машин и оборудования за счет лизинговых поставок. Целесообразно в регионах республики создать такое снабженческое предприятие, которое могло бы обеспечить достаточным количеством материально-техническими ресурсами (минеральные удобрения, ядохимикаты, топливо, смазочные материалы, сельскохозяйственные техники и запасные части), а также качественными высокоурожайными и научно испытанными элитными семенами по реальной рыночной цене;

- Министерство сельского хозяйства Республики Таджикистан, Таджикская Академия сельскохозяйственных наук и Таджикский аграрный университет в ходе реализации грантовых программ международных финансовых организаций на местах должны

организовать тренинги по изучению современных методов и передовой технологии производства, обработки и реализации сельскохозяйственных культур;

- соответствующим министерствам и ведомствам необходимо разработать инвестиционные проекты по развитию сельского хозяйства и программы по улучшению оросительных и мелиоративных сетей в сельской местности;

- необходимо разработать государственные целевые программы развития отдельных отраслей сельского хозяйства, отражающие политику Правительства Республики Таджикистан.

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## FROM BEHAVIORAL ROLES TO DIGITAL FUNCTIONS: RETHINKING THE BELBIN MODEL IN DIGITAL AGE HR PRACTICES

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**Abstract:** *Digital transformation has radically changed the nature of teamwork: hybrid and distributed formats, asynchronous communication, platform-based HR systems, and algorithmic control prevail. In this environment, M. Belbin's classic model of team roles, developed for stable face-to-face teams of the 20th century, requires critical rethinking. The problem lies in the inertial use of the model without taking into account new realities—remoteness, fragmentation of responsibility, and the replacement of some behavioral functions with algorithms. The article assesses the limits of the model's applicability in the digital era, identifying aspects that remain relevant (idea generation, strategic thinking, balance of contributions) and areas of lost explanatory power (diagnostics in an asynchronous environment, static roles). A transition from fixed behavioral roles to dynamic functions **that** are context-dependent and integrated with HR analytics is justified. Belbin's model is viewed as a diagnostic rather than a normative tool, requiring methodological adaptation to the conditions of digital transformation.*

**Keywords:** *Belbin model, HR digitalization, team roles, digital teams, remote work, HR analytics, dynamic functions.*

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Recent decades have seen an accelerated digital transformation of organizations, affecting not only technology but also the very architecture of teamwork. The spread of hybrid forms of employment, the growth of remote work, and the development of platform-based HR systems and digital monitoring tools have changed the way employees interact. Teams increasingly exist not as physical spaces of shared presence, but as a network of interfaces, tasks, and digital traces.

Under these conditions, the logic of role distribution, leadership, and responsibility is being transformed. Employee behavior is becoming less directly observable and is increasingly interpreted through performance indicators, digital profiles, and engagement metrics. Team management increasingly relies on algorithms and data rather than direct observation. This calls into question the applicability of classical models of organizational behavior developed within industrial or early post-industrial management logic.

Meredith's Team Role Model The Belbin model is one of the most widely used concepts in team building and development. It is widely used in manager training, personnel assessment, and project work. However, its application in the digital environment is often inert: roles are interpreted as stable personality traits, test results are integrated into HR platforms, and the model itself is used as a universal team diagnostic tool.

The model's initial assumptions were developed in the context of offline teams, relatively stable organizational structures, and observable behavioral interactions. In digital teams, behavior is often mediated by technology, communication becomes asynchronous, and responsibility is distributed

between people and algorithms. This creates the risk of replacing real team dynamics with formal digital profiles and KPIs, which can create the illusion of control without a real understanding of the processes taking place. A theoretical and practical gap arises between the classical behavioral model and modern organizational reality.

Meredith's Team Role Model Belbin's theory of collaboration emerged within the management paradigm of the second half of the 20th century, a period when organizations were characterized by relative structural stability, clear hierarchies, and predominantly face-to-face interactions between employees. Belbin's research, conducted as part of management experiments at Henley Management College, relied on observing the behavior of participants in collaborative work settings in physical spaces [1].

The organizational logic of the time assumed stable team composition, predictable work processes, and the dominance of direct communication. The behavioral approach underlying the model reflected a desire to move away from a rigid personality typology and toward an analysis of functional behavioral manifestations within a team. This represented a step forward from purely psychological tests, as the emphasis shifted to the individual's contribution to the collective outcome [2].

It's important to note that the model was developed in a non-algorithmic management environment. Team dynamics were captured through observable behavior, while leadership was demonstrated through direct interaction. Digital communication tools were absent, and performance measurement was not entirely quantitative.

The Belbin model is based on the idea that team effectiveness is determined not so much by the individual competencies of its members, but by the balance of behavioral roles they perform during their collaborative activities. A role, in this logic, is not a position or a formal function, but a stable behavioral tendency manifested in typical ways of responding, making decisions, and interacting with other team members [1].

Belbin identified nine team roles, grouped into three categories: action-oriented, thinking-oriented, and interaction-oriented. Each role describes a participant's distinctive contribution to the overall result—from idea generation and strategic analysis to process coordination and maintaining a team atmosphere. Furthermore, each role encompasses both strengths and acceptable weaknesses, emphasizing the model's rejection of the idealization of the "universal employee" [1,2].

A key feature of the concept is its dynamic nature: it assumes that a person can exhibit multiple roles, and their expression depends on the context and team composition. However, in practical applications, the model is often interpreted statically—as a fixed personality profile, which simplifies the author's original logic.

The model is built on the assumption that observable behavior is sufficient to diagnose a role, and that direct interaction allows for the identification of each participant's contribution. This assumption is becoming the subject of critical analysis in the digital environment, where behavior is increasingly mediated by technology, and contribution is recorded through metrics and digital traces rather than through direct observation.

The essence of the model is an attempt to explain collective effectiveness through behavioral diversity. However, transferring this logic to the digital age requires a reconsideration of the very understanding of the role—from a stable behavioral pattern to a context-dependent function manifested in changing organizational conditions.

Despite its historical context, the Belbin model possesses a number of enduring advantages that explain its long-standing popularity in management practice. First and foremost, its strength lies in its operationalizability: roles are described using clear behavioral logic and are easily translated into practical recommendations for team formation and development. Managers gain a tool to understand employees' contributions not only through formal functions but also through their type of participation in teamwork.

The second advantage of the model is its rejection of a rigid hierarchy of role values. No single role is declared "best" or "key"; team effectiveness is linked to balance, not the dominance of one

behavior type. This is especially important for project-based environments, where a diversity of approaches—from strategic thinking to meticulous implementation—promotes sustainable results.

The third strength is the universality of the underlying logic. The idea that teams benefit from behavioral diversity is supported by numerous studies in organizational behavior and cognitive psychology. The model provides a language for describing this diversity and thereby reduces interpersonal conflicts, shifting them from the realm of "personality differences" to the realm of functional contribution.

However, it's important to emphasize that these advantages are realized when the model is applied correctly—as a diagnostic tool for analyzing team dynamics, not as a mechanism for rigidly classifying employees. It's the balance between practical simplicity and methodological rigor that determines its sustainability in the modern management environment.

Digital transformation has changed not only work tools but also the very structure of teamwork. A modern team is increasingly less a stable group of employees physically located in the same space and included in a single hierarchy. The "presence team" is being replaced by the "interface team"—a distributed, hybrid, and often temporary configuration of participants interacting through digital platforms [7,8].

The first key characteristic of a digital team is remoteness. Participants may be located in different cities and time zones, and communication occurs primarily through instant messaging, video conferencing, and corporate platforms [9]. This reduces spontaneous interaction and increases the importance of formal communication channels. Behavioral manifestations become less directly observable and are more often recorded in digital traces—messages, comments, and tasks in trackers.

The second characteristic is asynchrony. Decisions are not necessarily made in real time; discussions are spread out over time, and participation can be fragmented. This transforms the dynamics of leadership and coordination: influence is determined not only by charisma and immediate presence, but also by the ability to structure information and manage task flows.

The third characteristic is the fragmentation of responsibility. In the digital environment, some functions are delegated to algorithms and platforms: systems automatically distribute tasks, record deadlines, and calculate performance indicators. As a result, a participant's contribution is assessed not only through collective perception but also through quantitative metrics [5].

The digital team represents a new organizational form in which behavior is mediated by technology, communication becomes intertwined, and human roles are intertwined with the functions of the digital infrastructure. It is in this environment that a re-evaluation of traditional behavioral models, including the Belbin model, is required, as the very nature of how team roles are manifested is changing.

One of the key characteristics of the digital age is the algorithmization of management processes. Modern HR platforms, task management systems, performance assessment tools, and analytical dashboards create an environment in which a significant portion of management decisions are based on data, metrics, and automated procedures [6].

Algorithmization manifests itself primarily in the standardization of performance indicators. KPIs, digital task trackers, rating systems, and automated deadline monitoring mechanisms set formal boundaries for employee behavior. Team dynamics are increasingly assessed through quantitative indicators—task completion speed, engagement levels, productivity metrics—which strengthens the focus on measurable results and reduces the significance of difficult-to-record behavioral contributions [5].

This has a direct impact on the distribution of roles within the team. The behavioral characteristics described by the Belbin model may become secondary to the functional requirements of the system. For example, the role of coordinator or "team worker" may be partially replaced by algorithmic mechanisms for task distribution and interaction control. At the same time, roles associated with data analysis, information flow management, and interpretation of numerical indicators gain importance.

Moreover, algorithmization creates the risk of reducing complex social dynamics to a set of formal criteria. This creates the illusion of complete control: if behavior is recorded in the system, it is explained and controlled. However, digital metrics reflect only part of the team's reality, leaving informal connections, emotional support, and creative interactions out of sight [1,6].

The algorithmization of management not only changes control tools but also transforms the very logic of team dynamics. In this environment, behavioral roles must be considered in light of the fact that some functions are redistributed between people and digital systems, and performance criteria become predominantly quantitative [5].

The digital environment has changed not only team structure but also the ways in which leadership is demonstrated and how members interact. While in the classic management model, influence was often based on personal presence, nonverbal communication, and charisma, in a digital team these mechanisms are partially losing their power. Leaders increasingly interact indirectly, but through interfaces—messages, tasks, regulations, and digital reports.

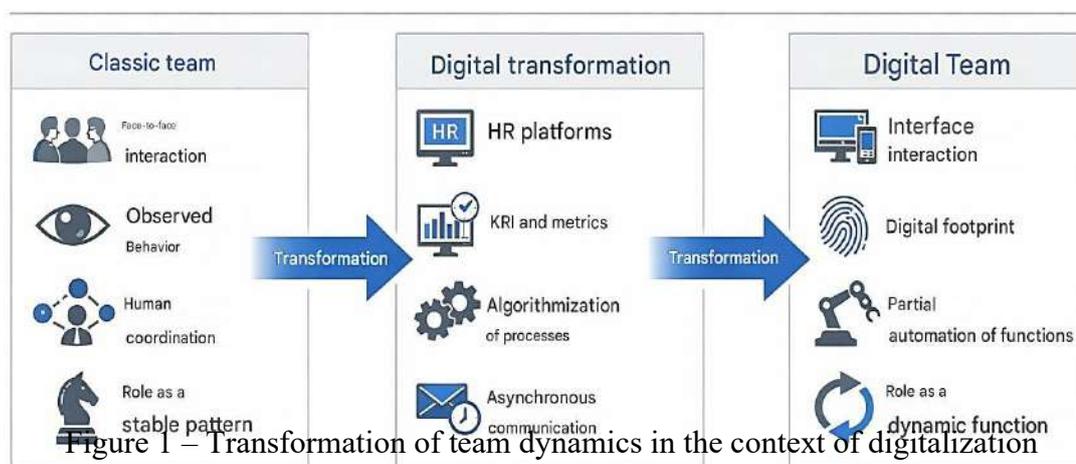
Communication is becoming mediated and fragmented. Much interaction occurs in writing, increasing the importance of structured thought and clear language. However, emotional cues and context can be lost or interpreted ambiguously. As a result, the way behavioral roles are expressed changes: initiative, support, or critical thinking are expressed less through live discussion and more through comments in trackers, edits to documents, and digital reactions.

Leadership is also transforming. Instead of charismatic influence, the importance of the ability to manage information flows, establish transparent rules of engagement, and ensure coordination in remote settings is increasing. Authority can be built on competence in using digital tools and the ability to interpret data, not just on personal qualities.

An additional factor is the digital footprint. Employee behavior is recorded in the system, from the frequency of communication to the speed of response. This influences the perception of roles: contribution becomes visible through activity metrics rather than through a collective sense of participation.

The transformation of communication and leadership is changing the conditions under which team roles are manifested. The behavioral patterns described in the classical model remain significant, but they are realized in a different environment—one that is mediated by technology, partially algorithmic, and less dependent on physical presence (Figure 1).

Transforming Team Dynamics  
in conditions of digitalization



Despite radical changes in the organizational environment, Belbin's model has not completely lost its explanatory value. A number of its principles remain relevant in digital teams, especially where human thinking and interaction remain key factors in effectiveness.

First, the idea of behavioral diversity as a resource for collective performance remains relevant. Regardless of the working format—in-person or remote—teams still require a combination of strategic analysis, idea generation, coordination, and implementation. The functions that Belbin described through the roles of "thinkers," "coordinators," and "doers" continue to manifest themselves, albeit in modified form. Even in a highly digitalized environment, algorithms do not completely replace strategic vision, creativity, or the ability to integrate diverse perspectives [1,3].

Secondly, the model remains useful as a tool for diagnosing team imbalances. Problems in digital projects are often associated not only with technical failures but also with a lack of certain types of input—for example, critical analysis or process structuring. Role language helps identify which behavioral functions are weakly expressed and require strengthening [7].

Third, the concept of "tolerable weaknesses" retains methodological value. In an environment of high digital transparency, the risk of striving for universal effectiveness of each employee increases. The Belbin model reminds us that strengths are inevitably associated with limitations, and it is their combination that creates team resilience [6].

The model remains relevant to the extent that it is used as an analytical framework for understanding behavioral contributions, rather than as a static classification of employees [2]. Its viability in the digital environment is not due to the immutability of roles, but to the recognition that the human factor continues to play a key role even in algorithmic organizational systems [5,10].

While some of its principles remain relevant, Belbin's model faces limitations in the context of digital transformation. These limitations stem not from flaws in the original concept, but from changes in the very environment in which behavioral roles are manifested.

First of all, the model's diagnostic accuracy is reduced in distributed and remote teams. Roles, in the classical sense, were identified through behavioral observation during face-to-face interactions. In a digital environment, a significant portion of behavioral manifestations is hidden behind interfaces and asynchronous communication. Chat activity or comment frequency don't always reflect actual contribution, and "quiet" participants can demonstrate high value through individual performance without exhibiting the typical behavioral markers of a role.

The second limitation is related to platform employment and hybrid work formats. Modern employees often participate in multiple projects simultaneously, temporarily joining different teams. In such circumstances, a role ceases to be a stable behavioral pattern and becomes a situational function, dependent on the task and context. A model oriented toward a relatively stable team composition has difficulty accounting for such fluidity [6].

The third problem is the confusion of role and function in the context of algorithmization. Some coordination and organizational tasks are transferred to digital systems. As a result, the boundary between the human role and the system function is blurred. For example, task distribution can be carried out automatically, which reduces the significance of the behavioral coordinator as a separate figure [5].

Finally, there's the risk of over-formalization. Integrating test results into HR platforms creates the illusion of a precise typology, whereas behavior in a digital environment is more variable and contextual. A role once defined may not reflect the employee's actual participation in a specific digital project.

The model loses some of its explanatory power where team dynamics are determined not only by interpersonal interactions, but also by the architecture of digital systems, asynchronous communication, and the high mobility of organizational connections.

One of the most significant threats to using the Belbin model in a digital environment is its formalization. What was originally conceived as a tool for monitoring live team dynamics is increasingly becoming a digital profile, embedded in the HR system and used as a stable employee attribute.

In digital practice, concepts are often subverted: a role is interpreted as a function, a test as an objective personality characteristic, and a one-time assessment as an immutable status. As a result, complex behavioral logic is reduced to a typological label. This is especially noticeable when

assessment results are integrated into platform HR tools, where a role can become part of the algorithmic logic for selecting tasks or forming project teams.

of pseudo-diagnostics arises. The presence of test results creates a sense of precision and scientificity, but an employee's actual behavior in a digital environment can differ significantly from the recorded profile. The context of tasks, the level of autonomy, the nature of digital tools, and the communication structure can radically alter the manifestation of behavioral tendencies.

An additional risk is the illusion of controllability. Even if a team is formally "balanced" by roles, this doesn't guarantee effectiveness in asynchronous and distributed environments. Algorithmic logic can emphasize measurable metrics while ignoring informal aspects of interaction, such as trust, support, or creative tension.

Without critical rethinking and contextualization, the model can degenerate into an HR ritual—formally correct but methodologically superficial. In the digital age, its application requires abandoning static assumptions and recognizing that a role is not the same as a function, and that a test is not synonymous with actual behavioral contribution to a specific team (Table 1).

Table 1 - Limits of applicability of the team role model in the digital environment

Area of analysis	Preservation of explanatory power	Partial applicability	Loss of explanatory precision	Methodological commentary
Idea generation	High - creativity remains a human resource	—	—	Behavioral logic is maintained regardless of the work format
Strategic thinking	High - the need for integration of views remains	—	—	Digital tools do not replace the strategic function
Team coordination	—	Partial - some of the functions are transferred to algorithms	With high automation	The role is shifting towards process design
Control and delivery of results	—	Partial - digital systems take over some control	With full algorithmization	The behavioral function is replaced by system logic
Team communication	—	Partial - the format of manifestation changes	In an asynchronous environment	Behavior is expressed through a digital footprint
Role stability	—	—	Low - roles become situational	A transition to a dynamic model is required
Role diagnostics	—	Partial - the test is supplemented by analytics	In formal typology	The test becomes a hypothesis, not a final conclusion.
Team balance	—	Partial - balance depends on the	In hybrid structures	The balance is dynamic in nature

		stage of the project		
Interpersonal conflicts	Partial behavioral nature is preserved	—	In digital conflicts	New forms of communication tension are emerging
The illusion of control	—	—	High risk in digital HR systems	Formalization creates pseudoscience

Adapting Belbin's model to the digital age is impossible without reconsidering the underlying assumption of contextual stability. In today's organizational environment, employee behavior is determined not only by personal inclinations but also by the architecture of digital tools, the type of tasks, and the degree of autonomy in decision-making. Role ceases to be a purely internal characteristic and becomes a function of the environment.

The first key parameter is the type of task. In digital project work, tasks can be creative, analytical, routine, or algorithmically structured. In creative and strategic projects, roles associated with idea generation and conceptualization remain highly significant. In operational digital processes, by contrast, behavioral variability may be limited by strict regulations and system rules. Consequently, the manifestation of roles depends on the nature of the activity, not just on individual profile.

The second parameter is the degree of autonomy. In conditions of high autonomy, employees independently distribute their efforts, take initiative, and determine the methods of interaction. Here, behavioral roles become more pronounced. In conditions of low autonomy, when tasks and deadlines are strictly regulated by the digital system, the space for role expression narrows, and differences between participants are smoothed out by algorithms.

The third parameter is the team's level of digital maturity. In mature digital teams, members understand the impact of tools on communication and are able to adapt their behavior to the specifics of the environment. In teams with low digital maturity, the technological environment can distort behavioral manifestations, creating false perceptions of engagement or leadership.

Considering the digital context requires a shift from a universal interpretation of roles to situational analysis. The Belbin model can retain its diagnostic value in the digital age only if a role is viewed not as an immutable employee characteristic, but as a variable dependent on the team's tasks, autonomy, and technological infrastructure.

Adapting the Belbin model to the digital age does not imply abandoning it, but rather integrating it methodologically with modern HR tools. With the development of HR analytics, talent management systems, and digital employee profiles, the role concept can be used more flexibly and contextually. However, such integration requires caution and a reconsideration of its application logic.

First, digital data can complement, but not replace, behavioral analysis. Metrics of activity, engagement, task completion, and communication intensity provide insight into the structure of an employee's participation in the team. However, quantitative indicators only reflect part of the reality. Their interpretation must be consistent with the content of tasks and the quality of interactions; otherwise, there is a risk of substituting formal indicators for behavioral contributions [4,5].

Secondly, digital profiles can be used as a dynamic observation tool rather than a fixed typology. Unlike one-time testing, the digital environment provides data in real time. This allows the role to be viewed as a fluid characteristic, manifesting itself differently across different projects. This approach reduces the risk of employee stigmatization and makes the model more flexible.

Third, integration with HR analytics must take into account the principle of context. A behavioral pattern may be effective in one team and destructive in another. Therefore, digital systems should support analytical support for management decisions rather than automated role assignment.

Integrating the Belbin model with digital HR tools is possible provided its diagnostic nature is preserved and its algorithmic rigidity is abandoned. Digital data can expand the model's analytical capabilities, but cannot serve as the basis for mechanically classifying behavior.

One of the key conditions for adapting the Belbin model to the digital age is to abandon the idea of a role as a stable and unchangeable employee characteristic. In hybrid and distributed teams, behavioral function increasingly depends on the project context, task structure, and participant configuration. A role ceases to be an individual's "property" and becomes a temporary function that can be performed in a specific situation.

In a digital environment, employees often work on multiple teams simultaneously, moving from one project to another. In one context, a person may act as an idea generator, while in another, they may act as a coordinator or implementer. This contextual role transition reflects not personal instability, but adaptability to the demands of the environment.

The shift to a dynamic understanding of roles is also linked to the principle of team antifragility. A team capable of redistributing behavioral functions depending on tasks and external changes demonstrates greater resilience to uncertainty. Role fixation can limit flexibility, whereas conscious role rotation enhances the ability to self-organize [8].

However, dynamism doesn't mean chaos. It's a systematic approach in which roles are viewed as resources allocated according to project goals. Digital tools can support this flexibility by providing data on the current distribution of tasks and employee participation levels [6].

Adapting the Belbin model to a digital environment requires a shift from a static typology to a process-based understanding of the role—as a temporary, context-dependent function that contributes to the achievement of a collective result (Table 2).

Table 2 - Operational model for adapting team roles to the digital environment

Adaptation condition	Indicators (measured parameters)	Evaluation method	Interpretation scale	Management decision
Contextuality of roles	Correspondence of role distribution to the type of project tasks	Comparison of task map and role structure	Low Match / Partial / High Match	Redistribution of functions across project stages
Level of autonomy	The share of decisions made without external approval	Analysis of regulations and digital logs	≤30% (low) / 30–70% (medium) / ≥70% (high)	Adjustment of the management architecture
Digital maturity of the team	Proficiency in digital tools; quality of digital communication	Competency audit + platform activity analysis	Basic / Developing / Advanced	Training or changing the format of interaction
Dynamic roles	Frequency of change of functional leadership in the project	Analysis of project phases and distribution of initiatives	Static / Moderately Flexible / Adaptive	Implementation of a role rotation mechanism
Correlation of role and outcome	Linking behavioral input to project KPIs	Correlation analysis of HR data	Weak / Moderate / Strong	Adjustment of performance criteria

Separation of roles and functions	The percentage of coincidence between the behavioral and the role job description	Comparative analysis of profile and functionality	Full Match / Partial / Independent	Revision of the logic of task distribution
Level of algorithmization	Percentage of processes controlled by digital systems	Business process audit	≤40% / 40–70% / ≥70%	Rethinking the Role of the Coordinator and Analyst

Digital transformation doesn't eliminate the behavioral logic of teamwork, but it does create new functional nodes within the team. While Belbin's classic model described behavior in face-to-face interactions, modern practice demonstrates the emergence of roles specifically conditioned by digital infrastructure. This isn't about replacing basic roles, but rather complementing and transforming them.

One such role is that of a digital process architect. This team member structures workflows in digital systems, configures interaction logic in task trackers, and creates transparent regulations and integrations. Their contribution lies not only in organizational coordination but also in designing the environment in which other participants interact.

The second role is that of a data interpreter. In an algorithmic management environment, the team is faced with a large volume of metrics and analytical indicators. This necessitates a participant who can translate data into management decisions, see the dynamics of processes behind the numbers, and warn against the risks of the illusion of quantitative control.

The third possible role is that of a digital mediator. In distributed teams, communication often suffers from asynchrony and a lack of nonverbal cues. A digital mediator ensures consistency, prevents conflicts from escalating in an online environment, and supports a culture of interaction through interfaces.

It's important to emphasize that these roles are not strictly fixed positions. They reflect the functional needs of the digital team. Expanding the model involves incorporating these contextually determined functions into the analytical framework, allowing the concept to be adapted to the modern organizational reality.

Hybrid and distributed teams create a different interaction configuration than traditional offline groups. Members may be part-timers, work in different time zones, and juggle multiple roles simultaneously. Under these circumstances, the idea of an "ideal balance" of roles within a stable team requires reconsideration.

Firstly, in hybrid teams, the importance of situational distribution of functions increases. A role may be used episodically rather than continuously, depending on the project stage or the nature of the task. For example, during the strategic planning stage, the need for analytical and creative roles increases, while during the implementation stage, the need for structuring and control increases. This makes the role balance dynamic rather than fixed.

Secondly, distributed work increases the importance of self-regulation and digital discipline. In the absence of constant physical supervision, role expression is linked not only to personal inclinations but also to the ability to manage one's own time and information flows. Behavioral contributions become less directly visible and require additional transparency mechanisms.

Third, hybrid teams are often formed around a specific task rather than a stable organizational structure. This leads to roles being assigned based on professional expertise and digital competence, rather than purely on behavioral preferences. As a result, the boundary between role and professional function becomes more blurred.

In hybrid and distributed teams, the Belbin model can retain its analytical value if roles are viewed as variable functions within a project. Moving away from a rigid notion of an "ideal set of roles" allows for flexible use of the model, taking into account the temporary nature of team configurations and the specifics of digital collaboration.

One of the key conditions for the correct application of the Belbin model in the digital age is its changing status in management practice. In the context of algorithmic management, there is a temptation to transform the model into a normative framework: defining the "correct" set of roles, distributing them among participants, and considering the team balanced. This approach methodologically simplifies the original concept and reduces its analytical depth.

Belbin model was originally conceived as a tool for observing actual team dynamics, not as a template for an ideal structure. Its purpose is to identify which behavioral functions are dominant, which are lacking, and how this impacts team performance. In a digital environment, this logic becomes especially important, as formal performance indicators can mask real imbalances in interactions.

Diagnostic application involves analyzing "what's happening" in a team, rather than prescribing "how things should be." This means abandoning the rigid assignment of roles to specific employees and recognizing their fluidity depending on the context. A role is viewed as a manifestation of behavior in a given situation, rather than as a fixed label. Furthermore, the diagnostic approach reduces the risk of pseudoscientific typologization. Instead of using test results as a final conclusion, the manager views them as a hypothesis that requires testing in real-world interactions. In the digital age, the Belbin model can retain its practical value only if used as an analytical tool for understanding team dynamics. Transforming it into a normative standard or an algorithmic rule for distributing functions contradicts both the model's original logic and the principles of agile management in a digital environment (Table 3).

Table 3 - The logic of team roles in a digital environment

Analysis parameter	Classical logic of the model	Digital organizational environment	Management conclusion
Role basis	A persistent behavioral pattern	Context-sensitive function	The role is viewed as a variable rather than a fixed characteristic
Method of manifestation	Observed face-to-face interaction	Digital footprint, asynchronous communication	Diagnosis requires data analysis + meaningful context
Team balance	Static "ideal set" of roles	Dynamic redistribution of functions	The balance is assessed according to the project stage
Coordination	The human role of the coordinator	Partially algorithmic	The coordinator is shifting towards the digital process architect
Quality control	Behavioral scrupulousness	System checks and automation	Human control shifts to analytical interpretation
Idea generation	Creative individual activity	Collective digital collaboration	of facilitating digital interactions is growing
Conflicts	Interpersonal	Communication and interface	There is a need for a digital mediator

Role stability	Relatively constant	Project-temporary	A rotational role model is required
Diagnostic method	Testing + observation	Testing + behavioral data + analytics	The model becomes part of a broader HR analytics system
Risk of distortion	Personality typology	Algorithmic formalization	Role assignment cannot be automated without contextual assessment.

The digital age hasn't abolished teamwork, but it has changed its nature. A team is no longer necessarily a physically connected group; it is becoming a networked structure, functioning through digital interfaces, algorithms, and distributed areas of responsibility. In such a context, classic behavioral models require critical reflection rather than mechanical adaptation.

The analysis showed that Belbin's model retains methodological value in recognizing behavioral diversity as a factor in collective effectiveness. The idea of balancing contributions, complementary roles, and acceptable weaknesses remains relevant even in algorithmic management systems. However, the limits of the model's applicability become more apparent in the context of remoteness, asynchronous communication, and digital transparency of activities [1,2].

The main risk of current practice lies in the formalization of roles and their consolidation in digital profiles as immutable characteristics. This approach creates the illusion of controllability but reduces sensitivity to the real dynamics of the team. In a digital environment, a role cannot be viewed as a static label; it becomes context-dependent and temporary, manifesting itself differently in different projects and interaction configurations [7,8].

Belbin model is not outdated, but it is no longer self-sufficient. Its productive use is possible only if contextualized, roles are understood dynamically, and it is integrated with HR analytics tools without algorithmic rigidity [5,6]. Otherwise, it risks becoming a ritualistic element of HR practice [3]. However, when adapted, the model can serve as an analytical framework for understanding team dynamics in the context of digital transformation and high organizational uncertainty.

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## THE LIPPITT-KNOSTER MODEL IN THE CONTEXT OF DIGITAL TRANSFORMATION OF ORGANIZATIONS: RETHINKING THE DRIVERS OF MANAGED CHANGE

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**Abstract:** *The digital transformation of organizations is accompanied not only by the implementation of technologies but also by managerial and behavioral changes. Experience shows that digital project failures are more often due to a lack of change management factors than to technological limitations. This article examines the Lippitt - Knoster model as a diagnostic framework for assessing organizational change readiness. The applicability of the model in the digital environment is analyzed, identifying its limitations related to linearity and insufficient consideration of digital maturity and algorithmic management. The need to expand the model by incorporating digital readiness and feedback parameters is substantiated, allowing it to be used as the basis for a sustainable digital transformation architecture.*

**Keywords:** *digital transformation; change management; Lippitt - Knoster model; digital maturity; resistance to change; organizational readiness.*

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Digital transformation has become a key development trend for organizations across various industries [1–4]. The transition to digital platforms, automated management systems, and data analytics is shaping a new organizational architecture [2]. These changes affect the management structure, distribution of authority, and employee competency models [5,6].

Implementation experience shows that digital projects are often plagued by organizational challenges. The main problems stem not so much from technology as from human and managerial factors: a lack of clear vision, a shortage of competencies, and a lack of alignment in motivation [7–9]. Consequently, the sustainability of digital transformations becomes a management challenge.

In this regard, the importance of classical change management models is increasing [10–12]. The Lippitt - Knoster model, based on the relationship between vision, skills, incentives, resources, and an action plan, can be considered as a tool for diagnosing an organization's readiness for change [13]. However, its applicability in a digital environment requires further analysis.

The development of the theory of organizational change is associated with the transition from stage models to factorial approaches [10,14]. K. Lewin's classical model (unfreezing - change - freezing) described change as a sequential process [10]. Later studies demonstrated the need to take leadership and organizational behavior into account in transformations [11,15].

The Lippitt - Knoster model is a factorial concept of change [13]. It states that successful transformation requires five elements: vision, skills, incentives, resources, and an action plan [13,12].

Lippitt - Knoster model is based on a factorial formula for managed change, which posits that sustainable transformation is possible when five key elements are simultaneously present: vision, skills, incentives, resources, and an action plan. The model's logic suggests that each component performs a compensatory function, eliminating the specific risk of destabilizing the change process.

Vision creates an image of the desired future state of the organization and reduces uncertainty [11]. Without it, employees experience anxiety and cognitive disorientation, which hinders the consolidation of efforts. Skills provide the ability to implement a new state in practice; their deficiency generates a feeling of incompetence and increases resistance [12]. Incentives, in turn, create a motivational basis for change, reducing the inertia of organizational behavior [12]. Insufficient alignment of motivational mechanisms leads to formal participation in transformation without real involvement.

Resources reflect the infrastructural and managerial support for the process. A lack of them causes frustration and a sense of failure of initiatives. Finally, an action plan structures the transition, eliminating chaos and ensuring a consistent flow of steps [13].

The model demonstrates the systemic interdependence of factors: the exclusion of one element disrupts the integrity of the transformational circuit. This demonstrates its diagnostic value—it allows not only to ascertain the presence of changes but also to identify critical management gaps that impede their sustainability [13].

One of the key advantages of the Lippitt - Knoster model is its structural simplicity coupled with its high analytical capacity. The formula, which combines five factors of change, provides a clear and logically complete analytical framework. This allows the model to be used as a tool for quickly diagnosing management deficiencies without the need for complex methodological constructs [13,11].

A second significant advantage is its cause-and-effect clarity. The model goes beyond listing success factors, establishing a connection between the absence of a specific element and the typical response of the organizational system. This logic allows managers to identify the source of disruption to the change process and correct the corresponding component, rather than intensifying transformational measures haphazardly.

The third strength of the model is its versatility. It is applicable to various types of change—strategic, structural, technological, or cultural. The factorial nature of the formula makes it adaptable to various organizational contexts and scales of transformation [12].

The model possesses high heuristic value. It stimulates management thinking focused on balancing the conditions of change rather than the formal implementation of initiatives. It is precisely this conceptual flexibility that allows it to be considered a basic analytical framework even in an increasingly complex digital environment, which underlies the relevance of its further rethinking.

Digital transformation is fundamentally different from traditional organizational change in its nature, speed, and scale of impact. While traditional transformations typically had a local or phased nature (structural reorganization, implementation of a new compensation system, regulatory changes), digital change simultaneously affects the technological, managerial, and cultural contours of an organization. This is not about modernizing individual processes, but rather about rebuilding the enterprise's functional logic.

One of the key differences is the highly dynamic nature of digital change. Technological solutions quickly become obsolete, requiring constant adaptation and iterative revision of strategies. Unlike linear transformation models, the digital environment is characterized by nonlinearity and a cumulative effect, where the implementation of one system automatically transforms related processes.

The second significant factor is technological complexity. Modern digital projects involve the integration of various platforms, information systems, and analytical tools, increasing the dependence of management decisions on technical infrastructure. Change management in this case requires not only organizational competencies but also digital literacy at the management level [2-4].

The third characteristic is the cross-functional nature of digital transformation. Digital initiatives are rarely limited to a single department; they require coordination across IT, HR, finance, and operations. This increases the risk of goal misalignment and reinforces the need for management synchronization.

Digital change represents a more complex and systemic type of transformation compared to classical organizational change. This circumstance requires a reconsideration of the applicability of traditional change management models and an assessment of their adaptive potential in the digital environment [5,6].

Despite the strategic importance of digital initiatives, their implementation is often fraught with significant difficulties. An analysis of management practices reveals a number of systemic factors that contribute to the ineffectiveness or partial implementation of digital projects [7].

First, there is a gap between the strategic level of digital transformation declaration and the operational implementation of changes. Management formulates ambitious digital goals, but these are not translated into specific behavioral standards, regulations, and competency requirements. As a result, the digital strategy remains declarative, and employees do not have a clear understanding of their role in the transformation [3,7].

Secondly, a significant barrier is the lack of digital competencies. Implementing new systems requires not only technical mastery of the tools but also a shift in decision-making logic and a shift to working with data and analytical indicators. In the absence of systematic staff training, digital solutions are used pro forma or reproduce previous ineffective practices in a new technological framework [8].

Third, a common factor is the illusion of automation—the belief that implementing an information system will, in and of itself, lead to increased efficiency. This approach ignores the need to rethink business processes, management roles, and incentive systems. As a result, digital tools become an additional layer of complexity rather than a simplification factor [8].

Inconsistency between motivational and evaluation mechanisms plays a significant role. If KPIs and metrics don't reflect digital goals, employees focus on the old metrics, which leads to hidden resistance to transformation.

Digital project failures are most often caused not by technical errors, but by management dysfunction. This underscores the need for diagnostic models that systematically assess an organization's readiness for change and identify critical deficiencies in the transformation process. [9].

Digital transformation is often interpreted as a technological process, but its sustainability is determined primarily by the human factor. With the algorithmization of management, automation of operations, and the implementation of analytical systems, employees are faced not only with the need to master new tools but also with a change in their own professional identity. This makes digital change a deeply behavioral and cultural process [6].

One of the key barriers is the fear of losing status and control. The automation of functions previously performed by specialists can be perceived as a threat to professional significance. This reaction increases latent resistance, formal participation in projects, and the minimization of initiative [8].

The second aspect is cognitive overload. The digital environment is characterized by high-speed information processing, multiple interfaces, and constant tool updates. Without adaptive mechanisms, employees experience decreased concentration and increased fatigue, which negatively impacts the quality of decisions [8].

The third factor is the phenomenon of digital burnout, associated with constant engagement with digital communication channels, monitoring metrics, and the need for continuous learning. This leads to emotional exhaustion and reduces engagement in transformational initiatives [6].

The human factor in digital projects extends beyond staff training. It includes psychological adaptation, rethinking professional roles, and the development of a new management culture.

Ignoring these aspects leads to the formation of a formally digital but effectively inert organization, requiring the integration of behavioral parameters into change management models (Table 1).

Table 1 - Comparative analysis of classical and digital organizational changes

Comparison criterion	Classic changes	Digital transformation	Management investigation
Scale of impact	Local or phased	Systemic and cross-functional	End-to-end coordination of departments is required
The pace of change	Planned, relatively stable	Accelerated, iterative	Flexible management methods are needed
Object of change	Structure, regulations, processes	Business model, data, solution architecture	The logic of the organization's functioning is changing
Technological role	Supportive	Defining and transforming	IT is becoming a strategic factor
The role of man	Change maker	Accomplice and adaptive subject	Development of digital competencies is required
Nature of risks	Organizational and behavioral	Technological + cultural + algorithmic	A comprehensive readiness assessment is required
Source of resistance	Loss of familiar practices	Fear of loss of status, cognitive overload, digital burnout	Change management must take into account psychological adaptation
Controllability	Linear logic of implementation	Nonlinear dynamics with feedback	Continuous monitoring and adjustment is required.

In the Lippitt - Knoster model, vision is the initial element of the change formula, setting the direction and meaning of the transformation. In the context of digitalization, the importance of this component increases significantly, as digital projects are often accompanied by a high degree of uncertainty and abstraction of strategic goals. Formulations such as "transition to a digital model" or "implementation of data-driven management" do not provide behavioral specifics and do not give employees a clear understanding of the organization's final state.

One common problem is the declarative nature of digital strategies. Management expresses its intention to implement modern technologies, but fails to translate this strategic vision into operational guidelines: which processes will change, which competencies will be in demand, how the accountability system will be transformed. As a result, employees are confronted not with a vision of the future, but with a series of disparate initiatives, which increases anxiety and reduces confidence in the transformation [7].

In a digital environment, a vision must be operationalized. This requires translating it into specific digital scenarios, success metrics, and expected changes in work practices. The vision becomes not a slogan, but a management tool for synchronizing the actions of various departments.

Furthermore, digital vision must take into account the redistribution of functions between humans and algorithms. Without a clear understanding of which decisions are automated and which retain human responsibility, transformation becomes fragmented [8].

In the context of digitalization, vision serves not only as a strategic guideline but also as a mechanism for reducing uncertainty. Its absence or formality become a source of systemic disorganization, confirming the relevance of the first element of the Lippitt - Knoster model in digital transformation.

The Lippitt - Knoster model views skills as a prerequisite for implementing change. In the digital environment, this component takes on a broader meaning, extending beyond professional training to include digital competence, analytical thinking, and adaptive learning.

One of the key challenges of digital transformation is the gap between technological capabilities and the level of their practical adoption. The implementation of information systems, ERP platforms, or analytical tools does not guarantee their effective use. Without developed digital skills, employees reproduce old work algorithms, adapting new tools to outdated processes. This leads to the formalization of digitalization without any real change in management logic.

Digital competence encompasses not only technical proficiency with interfaces but also an understanding of data management principles, metric interpretation, and awareness of the risks of algorithmic management. The ability to work in an environment of constant technological innovation is becoming essential, requiring the development of meta-skills—the ability to continuously learn and cognitive flexibility [8].

The organization of training systems is becoming increasingly important. Traditional one-time training sessions are proving insufficient in a dynamic digital environment. Microlearning formats, adaptive development programs, and educational modules integrated into work processes are proving more effective.

In the digital era, the concept of "skills" is being transformed into the category of digital readiness. A deficit in skills not only slows down transformation but also increases resistance to change, confirming the need to integrate systemic competency development into the architecture of digital projects.

The Lippitt - Knoster model views incentives as a factor that provides motivational support for change. In a digital environment, this element takes on particular significance, as transformation is often accompanied by a revision of performance measurement systems, the implementation of KPIs, OKRs, and digital dashboards.

One of the key problems is the inconsistency between the stated goals of digitalization and current performance metrics. If employees are evaluated based on metrics developed in a pre-digital world, they objectively focus on maintaining previous practices. In this case, digital initiatives are perceived as an additional burden that has no impact on compensation or career prospects [11,12].

An additional risk is associated with the formalization of motivation through quantitative indicators. Excessive focus on digital metrics can lead to the reduction of the meaning of transformation to the achievement of numerical targets. This creates the phenomenon of motivational asymmetry, when employees demonstrate performance improvements but do not share the strategic goals of the changes.

In the context of digitalization, incentives must be aligned with the transformation agenda. This requires revising KPIs, integrating digital goals into the performance evaluation system, and ensuring transparency of compensation criteria. Furthermore, non-material incentives—recognition of digital initiatives, participation in pilot projects, and expanded responsibilities—are becoming no less important than financial mechanisms.

The "incentives" element in the digital environment serves as a tool for aligning individual behavior with the transformation architecture. Its insufficient development increases latent resistance and reduces the sustainability of change, confirming the relevance of this component of the model in the context of digital transformation.

The Lippitt - Knoster model views resources as a prerequisite for implementing change. In the context of digital transformation, this element takes on a complex nature and includes not only financial and time resources, but also technological infrastructure, data access, management support, and organizational capacity.

One of the common problems with digital projects is underestimating infrastructure readiness. Implementing digital solutions without first assessing the state of the IT architecture, system compatibility, and cybersecurity leads to technical failures and reduced employee confidence in the transformation. Technological instability creates a sense of unpredictability and increases resistance.

Management resources are no less important. Senior management support should be expressed not only through declarations but also through the distribution of authority, the adjustment of priorities, and the provision of cross-functional coordination. The lack of institutional support for transformation leads to its fragmentation and conflicts between departments [1,5].

Access to high-quality data is particularly important. In the digital environment, data becomes a strategic resource, informing decision-making. However, fragmentation, poor quality, or limited access to data reduce the effectiveness of digital tools and hinder the development of a culture of analytical management.

Moreover, transformation requires time—a period of adaptation, testing, and process adjustment. Ignoring this aspect leads to staff overload and an increase in errors.

In the digital age, resources should be viewed as a combination of technological, organizational, and managerial readiness. A shortage of these resources causes frustration and undermines the sustainability of change, confirming the systemic importance of this element in the Lippitt - Knoster model.

In the Lippitt - Knoster model, the action plan serves as a structuring mechanism for change, ensuring a consistent flow of steps and reducing the chaos of transformation. In the digital environment, this element takes on particular significance, as digitalization processes unfold in conditions of high uncertainty and rapid decision obsolescence [2,15].

The classic understanding of a plan as a fixed set of stages proves insufficient. Digital projects require an iterative logic that involves regularly revisiting goals, adjusting tools, and adapting deadlines. In this context, flexible management methodologies, including Agile approaches, sprint workflows, and prototyping, are particularly important. The plan becomes not a rigid blueprint, but a dynamic roadmap.

A crucial element is the decomposition of strategic goals into measurable stages. Without clear assignment of responsibilities, time horizons, and milestones, transformation becomes unmanageable. Furthermore, the digital environment requires the integration of analytical monitoring tools to track progress in real time.

Risk management is especially important. Planning in a digital environment must include scenario analysis, assessing technological dependencies, and developing alternative solutions. The absence of such mechanisms leads to "digital overheating," when an organization launches multiple initiatives without sufficient coordination.

In the digital age, the "action plan" element is being transformed from a static sequence of steps into a flexible architecture for implementing change. Its adaptation to conditions of uncertainty allows for the transformation to be managed and system failures to be minimized, confirming the relevance of this component in rethinking the Lippitt - Knoester model (Table 2).

Table 2 - Diagnostic assessment of the Lippitt - Knoster model factors in digital projects

Model factor	A critical question for a digital project	Observed deficiency symptom	Digital indicator	Management decision
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Vision	Do employees understand which processes will change and why?	Formal participation in the project, increasing anxiety	Low level of understanding of strategy based on internal surveys	Operationalization of digital strategy, cascading of goals
Skills	Are digital competencies sufficient to operate the new system?	Errors, return to "manual" procedures	The share of unfinished tasks in the system, the frequency of support requests	Systematic microlearning, built-in learning modules
Incentives	Do KPIs support digital goals?	Sabotage or imitation of penetration	Misalignment of KPIs with digital initiatives	Review of the evaluation system, synchronization of KPIs and OKRs
Resources	Is there sufficient infrastructure and management support?	Failures, employee overload	System response time, number of incidents	IT architecture audit, resource redistribution
Action plan	Is there an iterative implementation logic?	Overheating of projects, parallel uncoordinated initiatives	Number of unfinished tasks, violation of sprint deadlines	Agile approach, change portfolio prioritization

One of the key limitations of the Lippitt - Knoster model in the context of digital transformation is its factorial, yet essentially linear, logic. The formula assumes that if all components are present—vision, skills, incentives, resources, and an action plan—the change will be implemented. This framework is effective in a relatively stable environment, where processes unfold sequentially and cause-and-effect relationships are fairly predictable.

The digital environment, by contrast, is characterized by nonlinearity and a high degree of interdependence among its elements. The implementation of a single digital system can alter communications structures, redistribute responsibilities, and transform behavioral practices faster than planned. In such circumstances, the influence of factors is not always additive; they can reinforce or, conversely, cancel each other out.

Furthermore, digital processes often develop according to a feedback loop, where intermediate transformation results require immediate strategic adjustments. A linear formula does not fully capture the dynamics of cyclical changes and the cumulative effect of organizational consequences [2].

Consequently, despite its diagnostic value, the model requires adaptation to an environment where changes unfold as a complex system of interactions, rather than as the sequential implementation of predetermined conditions. Accounting for nonlinearity and integrating continuous feedback mechanisms are essential to maintaining its analytical relevance in the digital age.

The Lippitt - Knoster model focuses on the managerial conditions of change, but its classic construction understates the cultural and institutional context. Meanwhile, digital transformation affects not only processes and competencies but also the underlying foundations of organizational behavior—values, norms, informal practices, and the distribution of power.

Organizational culture determines the degree of openness to experimentation, the tolerance for mistakes, and the willingness to challenge established roles. Even with a vision, resources, and a formal plan, transformation can be slowed if the culture is focused on maintaining the status quo or avoiding responsibility. In such conditions, digital initiatives are formally launched but lack behavioral support [6].

Institutional constraints also have a significant impact. Regulatory requirements, industry standards, established management traditions, and hierarchical structures can limit the flexibility of change. In particular, highly centralized decision-making slows down the speed of digital experimentation, while rigid bureaucratization of processes hinders the adoption of new tools.

Of particular significance is the phenomenon of "algorithmic culture," where employees begin to focus primarily on numerical metrics rather than substantive performance goals. This leads to the development of a metric-centric logic, in which quantitative indicators replace the strategic meaning of change.

Ignoring cultural and institutional parameters limits the model's explanatory potential in the digital age. To enhance its analytical comprehensiveness, it requires integrating contextual factors that take into account not only the formal conditions of change but also the deep structure of the organizational environment.

Digital transformation is accompanied by an increase in algorithmic management, in which a significant portion of decisions are made based on digital systems, analytical dashboards, and automated procedures. This aspect is largely ignored in the classic Lippitt - Knoster model, as it was developed in a context where the key agent of change was the human leader.

In modern organizations, algorithms are becoming part of the management process: they generate reports, rank indicators, prioritize tasks, and influence employee performance assessments. This changes the structure of responsibility and redistributes influence between managers and digital systems. However, the model does not take into account the degree to which transformation depends on the quality of algorithms, the accuracy of metrics, and the transparency of digital solutions [8].

An additional risk is associated with the metric-centric effect, when numerical indicators begin to replace strategic goals. Under such conditions, an organization may demonstrate an increase in quantitative indicators without any real change in processes. A model focused on the balance of factors does not capture the possible distortion of management logic under the influence of automated control systems.

The problem of platform dependence—a situation where transformation is determined by the limitations of the digital solutions used—also remains outside her focus. The choice of IT platform can predetermine the organizational structure and the ways in which departments interact, reducing the flexibility of management decisions.

In the context of algorithmic management, the classical model design proves insufficient for analyzing digital change. To maintain its relevance, it is necessary to consider the impact of digital systems on decision-making processes, the structure of responsibility, and the formation of organizational behavior (Table 3).

Table 3 - Limitations of the classical Lippitt - Knoster model in the context of digital transformation

Analysis parameter	Classical logic of the model	Digital reality	The emerging management gap	Consequence for transformation
Nature of changes	Sequential accumulation of factors	Nonlinear dynamics, the effect of cascading changes	Inconsistency between a static formula and a dynamic environment	Loss of control during abrupt technological shifts
The structure of causality	Additive (factors are summed)	Network interaction of factors	Underestimation of cross-effects	Unpredictability of the result even if the conditions are formally met

The role of culture	Indirectly implied	Data culture and digital identity determine success	Lack of cultural diagnostics	Formal digitalization without behavioral transformation
Decision making	Human-centered management model	Algorithmic and platform-based management	Ignoring the influence of digital systems on behavior	Metrics are replacing the strategic meaning of change
The pace of transformation	Planned and predicted	High speed and constant adaptation	Lack of planning flexibility	Organizational overload and increased resistance

the Lippitt - Knoster model's limitations in the digital age suggests the need for its conceptual expansion. The classic change formula takes into account managerial and organizational factors, but does not capture the system's level of readiness to function in a digital environment. Therefore, it is proposed to supplement the model with the parameter "digital maturity."

Digital maturity is defined as an integral characteristic of an organization's ability to effectively utilize digital technologies, manage data, adapt processes, and maintain a culture of digital engagement. This metric reflects not only the availability of technical infrastructure but also the level of staff competence, the sophistication of analytical practices, data quality, and a willingness to experiment.

Incorporating digital maturity into the formula allows for the differences between organizations at different stages of digital development to be taken into account. Even with the vision, skills, incentives, resources, and an action plan in place, transformation can be unstable if the underlying digital infrastructure or management culture is not aligned with the demands of change.

The proposed extended formula can be represented as follows:

**Vision + Skills + Incentives + Resources + Plan + Digital Maturity = Sustainable Transformation.**

Digital maturity is not an add-on, but a systemic moderator of the effectiveness of other factors. Its integration into the model allows for a transition from a one-size-fits-all diagnostic framework to a more precise assessment of an organization's readiness for digital transformation.

Lippitt - Knoster model captures the conditions for change, but its original design lacks a mechanism for systemic correction of transformation during implementation. In a digital environment characterized by rapid technological innovation and changing external parameters, sustainability of change is impossible without an integrated feedback loop.

The dynamic framework involves regularly collecting and analyzing data on the transformation process, assessing interim results, and promptly adjusting management decisions. In a digital environment, this mechanism can be supported by analytical dashboards, digital progress indicators, and real-time analysis tools. This allows not only for recording deviations from planned indicators but also for identifying the behavioral and organizational effects of changes.

The connection between quantitative metrics and qualitative parameters—levels of employee engagement, adoption of digital solutions, and resistance dynamics—is particularly important. Without integrating these aspects, digital analytics risks being limited to formal performance monitoring.

The introduction of a dynamic feedback loop transforms the model from a static formula into a cyclical architecture of change. The factors of vision, skills, incentives, resources, and plan cease to be one-time conditions and become subject to constant calibration. This ensures the adaptability of the transformation and reduces the likelihood of the accumulation of hidden management deficiencies.

Supplementing the model with a mechanism for continuous analytical adjustment corresponds to the logic of the digital environment and enhances its applied potential in change management practice.

Expanding the Lippitt - Knoster model by incorporating the digital maturity parameter and a dynamic feedback loop allows us to move from a static formula to a more complex construct—a change architecture. In its classic form, the model serves as a diagnostic tool: it identifies the presence or absence of key transformation factors. In a digital environment, this proves insufficient.

The architectural approach involves the systemic integration of factors into a unified management framework. Vision forms the strategic framework, skills ensure operational feasibility, incentives reinforce behavioral changes, resources create the infrastructural foundation, a plan structures the process, and digital maturity and analytical feedback ensure adaptability. Thus, the model begins to function as an interconnected system, rather than a set of conditions.

Coordination between elements is particularly important. For example, adjusting the incentive system without updating skills or modernizing digital infrastructure can lead to imbalances. The architecture of change requires synchronizing management decisions at the strategic, tactical, and operational levels.

Furthermore, the architectural logic is focused on long-term sustainability, not a one-time project success. Digital transformation is viewed as an ongoing process of organizational development, requiring constant updating of the model's factors.

The transformation of the model from a formula into an architecture of changes expands its methodological potential and makes it applicable to complex digital transformations, where controllability is determined not only by the presence of conditions, but also by their systemic interconnectedness (Table 4).

Table 4 - Architectural integration of the extended Lippitt - Knoster model in digital transformation

Element of architecture	Management level of influence	Readiness assessment indicators	Typical risks and distortions	Control tools
Vision	Strategic	Availability of a digital value map; percentage of employees understanding the transformation goals	Declarativeness of strategy; the gap between strategy and operations	Strategy sessions; digital town hall ; OKR cascading
Skills	Operating	Digital Competency Index; % of employees trained; speed of adaptation to new systems	Formal training without changing practices; dependence on individual experts	Microlearning ; peer-learning ; embedded learning modules
Incentives	Behavioral	Share of KPIs related to digital goals; level of engagement	Metrics for the sake of metrics; motivational asymmetry	KPI review; OKR integration; intangible recognition

Resources	Infrastructure	Digital maturity level; data availability; IT stability	Technical instability; system fragmentation	IT architecture audit; data governance; integration roadmap
Action plan	Processual	Having an iterative roadmap; regular sprints	Initiative overload; lack of prioritization	Agile approach; stage-gate control; project portfolio management
Digital maturity (additional parameter)	Systemic	Data integration; digital culture; automation level	The Illusion of Digitalization; Resistance to Data Culture	Maturity assessment model; maturity audit; cross-functional projects
Feedback loop	Dynamic	Frequency of analytical reviews; real-time monitoring	Delayed response; data distortion	BI dashboards; pulse surveys; KPI adjustments

The analysis revealed that the Lippitt - Knoster model remains methodologically relevant in the context of digital transformation of organizations. Its factorial logic allows for structuring the key conditions of managed change and identifying deficiencies in the transformation process. The simplicity of its design and diagnostic clarity make the model a convenient tool for analyzing organizational readiness for change [13].

At the same time, the digital environment places new demands on change management. The rapid pace of technological innovation, nonlinear processes, algorithmic management, and increasing dependence on data significantly complicate the transformation process. Under these conditions, a classic formula based on a static set of factors proves insufficient to explain the dynamics of digital change.

The paper substantiates the need for a conceptual expansion of the model. Including the digital maturity parameter allows for consideration of the organization's level of infrastructural and cultural readiness for digital transformation. The introduction of a dynamic feedback loop transforms the model into an adaptive system focused on the continuous adjustment of management decisions. The transition from a formula to a change architecture enhances its practical potential and allows the model to be used as a methodological foundation for digital change. management [5,6,8].

Lippitt - Knoster model can be considered a basic diagnostic framework for digital transformations; however, its effective application requires the integration of digital maturity parameters, algorithmic management, and analytical adaptability [2,9]. Further research should be directed toward empirical testing of an expanded version of the model in various organizational contexts and the development of tools for quantitatively assessing digital readiness for change.

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## THE CORE OF RUMELT'S STRATEGY IN THE CONTEXT OF DIGITAL TRANSFORMATION: RETHINKING THE STRATEGIC LOGIC OF THE ORGANIZATION

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**Abstract:** *Digital transformation has changed not only business tools but also the very logic of strategic thinking. Amid exponential data growth, accelerated technology cycles, and intensifying platform competition, organizations are facing strategic turbulence: decisions are made faster, projects are launched on a larger scale, yet the coherence of the strategic vision is increasingly blurred. Digital initiatives proliferate, but their connection to the organization's fundamental problem remains unclear. This creates a paradox: despite the formal existence of a strategy, actual management is carried out by a collection of disparate digital projects, not united by a single core idea.*

*In this situation, the concept of "strategy core," developed by Richard Rumelt within the Good Strategy/ Bad Strategy approach, acquires particular methodological value. According to this logic, a true strategy comprises three interrelated elements: an accurate diagnosis of the key problem, a guiding policy as a principle for decision-making, and a coordinated system of actions. Rumelt's model disciplines managerial thinking, eliminates the substitution of slogans for strategy, and allows for the concentration of resources on overcoming truly significant constraints.*

*Digital Strategy Kernel model is proposed, complementing the traditional structure with two key components: an architectural component that defines the principles of digital infrastructure design and responsibility allocation; and a dynamic component that forms a strategic feedback loop based on analytical monitoring and adaptive metrics. It is argued that without these elements, the strategic core in the digital environment becomes unmanageable.*

**Keywords:** *strategy, Rumelt, strategy core, digital transformation, strategic architecture, digital maturity, change management.*

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At the beginning of the 21st century, digital transformation ceased to be a specific area of modernization and became a systemic condition for organizational functioning [1–3]. Big data technologies, cloud architectures, algorithmic management, artificial intelligence, and platform business models are radically changing the ways in which value is created, processes are coordinated, and management responsibilities are distributed [2–5]. However, along with increasing technological maturity, strategic uncertainty is also increasing: companies invest in digital solutions, launch automation programs, and implement new IT platforms, but do not always demonstrate strategic alignment and sustainable impact [4].

The phenomenon of "strategic dissipation" is increasingly observed in management practice: digital initiatives are being developed as independent projects, not united by a single logical foundation [6]. Organizations declare digital transformation, but fail to formulate a clear diagnosis of

the key problem for which this transformation is being implemented. As a result, technology becomes an end in itself, and strategy—a set of declarations [6]. This substitution undermines cause-and-effect clarity and reduces the manageability of change [7].

In these circumstances, turning to fundamental concepts of strategic management, capable of restoring disciplined thinking to the development process, is becoming relevant. One such concept is the "strategy core" model proposed by Richard Rumelt [6]. It is based on the idea that a true strategy is built around three elements: an accurate diagnosis of the problem, a guiding policy, and a coordinated system of actions [6;8]. This structure ensures the concentration of resources and eliminates the illusion of strategicity that arises during formal planning [9].

In strategic management, one of the key problems remains the substitution of content for form. Organizations develop lengthy strategic documents, formulate ambitious goals, declare missions and values, but fail to formulate a clear answer to the fundamental question: what specific problem does the company intend to solve and by what principle of action [8;9]. It is precisely this managerial illusion that Richard Rumelt's concept, outlined in his work *Good Strategy / Bad Strategy* [6], is directed against.

According to Rumelt, "bad strategy" is characterized by four typical features: excessive declarativeness, the substitution of slogans for analysis, vagueness of goals, and a lack of prioritization [6]. It creates a sense of strategic activity but fails to ensure the concentration of resources. In contrast, "good strategy" is built around a clear understanding of the obstacle or constraint that must be overcome to achieve competitive advantage [6;8].

Rumelt's key contribution lies in structuring strategy as a logical construct rather than as a set of goals. He emphasizes that strategy is not a growth ambition or a list of initiatives, but a meaningful choice of direction based on a diagnosis of the situation [6]. The diagnosis identifies the critical bottleneck; the guiding policy defines the solution principle; and coordinated actions ensure practical implementation [6].

The central element of Rumelt's concept is the idea of a "strategic core"—a minimal yet logically complete structure, without which strategy becomes a mere declaration. Unlike traditional strategic plans, which contain numerous goals and initiatives, the core represents a concentrated cause-and-effect model. It links situational analysis with management choices and practical actions.

Structurally, the core includes three interrelated components: diagnosis, guiding policy, and coordinated action.

A diagnosis is an analytical identification of the key constraint or problem hindering an organization's development. Its purpose is not to list environmental factors, but to focus attention on the primary bottleneck. A diagnosis simplifies complexity by highlighting the cause-and-effect center of a strategic objective. Without an accurate diagnosis, strategy is replaced by a set of initiatives that may be proactive but not decisive.

A guiding policy sets the principle for decision making. It is not a detailed plan, but a logic of action that defines how the organization intends to overcome the identified constraint. A guiding policy forms the framework for resource prioritization and management decisions, ensuring the internal coherence of the strategy.

Coordinated actions are a system of mutually reinforcing measures subordinated to a guiding policy. Their coherence means the absence of contradictions and the scattering of resources. This is where the practical side of strategy comes into play: actions should not simply be activities, but elements of a unified structure.

The methodological value of this framework lies in its logical rigor. Diagnosis explains, guiding policy guides, and coordinated actions implement. If any element is missing, the structure loses its integrity: without diagnosis, there is no focus, without policy, there is no principle of choice, and without action, there is no result.

In a traditional management environment, such a structure ensures focus and discipline. However, in the context of digital transformation, where problems are multilayered and actions are

often implemented through complex architectural and technological solutions, it becomes necessary to clarify and expand the logic of the strategic core.

Rumelt's strategic core model has not only practical but also high methodological significance. Its value lies in the fact that it restores strategy to its status as an intellectual construct rather than an administrative document. In a context where strategic planning is often reduced to the formulation of KPIs, budgetary targets, and roadmaps, the core model re-emphasizes the cause-and-effect logic of management choices.

First, the core strategy ensures the concentration of resources. A clear diagnosis eliminates the dispersion of efforts and establishes management priorities. The organization stops reacting to every external signal and begins to act within the logic of the chosen constraint. This reduces the entropy of decisions and enhances the impact of investments [8-10].

Secondly, the model creates cause-and-effect clarity. The connection between the problem, the solution principle, and the actions becomes transparent. This logic allows the strategy to be assessed not by the scale of its declarations, but by its internal coherence. If actions do not follow from the guiding policy, and the policy from the diagnosis, the strategy loses its systemic nature. It is precisely this coherence that makes the model an analytical tool, not just a conceptual framework [7].

Third, the core strategy strengthens managerial discipline. Management is forced to answer difficult questions: What is the real problem? Why was this particular operating principle chosen? Which actions are truly coordinated? This intellectual rigor reduces the risk of imitative transformation and formal strategizing [9].

Finally, the model is universal: it is applicable to organizations of various sizes and industries, as it relies not on tools but on the logic of thought. This is why Rumelt's concept remains relevant in the digital age. However, its methodological strength only manifests itself when adapted to an environment where strategic reality is shaped not only by the market and competitors, but also by data architecture, algorithms, and technology platforms.

Digital transformation differs fundamentally from traditional organizational development programs in that it occurs in a highly nonlinear environment. While classical strategy assumed relative predictability in industry dynamics and gradual changes in competitive factors, the digital environment is characterized by abrupt shifts, network effects, and technological discontinuities [1,2].

Nonlinearity manifests itself primarily in the acceleration of change cycles. Technological platforms are updated faster than strategic programs can be completed. Decisions made today may become irrelevant in a few quarters due to the emergence of a new tool, algorithm, or monetization model. In such an environment, traditional strategic logic, focused on sustainability and long-term positioning, faces the need for constant adaptation.

The second aspect of nonlinearity is technological dependence. Organizations increasingly find themselves embedded in ecosystems of cloud providers, software platforms, and digital services. This means that strategic opportunities are determined not only by internal resources but also by the architecture of external technological solutions. As a result, the strategic landscape becomes multilayered: management logic must take into account infrastructural constraints, algorithmic rules, and integration standards.

The third factor is the network amplification effect. In a digital environment, the value of a product or service increases as the number of users increases. This creates an asymmetric competitive dynamic, in which the leader gains an exponential advantage. Strategic decisions must take this exponentiality into account, otherwise the organization risks operating linearly in an environment of nonlinear effects.

Digital transformation is creating an environment of strategic turbulence, where cause-and-effect relationships are becoming more complex and fluid. The strategic core model proposed by Richard Rumel initially focused on identifying the key constraint within a relatively stable configuration of factors. In a digital environment, however, the configuration of factors itself is constantly changing. This requires a rethinking of the diagnostic mechanism and a refinement of guiding policies, taking into account the nonlinear nature of technological processes.

One of the most characteristic effects of digital transformation is strategic fragmentation—the fragmentation of a single development logic into a multitude of autonomous digital initiatives. Organizations launch automation projects, implement ERP systems, develop data analytics, and create mobile services and digital customer engagement channels. However, without a unified strategic core, these initiatives exist in parallel, failing to form a coherent change architecture.

Fragmentation arises for several reasons. First, digital technologies are highly modular: they can be implemented locally, without immediately transforming the entire system. This creates the illusion of control—the company "moves forward," but the strategic focus is blurred. Second, digital projects are often initiated by various departments—IT, marketing, production, HR—without cross-functional synergy. Each project may be rational in its own logic, but their combined effect does not form a strategic framework.

The result is a "digital noise" effect: a large number of initiatives generates activity but fails to enhance competitive advantage. Resources are allocated reactively, priorities are revised ad hoc, and the organizational architecture becomes increasingly complex and fragmented. While a strategy may formally exist—in the form of a presentation or roadmap—it fails to integrate decisions.

Strategic fragmentation is particularly dangerous because it masquerades as innovation. The more digital projects, the greater the sense of progress. However, without a clear diagnosis and guiding policy, actions don't reinforce each other but compete for resources. The organization begins to manage initiatives instead of managing development.

Digital transformation increases the risk of strategic integrity collapsing. This calls into question the adequacy of the classical logic of the strategic core and requires the inclusion of an architectural dimension capable of ensuring the coherence of digital solutions in a multi-project environment.

Digital transformation is changing not only management tools but also the very structure of responsibility within an organization. While in industrial logic, strategic decisions were concentrated within the management hierarchy, in the digital environment, a significant portion of the management function is being redistributed in favor of algorithms, analytical systems, and automated platforms [3-5].

Data-driven management assumes that decisions are made based on massive amounts of data and analytical models. This strengthens the validity of actions, but simultaneously transforms the source of managerial authority. Managers increasingly act not as the sole subject of choice, but as interpreters of digital signals. A new type of responsibility is emerging—responsibility for the data architecture and the correctness of algorithms, and not just for the final decision [4].

At the same time, the role of IT functions and digital departments in shaping strategic priorities is increasing. The choice of platform, integration architecture, level of automation, or algorithmic models is becoming a strategic decision, influencing the long-term trajectory of the organization. Thus, technological infrastructure ceases to be ancillary and becomes a strategic factor.

However, the redistribution of responsibility also creates risks. First, it creates an illusion of objectivity: data-driven decisions are perceived as neutral, although they depend on the quality of the source data and the parameters of the algorithms. Second, the boundary between the strategic and operational levels blurs: automated systems begin to determine priorities that actually shape the company's strategic behavior.

In this configuration, the classic strategic core faces a new reality. The problem diagnosis must take into account not only market and organizational constraints, but also the limitations of the digital architecture. The guiding policy must define the principles of interaction between humans and algorithms. Coordinated action requires cross-functional integration of managers, analysts, and IT architects.

The digital environment is transforming strategy from a purely managerial construct into a hybrid system where responsibility is distributed across people, processes, and digital mechanisms. This reinforces the need for an architectural and dynamic expansion of the strategic core.

In the classical logic of the strategic core, diagnosis functions as an intellectual filter: it identifies the key constraint around which the entire management structure should be built. However, in the digital environment, it is precisely this element that is most often eroded. This is due to the technological substitution of the problem—when an organization begins to view technology implementation as an answer without clearly defining the question it is answering.

This blurring of diagnosis manifests itself in typical formulations: "we need digitalization," "we need to implement AI," "we should move to the cloud." These statements describe the tool but fail to identify the strategic obstacle. The lack of a clear diagnosis leads to technology becoming an end in itself rather than a means to overcome a specific constraint—whether it's low productivity, weak customer engagement, or ineffective process coordination.

The digital environment exacerbates this risk for several reasons. First, technological solutions are highly attractive and create the illusion of quick results. Second, market and competitive pressures encourage reactive actions: organizations implement what others have already implemented without conducting a thorough analysis of their own constraints. Third, the multilayered nature of digital systems complicates identifying the root cause of a problem—it may be related not to a lack of technology, but to the organizational architecture or distribution of responsibilities [11].

As a result, the diagnosis ceases to be an analytical tool and becomes a set of general formulations. This undermines the cause-and-effect basis of the strategy: the guiding policy becomes declarative, and actions become disjointed.

The key limitation of the classic strategic core in the digital environment is the risk of technological misdiagnosis. Maintaining methodological rigor requires expanding the analytical framework to separate the strategic problem from the technological solution and identify the structural causes of the digital divide.

If a diagnosis is blurred in a digital environment through technological substitution, the guiding policy often loses its meaning and becomes little more than a slogan. Phrases like "digital- first," "AI-driven," and "data- centric" create the impression of strategic clarity, but in reality, they don't define the principles for making management decisions. They indicate an orientation but don't define a logic of action.

In the classical strategic core model, guiding policy performs a normative function: it determines which decisions are consistent with the strategy and which are not. This is a selection principle that limits the managerial scope. In digital practice, this function is often lost. Policy is formulated as value statements, unsupported by architectural solutions and coordination mechanisms.

Declarative language is increasing under institutional pressure. Organizations strive to demonstrate digital maturity to investors, regulators, and partners. As a result, strategic rhetoric outpaces structural change. A disconnect arises between stated policy and actual decision-making. For example, a company may declare a data- driven approach, but key decisions continue to be made intuitively and outside of a unified analytical framework.

Another aspect of the problem is the lack of architectural logic. Guiding policies in the digital environment must define not only a value orientation but also the design principles of digital infrastructure: integration standards, data ownership rules, and automation levels. Without these, policies remain abstract and fail to ensure coherence.

The limitations of the classical strategic core are evident in the fact that guiding policy in the digital age requires deeper institutionalization. It must move from slogans to operationalized principles for designing and managing a digital system. Otherwise, strategy retains its form but loses its regulatory function.

The third element of the strategic core—coordinated action—is tested no less in the digital environment than the diagnosis and guiding policy. While in classical logic, coordination meant mutual reinforcement of initiatives within a chosen direction, in the context of digital transformation, it requires cross-functional synchronization at the level of architecture, data, and processes. This is where systemic disconnects most often arise.

The lack of coordination manifests itself on several levels. First, digital projects are being implemented in parallel by different departments without a unified integration framework. HR implements one platform, finance another, and production a third. Formally, each action is consistent with the overall idea of digitalization, but their interaction does not form a coherent system. Instead of synergy, a technological mosaic emerges.

Secondly, actions often contradict the guiding policy. An organization may declare a focus on customer experience but implement solutions that complicate interfaces and increase operational burdens. Or it may declare a data-driven approach but fail to ensure a unified data quality standard. In such cases, actions exist, but they are not aligned either logically or architecturally.

Third, the digital environment increases interdependencies between decisions. A change to one system element (for example, the implementation of a new ERP platform) impacts planning, budgeting, performance measurement, and HR management processes. If these interdependencies are not considered at the strategic level, the organization faces cascading effects and increased management complexity.

Incoherence in the digital environment is becoming systemic. It manifests itself not only in managerial disunity but also in architectural fragmentation. This demonstrates that the classic interpretation of coordinated action as a set of initiatives is insufficient. In the digital era, coherence must be understood as the structural integration of processes, data, and responsibilities within a unified strategic logic (Table 1).

Table 1 - Deformations of the classical strategic core in the digital environment

Element of the strategic core	Classic function	Type of digital deformation	Mechanism of occurrence	Management implications
Diagnosis	Identifying the key limitation	Technological substitution of the problem	Focus on the tool instead of the cause	Scattering resources and losing focus
Guiding policy	The principle of decision selection	Slogan digitalization	Digital-rhetoric first without architecture	Strategic declarativity
Coordinated actions	Mutual reinforcement of initiatives	Design insulation	Lack of interfunctional synchronization	Local optimization instead of systemic effect
Strategic logic	Causal connection	Metric-centricity	Substituting KPI sets for strategy	Performance management instead of development management
Management responsibility	Centralized strategic choice	Algorithmic diffusion of responsibility	Transferring decisions to analytical systems without strategic control	Weakening of the subjectivity of management

The expanded, digitally adapted strategic core model begins with clarifying the nature of the strategic diagnosis in the digital environment. While in classical logic, the diagnosis identified a market or competitive constraint, in the context of digital transformation, the key object of analysis becomes the so-called digital divide—the structural inconsistency between the organization's strategic intentions and its actual digital architecture.

The digital divide manifests itself in several dimensions. First, it's the gap between data and decisions: an organization accumulates vast amounts of information, but it's not integrated into management logic. Data exists, but it doesn't become a strategic resource. Second, it's the gap between technologies and processes: the implemented systems don't support the actual operating model, but merely overlay a legacy structure. Third, it's the gap between declared digital maturity and the actual ability to coordinate across functions.

Unlike traditional diagnosis, which focuses on the external market, the digital divide diagnosis looks inward at the organizational architecture. It identifies not only the competitiveness issue but also the structural limitations of the digital infrastructure: fragmentation. IT landscape, lack of a unified data ownership model, unclear distribution of responsibility between managers and algorithms.

A key element of this diagnosis is the recognition of data as a strategic resource. While the industrial model considered capital, labor, and technology as resources, in digital logic, data forms the basis of management choices. Their quality, accessibility, and integration directly impact strategic sustainability.

The first element of the expanded strategic core requires a shift from a superficial statement of the "need for digitalization" to a systemic identification of architectural inconsistencies. The digital divide diagnosis sets the starting point for the formation of an architectural guiding policy and provides a methodological basis for synchronizing transformational actions.

In the expanded strategic core model, guiding policy takes on an architectural dimension. While in the classical interpretation it defined a general principle for overcoming an identified limitation, in the digital environment this proves insufficient. An organization functions as a set of interconnected digital systems, platforms, and data flows, and therefore guiding policy must define the principles of their design and integration [11].

An architectural guiding policy answers the question not only "what are we doing" but also "how is the system structured to enable this?" It establishes the fundamental principles of a digital organization: the data ownership model, integration standards, levels of automation, and boundaries of responsibility between humans and algorithms. Without these principles, even a well-formulated strategy remains vulnerable to fragmentation [11].

A key element of architectural policy is recognizing digital infrastructure as a strategic asset. The choice of IT architecture, platform model, and degree of data centralization are not technical decisions, but strategic ones. They determine the speed of change, the scalability of processes, and the ability to manage analytically. Thus, architecture becomes the tangible expression of guiding policy.

It's important to emphasize that architectural guiding policy does not replace technology strategy. It establishes the design rules for an organizational system in accordance with the identified digital divide diagnosis. If the diagnosis identifies a structural inconsistency, the policy sets the principles for addressing it through system integration.

Unlike declarative formulas like "digital- first," an architectural guiding policy is operationalizable. It can be expressed in standards, regulations, requirements for digital projects, and consistency metrics. This is what enables strategic coherence to be maintained across multiple initiatives.

An expanded strategic core requires a shift from value-based rhetoric to digital organizational design principles. An architectural guiding policy ensures the structural integrity of the strategy and forms the basis for synchronizing transformational actions.

The third element of the expanded strategic core model in the digital environment is not simply coordinated actions, but synchronized transformational actions. The difference is fundamental. In industrial logic, coordination meant the absence of contradictions between initiatives. In the digital environment, this is not enough: actions must be integrated into a unified architecture of data, processes, and metrics.

Synchronization involves three levels of consistency.

First, cross-functional integration. Digital transformation simultaneously impacts finance, HR, production, marketing, and IT. If changes are implemented separately, the organization achieves a set of localized improvements but not a systemic effect. Synchronization means that every action is designed with consideration of its impact on other functions. This requires a common digital framework and a single center for strategic coordination.

Secondly, metric Coherence. In a digital environment, metrics become behavioral regulators. If departmental metrics contradict each other, strategy disintegrates into local optimizations. Synchronized actions are based on a unified system of strategic metrics that reflect a common diagnosis and guiding policy. This creates the effect of management coherence.

Third, temporal coordination. Digital projects have varying implementation speeds. A lack of temporal synchronization leads to cascading failures: one system is implemented, another is not ready, and a third is outdated even before integration. Transformational actions must be structured as a sequence of mutually reinforcing stages.

The key distinction of the expanded model is the recognition that digital activities alter the organizational structure itself. They transform processes, redistribute responsibilities, and influence decision-making culture. Therefore, their coherence should be assessed not only by formal alignment with strategy but also by the degree of systemic integration.

Synchronized transformational actions transform strategy from a set of initiatives into a managed process of structural restructuring. Without this synchronization, even a correct diagnosis and architectural policy remain theoretical constructs. In the digital age, strategy is realized not through the number of projects, but through their structural coherence and controlled dynamics.

The digital environment fundamentally changes the temporal dimension of strategy. While in industrial logic, the strategic core was formed over a long horizon and adjusted periodically, in the context of digital transformation, strategy must operate in a mode of constant calibration. This is why the expanded model includes a dynamic feedback loop as a mandatory element.

Dynamic feedback means systematically collecting, analyzing, and interpreting data on strategy implementation. However, this isn't simply a matter of monitoring KPIs. The feedback loop must assess three aspects: the adequacy of the initial diagnosis, the effectiveness of the guiding policy, and the degree of synchronization of actions. If the data shows a persistent deviation in results, this may indicate not poor execution, but an incorrect problem definition.

In a digital environment, analytical monitoring capabilities are significantly expanded. BI tools, end-to-end analytics, process mining, and behavioral data enable tracking dynamic changes in near real time. This creates the preconditions for moving from reactive adjustments to proactive strategy adaptation. However, data availability alone does not guarantee strategic flexibility. Institutionalizing a mechanism for reviewing decisions is essential.

The dynamic feedback loop functions as a "strategic regulator." It reduces the risk of inertia, prevents the entrenchment of erroneous directions, and allows for the refinement of architectural principles as experience accumulates. In the face of technological turbulence, it is the ability to adjust that becomes a factor of resilience.

The expanded strategic core is complemented by an adaptive mechanism. Strategy ceases to be a static document and becomes a cyclical process of diagnosis, design, and synchronization. A feedback loop ensures the maintenance of strategic coherence in an environment where change is continuous and nonlinear (Table 2).

Table 2 - Structural and functional model of the extended strategic core in the digital environment

Strategic module	Management function	Object of regulation	of	Type of strategic logic	Risk of module deformation
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Module 1. Diagnostic	Focusing on systemic constraints	Structural digital divide (data, processes, architecture)	Cause and effect logic	Technological substitution of the problem
Module 2. Architectural	Formation of principles for designing a digital organization	Infrastructure, integration standards, data ownership model	Constructive (design logic)	Fragmentation of the digital landscape
Module 3. Coordination and transformation	Synchronizing changes between functions	Projects, KPIs, implementation timelines	System logic of coordination	Local optimization and metric conflict
Module 4. Dynamic Controller	Data-driven strategy calibration	Results, deviations, behavioral effects	Adaptive logic	Inertia and the consolidation of an erroneous course
Integration circuit	Ensuring strategic coherence	Interconnection of all modules	Metasystemic logic	The growth of strategic entropy

Practical testing of the expanded strategic core model requires the development of a tool to measure its maturity and consistency in the digital environment. Otherwise, the model will remain a conceptual construct without operational application. The diagnostic tool should assess not the existence of a strategy as a document, but the integrity of its logical structure.

The first diagnostic block aims to assess the quality of the strategic diagnosis . It analyzes whether the key constraint is formulated in cause-and-effect form; whether the problem is separated from the technological solution; and whether a structural digital gap (data, architecture, processes) has been identified. The diagnosis is considered valid if it explains the allocation of resources and priorities, rather than simply repeating general market trends.

The second block concerns the architectural guiding policy. The presence of clearly defined principles for digital system design is assessed: the data ownership model, integration standards, automation rules, and the distribution of responsibilities between functions. It is important to determine whether these principles are institutionally enshrined or remain mere declarations.

The third diagnostic block is dedicated to synchronizing actions . Cross-functional project alignment, a unified metrics system, and the time coordination of transformation stages are assessed. Particular attention is paid to whether actions reinforce each other or create competition for resources.

The fourth element of the tool is an assessment of the dynamic feedback loop . This examines whether a mechanism for regularly reviewing diagnoses and policies based on data exists, as well as whether analytical tools are used for strategic calibration.

For an integrated assessment, a strategic coherence indicator (e.g., a weighted average across four blocks) can be introduced, reflecting the degree of structural integrity of the strategy in the digital environment. This tool allows for identifying areas of strategic noise and prioritizing corrective actions.

The diagnostic tool translates the expanded strategic core model from theoretical frameworks into management practice. It enables the measurement of the quality of their strategic integration, rather than the quantity of digital initiatives.

While the diagnostic tool addresses the integrity of the strategic core, the indicator system allows for the dynamic measurement of its digital coherence. In the context of digital transformation, it is important to evaluate not only the achievement of financial or operational results, but also the structural coherence of strategic decisions.

Digital strategic alignment indicators can be grouped into four key areas.

The first area is diagnosis coherence . This assesses the extent to which strategic initiatives are directly linked to the identified digital divide. Potential metrics include the proportion of projects with a formally documented link to the key constraint, as well as the degree to which resources are reallocated in accordance with the diagnosed problem. If projects are launched without a logical connection to the diagnosis, the level of coherence decreases.

The second area is architectural integrity. Indicators include the degree of integration of IT systems, the proportion of processes operating in a single digital environment, the level of data standardization, and the presence of a centralized architecture management model. High fragmentation of the digital landscape indicates a weak guiding policy.

The third area is cross-functional synchronization. This involves analyzing the alignment of KPIs across various departments, the presence of common transformation roadmaps, and the degree of metric overlap. If functional goals conflict, the strategy loses its coherence.

The fourth area is strategy adaptability. This assesses the frequency of strategic reviews based on analytical data, the speed of response to identified deviations, and the presence of a formalized mechanism for policy adjustment. High adaptability indicates a functioning dynamic feedback loop.

The integration of these indicators allows us to create a digital strategic coherence index, reflecting the degree of internal strategy coherence in the digital environment. This index does not replace traditional performance indicators, but rather complements them by capturing the structural stability of strategic logic.

Digital strategic alignment indicators thus serve as a tool for maintaining strategic discipline in the face of technological turbulence. They measure not the scale of digital investments, but the depth of their integration into a unified strategic core.

Despite the methodological integrity of the expanded strategic core model, its practical implementation is fraught with a number of systemic risks. Ignoring these limitations could transform the concept into a formal superstructure without any real managerial impact.

The first risk is institutional resistance . The architectural guiding policy involves the redistribution of authority, data standardization, and increased cross-functional coordination. This inevitably affects the areas of influence of departments and managers. In an established hierarchy, digital centralization can be perceived as a threat to autonomy.

The second risk is the hyper-bureaucratization of strategy . Attempts to formalize architectural principles and feedback loops can lead to excessive regulation. As a result, the organization focuses on following procedures rather than actually solving the diagnosed problem. Strategic discipline turns into an administrative burden.

The third risk is the metric illusion of controllability. The introduction of strategic alignment indices and advanced analytics may create the feeling of complete process control. However, data only reflects measurable aspects of reality. There is a risk that strategic analysis will be replaced by technical reporting.

The fourth risk is technological determinism . Strengthening the architectural component can lead to excessive strategy dependence on the chosen digital platform or IT provider. In this case, flexibility is reduced, and strategic logic is subordinated to the limitations of the infrastructure.

The fifth risk is a shortage of strategic talent. The expanded model requires managers capable of thinking both strategically and architecturally, and understanding the interrelationships between data, processes, and organizational structure. A lack of such competencies reduces the quality of implementation.

Implementing an expanded strategic core requires not only methodological development but also the organization's institutional maturity. The model enhances the manageability of digital transformation only if a conscious balance is struck between architectural rigor and adaptive flexibility. Without this, the strategy risks becoming another element of management noise rather than reducing it (Table 3).

Table 3 - Maturity levels of the extended strategic core in the digital environment

Level	The nature of strategic logic	Architectural configuration	Management system behavior	Typical consequences
Declarative	The strategy is formulated as a set of goals and digital initiatives	Disparate IT solutions, lack of a unified architecture	Reactive decisions, project impulsiveness	Growing digital noise, low return on investment
Project	Having a partial strategic focus	Local integration of systems within functions	Coordination through temporary working groups	Improving individual processes without systemic effect
Integration	A clear diagnosis of the digital divide	Formalized architectural principles	Cross-functional synchronization of initiatives	Improving controllability and predictability of results
Architectural	The strategy is embedded in the organization's digital model	Unified data model and standardized infrastructure	Managing through agreed metrics and platforms	Reduced fragmentation, increased scalability
Adaptive-coherent	The strategic core is regularly reviewed based on analytics	Dynamic architecture with fast restructuring mechanisms	Cyclical adjustment of diagnosis and policy	High digital resilience and strategic flexibility

The analysis suggests that Richard Rumelt's strategic core model retains its fundamental methodological value even in the context of digital transformation. Its logic—diagnosis, guiding policy, and coordinated actions—continues to provide cause-and-effect clarity, resource concentration, and managerial discipline. However, the digital environment radically complicates the context in which this model is applied.

Digitalization increases the nonlinearity of processes, provokes strategic fragmentation, and redistributes management responsibility between people and algorithms. Under these conditions, the traditional strategic core faces the risk of blurred diagnosis, declarative guiding policies, and inconsistent actions. Technology begins to replace the problem, and activity replaces strategy.

In response to these limitations, this paper proposes an expanded model of the strategic core, including two additional components: an architectural dimension of guiding policy and a dynamic feedback loop. The architectural component ensures the structural integrity of the digital infrastructure and anchors the organization's design principles. The dynamic loop creates an adaptation mechanism that enables regular revision of strategic foundations based on analytical data.

Practical testing of the model using a diagnostic tool and a system of digital strategic alignment indicators demonstrates the feasibility of moving from declarative digitalization to managed transformation. The model's effectiveness depends on institutional maturity, the quality of management competencies, and the organization's ability to avoid hyper-bureaucratization and technological determinism.

Strategy in the digital age is no longer a static plan but a discipline for maintaining coherence amid technological turbulence. An expanded strategic core allows for greater systemic coherence and sustainability rather than increasing the number of digital initiatives. A promising direction for further

research is the empirical validation of a strategic coherence index and the development of quantitative models for assessing the digital resilience of organizations.

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## DIGITAL TRANSFORMATION AND INTANGIBLE MOTIVATION: CHANGES, RISKS, AND NEW MANAGEMENT MODELS

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**Abstract:** *Digital transformation has changed the context of work: hybrid employment, distributed teams, and algorithmic control have become the norm. Traditional intangible motivators (recognition, autonomy, participation) are increasingly mediated by digital systems, acquiring a measurable nature. The aim of this study is to identify the transformation of the structure of intangible motivation in the digital environment and propose updated management models that minimize the risks of hypercontrol, burnout, and the illusion of recognition. Methods: literature review, case studies, scenario modeling, and a survey of employees of hybrid organizations. Scientific novelty: conceptualization of the paradox of the algorithmization of intangible motivation: increasing the controllability of incentives is accompanied by a decrease in their symbolic value. A hybrid model of motivation 2.0 is proposed, combining algorithmic transparency with the preservation of internal autonomy. Practical significance: recommendations for HR and top management on creating sustainable motivation systems that prevent demotivation from digital tools.*

**Keywords:** *changes, risks, motivation, digital transformation, models.*

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Digital transformation is no longer a project; it has become the very fabric of organizations. The transition to hybrid employment, the implementation of HRIS systems, algorithmic performance monitoring, and the use of real-time analytics have changed not only management processes but also the very nature of labor relations. While non-material motivation was previously built around personal interaction, symbolic recognition, and trust, today it is mediated by digital interfaces, ratings, digital profiles, and performance metrics.

The paradox of modern management is this: the more control and feedback tools an organization acquires, the more frequently it records a decline in engagement and an increase in burnout. International employee engagement studies in recent years have demonstrated a persistent gap between companies' digital investments and employees' subjective sense of meaning in their work. This creates a contradiction: digitalization enhances process control, but at the same time, it can weaken underlying motivational mechanisms.

Classical theories of motivation developed in the industrial and post-industrial eras, when the primary space of interaction was the physical work environment. Recognition, status, participation in decision-making, autonomy, and career advancement were social and personal in nature and relied on direct contact. In the digital environment, these tools are transformed: recognition becomes a digital badge, autonomy becomes a flexible schedule monitored by an algorithm, and feedback becomes automatic notifications of KPI achievement. This raises questions about the substantive content of these mechanisms and their actual effectiveness [1-4].

The working hypothesis is that digitalization does not eliminate non-material motivation, but rather redistributes its structure: it increases the importance of transparency, personalization, and speed of feedback, while simultaneously devaluing formal symbolic incentives and reducing the effect of traditional recognition methods.

This work aims to rethink non-material motivation not as a set of traditional tools, but as a dynamic system whose effectiveness is determined by the ability to combine algorithmic rationality and preserve individual autonomy in a digital environment. In a context where management increasingly measures behavior, the question of whether an organization can preserve space for meaning, trust, and intrinsic motivation is particularly important.

Understanding non-material motivation is impossible without reference to the classical theories that formed the foundation of 20th-century management thought. These theories laid the foundation for key ideas about the nature of human activity, the relationship between internal and external incentives, and the role of meaning, recognition, and autonomy in work.

Maslow's hierarchy of needs, which views motivation as a progressive movement from basic physiological and social needs to self-actualization. In this context, non-material motivation relates to the upper levels—recognition, respect, and self-actualization. The organization serves not only as a source of income but also as a space for personal growth [1].

Herzberg's two-factor theory reinforced the distinction between tangible and intangible incentives. According to his approach, hygiene factors (salary, working conditions, safety) prevent dissatisfaction but do not create sustainable engagement. The source of true motivation is substantive factors: achievement, recognition, responsibility, and opportunities for professional growth. This is where the core of intangible incentives is formed [2].

McGregor's Theory X and Y added a managerial dimension to the discussion. It demonstrated that the effectiveness of motivation depends on management philosophy: whether management views employees as objects of control or as independent agents capable of self-organization. Non-material motivation, according to the logic of Theory Y, is built on trust and delegation, not on strict control [3].

Of particular importance is Edward Deci and Richard Ryan's self-determination theory, which identifies three basic psychological needs: autonomy, competence, and affiliation. Satisfaction of these needs is what creates sustainable intrinsic motivation. This model is particularly relevant for analyzing the digital environment, as it directly addresses the balance between control and autonomy [4,5].

Classic concepts agree on one thing: sustainable employee engagement is achieved not so much by material compensation as by a sense of meaning, recognition, and autonomy. Non-material motivation is not an addition to compensation, but a strategic factor in long-term effectiveness.

However, all of these models were developed in the context of predominantly offline organizations, with stable structures and relatively stable social interactions. This creates the preconditions for further analysis: to what extent do these concepts retain their explanatory power in the context of digital transformation, where mechanisms of recognition, autonomy, and feedback are algorithmically mediated.

In the traditional management model, non-material motivation is reinforced through stable corporate institutions. These include recognition systems, career paths, status symbols, mechanisms for participation in management, and forms of professional development. These elements create symbolic capital for employees within the organization and foster long-term commitment.

One of the key forms is recognition. It can be expressed through public gratitude, awards, inclusion in strategic projects, and trust in decision-making. In the pre-digital era, recognition was primarily personal and relied on direct interaction between manager and employee.

Career dynamics are no less significant. Opportunities for professional growth and expanded responsibilities and influence serve as a powerful non-material incentive. A career in the classic model is not only about promotion but also a symbolic affirmation of an employee's value to the organization.

Autonomy is also an institutionalized motivational mechanism. Delegation of authority, participation in decision-making, and project-based freedom foster a sense of significance and professional maturity. It is autonomy that ensures the transition from extrinsic to intrinsic motivation.

Corporate culture plays a special role as a systemic institution of non-material motivation. Values, norms, organizational language, and symbolic rituals create an environment in which employees feel a sense of belonging and meaning. In this case, motivation is not the result of individual tools, but a consequence of the overall management logic.

Institutional forms of non-material motivation are built around recognition, status, autonomy, professional development, and cultural identification. Their sustainability is ensured not by one-off actions, but by their integration into the organization's management architecture [5].

However, in the context of digital transformation, these institutions are beginning to change: recognition is becoming digitalized, career trajectories are becoming nonlinear, autonomy is partially limited by algorithmic control, and corporate culture is increasingly being communicated through digital platforms. This creates the preconditions for analyzing the limitations of traditional models in the new digital environment.

Classic models of intangible motivation demonstrate high explanatory power in the context of stable organizational structures and offline interactions. However, digital transformation is changing the very environment in which motivational mechanisms are implemented. As a result, many traditional tools are losing some of their effectiveness or begin to function differently than originally intended [6-10].

First, the nature of recognition is changing. In the digital environment, it is increasingly mediated by interfaces—corporate portals, performance management systems, internal social networks. Recognition is becoming recorded, measurable, and comparable. This increases its transparency, but simultaneously reduces its symbolic depth. When gratitude becomes an automatic notification, its emotional value can weaken.

Secondly, the structure of autonomy is changing. Traditional models relied on expanding employee freedom as a source of intrinsic motivation. However, digital management tools create a parallel layer of constant monitoring—real-time KPI tracking, activity analytics, and digital traces of interactions. Formally, autonomy is retained, but in reality, it is limited by algorithmic control. A "conditional freedom" effect emerges, in which employees operate within predetermined digital boundaries.

Third, the institutional stability of career trajectories is weakening. The digital economy is characterized by accelerated role transitions, project-based employment, and lateral moves. The linear career growth model, which long served as a powerful non-material incentive, is becoming less predictable. This reduces its motivational potential and requires new forms of professional identity.

An additional constraint is the changing social context of work. Hybrid and remote teams reduce the informal interactions that traditionally convey recognition and belonging. As a result, cultural mechanisms of engagement are weakened, and formalized digital tools don't always compensate for this deficit.

Traditional models of non-material motivation face several challenges: the algorithmization of recognition, digital control of autonomy, nonlinear career trajectories, and the decline in the density of social interaction. These factors do not negate the importance of classical concepts, but they require their revision and adaptation to the digital environment. It is at this intersection of theory and digital practice that new issues in motivational management are emerging.

Digital transformation has changed not only management tools but also the very structure of work. Work is increasingly taking place in a digital environment, where the workspace is defined not by a physical office, but by an information system. This fundamentally alters the logic of interaction, control, and performance evaluation. [6,10].

Modern organizations operate through platform architectures: corporate portals, HRIS systems, ERP, and cloud collaboration services. Work processes are recorded, structured, and analyzed in real

time. This is the emergence of the phenomenon of "digital labor," in which employee activity leaves a digital trace that can be analyzed.

One of the key factors in the new environment is algorithmic control. Performance metrics, rating systems, and automatic task completion notifications form a continuous field of observation. While in the industrial model, control was periodic and primarily managerial, in the digital model, it becomes systemic and technologically integrated. This increases process transparency but simultaneously changes the psychological perception of work.

Hybrid work and distributed teams are also transforming the motivational context. Employees may be physically outside the office, but their engagement with the organizational system is ensured through digital communication channels. In this environment, traditional forms of social interaction are weakened, and the role of formalized digital feedback mechanisms is strengthened.

Additionally, it's worth noting the acceleration of decision-making cycles. The digital environment requires rapid responses to changes and quick adjustments to tasks and priorities. This increases the demands on staff adaptability and reinforces the importance of short-term performance indicators.

The digital environment is not simply an instrumental supplement to traditional management, but a new work context in which the categories of control, autonomy, recognition, and professional identity are being redefined. Under these conditions, non-material motivation ceases to be a purely interpersonal phenomenon and becomes part of the organization's digital architecture. This circumstance requires an analysis of the transformation of its channels and tools.

The digital environment doesn't eliminate non-material motivation, but it does radically change the channels through which it is transmitted. While recognition, status, and engagement were previously formed primarily through personal interaction, today they are increasingly mediated by digital interfaces and algorithms.

One of the most noticeable changes has been the emergence of digital recognition. Corporate platforms allow achievements to be recorded in the form of badges, ratings, and publicly recognized within the system. On the one hand, this enhances transparency and makes an employee's contribution visible to the entire organization. On the other hand, recognition is becoming standardized, where symbolic meaning may be inferior to quantitative metrics.

The second transformed channel is KPI transparency. Performance indicators, previously available to management, are now often open to employees in real time. This creates a sense of public comparability, enhances competition, and improves process control. However, excessive formalization risks shifting the focus from substantive work to achieving measurable indicators.

Gamification is also becoming a tool for non-material incentives. Game mechanics—levels, points, leaderboards—are being integrated into HR platforms to increase engagement. Theoretically, they enhance interest in tasks and create a sense of progress. In practice, their effectiveness depends on the depth of their integration into the meaningful structure of work: mechanical gamification without meaningful content quickly loses its motivational potential.

Digital feedback is another transformed channel. Automatic goal achievement notifications, regular engagement surveys, and instant comments in task management systems speed up communication. This increases the efficiency of interactions, but can reduce the emotional connection between manager and employee.

Non-material incentive channels are becoming faster, more transparent, and more measurable. However, their dependence on digital infrastructure and data processing algorithms is also increasing. A new management challenge arises: preserving the meaningful nature of non-material incentives in the face of their digitalization. It is in this context that the paradox of motivation algorithmization emerges, requiring separate analysis.

Digital transformation has led to non-material motivation increasingly becoming the subject of quantitative measurement. Recognition is recorded in the system, engagement is expressed as a percentage, competence is confirmed by a digital skills profile, and reputation by a rating. This creates a managerial temptation: if intangible factors can be measured, then they can be precisely managed.

However, it is here that the paradox of algorithmization manifests itself. Intangible motivation has historically been based on subjective perceptions—feelings of respect, trust, belonging, and meaning. When these elements are translated into metrics, they take on the form of an external incentive. Recognition expressed in points begins to be perceived as a conditional resource, rather than as confirmation of individual value.

Algorithmization enhances transparency and comparability, but can weaken intrinsic motivation. According to self-determination theory, excessive external regulation can reduce behavioral autonomy. If an employee focuses on a numerical rating, they gradually shift their focus from the intrinsic meaning of their work to achieving a measurable indicator. As a result, intangible motivation loses its "intangibility" and becomes a form of controlled incentive [4,11].

An additional contradiction arises in the area of trust. Algorithms assume objectivity, but they don't always take into account the context of the employee's efforts, the complexity of the tasks, or the hidden contributions. When a digital system shapes reputation but doesn't reflect the full scope of professional activity, there is a risk of demotivation and a sense of injustice.

The paradox of algorithmization lies in the dual nature of the digitalization of motivation: on the one hand, it increases controllability, transparency, and the speed of feedback; on the other, it can devalue the symbolic and personal nature of intangible incentives. The issue is not about abandoning digital tools, but about finding a balance between measurability and preserving the subjective meaning of work. This balance is becoming a key challenge in modern management design. ( table 1).

Table 1 - Transformation of non-material motivation under the influence of the digital environment

Element of motivation	Traditional form (pre-digital environment)	Digital form	The nature of the transformation	Possible effects
Confession	Personal interaction, public gratitude, symbolic awards	Digital badges, marks in the system, achievement ratings	Formalization and measurability	Increased transparency, but risked decreased emotional depth
Feedback	Periodic meetings, evaluation by the manager	Instant notifications, automated reports, online surveys	Acceleration and algorithmization	Increased efficiency, but possible superficiality
Autonomy	Delegation of authority, trust	Flexible schedule with continuous digital monitoring	Conditional autonomy within an algorithm	Growing formal freedom with increasing control
Status	Job hierarchy, experience, expertise	Digital competency profile, public KPIs	Visualization and comparability	Increased transparency, risk of reputational dependence
Career development	Linear growth up the career ladder	Project dynamics, horizontal roles, flexible trajectories	Nonlinearity and acceleration	Increased opportunity but decreased predictability

Affiliation	Corporate culture, offline interaction	Online communications, digital communities	Platform socialization	Maintaining connection while risking reduced depth of contact
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In a digital environment, recognition becomes technically simple: click a "thank you" button, issue a badge, and mark the achievement in the system. Formally, the organization demonstrates high activity in rewarding employees. However, a phenomenon arises that can be described as the "illusion of recognition"—a situation in which digitally recording achievements does not equate to a real experience of respect and value [9].

Traditionally, recognition was interpersonal. It involved intonation, context, and individualized assessment. In digital systems, recognition is standardized: the same message format is used for different employees and situations. This standardization increases scalability but reduces the depth of perception. The employee receives a signal, but doesn't always perceive its significance.

An additional risk is the inflation of digital rewards. With excessive use of badges and ratings, their symbolic value diminishes. Recognition becomes a routine interface element rather than an event that enhances professional identity. A gap arises between the number of digital badges and the actual level of internal satisfaction.

Psychologically, the illusion of recognition manifests itself in the fact that employees receive external confirmation of their performance but experience no emotional feedback. The lack of personal contact can create a sense of formality and distance. This is especially noticeable in a hybrid work environment: digital recognition often replaces real-life managerial attention.

The problem lies not in the digital recognition itself, but in its content. If recognition becomes solely an element of the accounting system, it loses its motivational potential. To maintain its effectiveness, a combination of digitally documented achievements and personalized, meaningful feedback is required. Otherwise, the organization risks creating the appearance of engagement while actually reducing employee intrinsic motivation.

One of the less obvious, yet significant, risks of digitalization is the gradual devaluation of intangible incentives themselves. This isn't about psychological states or overload, but rather a transformation of their motivational content.

The digital environment is moving toward standardization. Recognition, participation, engagement, and even "team spirit" are beginning to be described through universal templates: fixed feedback formats, standard forms of gratitude, uniform contribution assessment scales. This standardization increases system manageability but diminishes the individual significance of the motivational signal.

Non-material motivation is inherently based on subjective value—a sense of unique contribution, personal connection, and trust. When these elements become part of an automated procedure, their symbolic weight diminishes. An employee may formally receive a positive evaluation, but perceive it as a routine rather than a sign of genuine recognition.

An additional factor is the acceleration of communication. Digital tools allow for instantaneous recording of achievements, but speed often replaces depth. Reducing meaningful feedback to brief notifications deprives the motivational process of meaningful content.

As a result, a shift in emphasis occurs: the value is acquired not by the contribution itself, but by its digital recording. Intangible incentives begin to be perceived as an element of accountability rather than as a manifestation of organizational trust. This diminishes their intrinsic strength and gradually shifts motivation to the plane of formal compliance with system expectations.

Digital standardization creates the risk of losing the uniqueness of intangible incentives. Maintaining their motivational potential requires the conscious design of management practices in which technological scalability does not replace personalized recognition and the individual meaning of professional contribution.

Digital transformation has strengthened the role of reputation as an element of non-material motivation. Corporate systems are now incorporating ratings, public performance indicators, comparative dashboards, and digital achievement profiles. A new motivational variable is emerging: visibility of results.

On the one hand, transparency promotes fairness: employees' contributions become visible, and achievements are recorded. Reputational capital can serve as an incentive, strengthening the desire for professional growth. However, this carries the risk of shifting the motivational focus.

When performance is assessed through public metrics, intrinsic motivation gradually gives way to a focus on external reputational gains. Employees begin to optimize their behavior not for substantive results, but for the evaluation algorithm. This leads to the development of "window dressing"—a display of metrics that are well-represented in the system but don't always correspond to the true value of their work.

An additional effect is dependence on comparison. The digital environment enhances the comparability of employees. Ratings become not only an assessment tool but also a factor in constant social comparison. As a result, non-material motivation can transform from an intrinsic desire for development into a response to one's position in the digital hierarchy.

Reputational digitalization creates a dual effect. It enhances transparency and controllability, but at the same time, it can change the very structure of incentives, shifting them from a semantic focus to a focus on the digital representation of results. The goal of management in this context is not to eliminate reputational mechanisms, but to ensure their alignment with real professional values, so that digital visibility does not replace the substantive value of work (Table 2).

Table 2 - Key risks of digitalization of non-material motivation

Risk	Source of origin	Mechanism of manifestation	Management implications	Possible mitigation measures
The illusion of recognition	Automated gratitude and digital reward systems	Formal recording of merits without personal context and emotional content	Decreasing the importance of recognition, creating a sense of formality	Personalized feedback, combining digital and in-person forms of recognition
Devaluation of non-material incentives	Standardization and unification of digital motivation tools	Recognition and participation are becoming regulated procedures	Weakening the symbolic value of status and trust	Differentiation of forms of recognition, limiting the frequency of formal incentives
Reputational dependence	Public ratings and comparable KPIs	Orienting employees to a digital position instead of a substantive result	Window display efficiency, behavioral optimization for metrics	Multifactorial assessment, limiting public comparisons
Shifting motivational focus	Dominance of quantitative indicators	Replacing internal motivation with external regulation	Decreased initiative, increased instrumental behavior	Balance of quantitative and qualitative evaluation criteria

Formalization of autonomy	Algorithmic control and monitoring	The presence of formal freedom with actual limitations of decisions	Decreased sense of subjectivity, passivity	Transparency of algorithms, zones of controlled choice
Degradation of symbolic capital	Excessive digital regulation	Replacing interpersonal recognition with interface communication	Weakening of corporate identity	Maintaining offline/live forms of management interaction

Digital transformation doesn't "remove" intangible motivation—it changes its medium. Previously, key intangible incentives (recognition, status, autonomy, participation, trust) resided in live management interactions and corporate rituals. Now, they are increasingly embedded in digital architecture: HRIS, KPI dashboards, Competency profiles, internal social networks, and automated feedback loops. This results in a new mode of motivational management: some incentives become measurable and replicable, but at the same time, the risk of losing depth of meaning increases.

The hybrid model of non-material motivation is a management construct in which an algorithm ensures transparency and regularity, while the manager provides meaning, context, and trust. Essentially, it is a "dual-loop" system: the digital loop is responsible for data and process discipline, while the human loop is responsible for interpretation and personal recognition. If either loop fails, the model degenerates: either into "digital bureaucracy" (there are metrics, but no motivation) or into "charismatic chaos" (there are emotions, but no fairness or repeatability) [4,11].

Algorithmic circuit (system): records results and progress (tasks, SLAs, deadlines, KPIs, participation in projects); ensures regular feedback (cycles, notifications, reminders); reduces the arbitrariness of assessment (uniform rules, uniform criteria); makes the contribution visible (transparency, comparability, history of achievements).

Human contour (manager/HR): turns metrics into recognition: explains “why it matters”; restores context: takes into account complexity, limitations, invisible contributions; protects autonomy: provides space for choice and initiative; maintains fairness: corrects distortions of metrics and algorithms; connects the result with meaning: values, development, role in the big picture.

The key idea here is simple and a bit jarring for those who like to "automate everything": data doesn't motivate in and of itself. It merely creates the ground for motivation. Motivation is born where there is meaning, recognition, and a sense of agency.

Three levels of integration: how digital and human beings are “stitched together”.

Level 1 – Informational (What Happened): The system collects and aggregates performance data: results, contribution, dynamics, participation, and learning. At this level, data quality is important: accuracy, completeness, comparability, and the absence of "junk metrics."

Level 2 – Interpretive (what does this mean): The manager and/or HR perform a managerial "decoding" of the indicators: where the result was achieved through professionalism, where through favorable conditions; where the failure is due to a system barrier; where the contribution was "behind the scenes." This is the layer that the algorithm cannot extract without losses.

Level 3 – Motivational (how it affects a person): Personalized feedback is generated, which: acknowledges contributions that are meaningful and not just for show; records the growth of competence and professional meaning; suggests the next step (development, role, project, area of responsibility); maintains autonomy: “you influence,” not “you are judged.”

Principles of hybrid model sustainability. Transparency of algorithms. Employees must understand what is being measured, how it is calculated, what weights are applied, what exceptions are made, and who can make adjustments. An opaque algorithm breeds mythology and suspicion rather than motivation.

Contextuality instead of "blind metrics. " Any number without context is potentially demotivating. The model introduces a rule: numerical metrics are not used as the sole source of truth for recognition, status, and career decisions.

Prioritize meaning over interface. A digital badge is packaging. It's not the badge itself that motivates, but the meaning behind it: impact on results, trust, recognition of competence, and role growth.

Limiting incentive inflation. If rewards are given too frequently and uniformly, the value declines. The hybrid model separates the levels: operational recording of progress (digital, frequent), meaningful recognition (less often, personalized, "weighty").

Maintaining a zone of autonomy. In a digital environment, autonomy is not "do whatever you want," but rather controlled choice: choosing a solution method, choosing a sequence, participating in projects, and the right to reasoned experimentation.

For the model to function as a system, it is assembled from management modules: Fairness module: uniform criteria + clear exceptions + appeal/clarification procedure. Recognition module: digital recording + management interpretation + personalized feedback. Development module: linking results to competencies, training, project roles, and career steps. Autonomy module: a framework within which one can choose and influence, without feeling "under control". Participation module: mechanisms for engaging in decisions—not slogans, but concrete formats: proposals, voting, initiatives, working groups. In corporate translation: we don't "motivate people," but rather design an environment where motivation doesn't break down against the system.

A practical implementation framework: how to launch painlessly. Step 1. Mapping intangible incentives. Identify which incentives are truly effective in the organization (recognition, autonomy, status, meaning, development) and where they currently reside—in people or in platforms. Step 2. Audit of metrics and "shadow" effects. We check which metrics are driving window dressing, competition for rankings, and optimization for the system rather than for results. Step 3. Setting up transparency rules and contextual adjustments. Clear principles are introduced: what is and isn't considered, which situations require management interpretation, and how non-standard contributions are recorded. Step 4. Train managers to "translate data into meaning. " A manager in a hybrid model is not a controller, but an interpreter and trust architect. Without this, you'll just have a pretty dashboard and sad people. Step 5. Regular "meaningful" feedback loops. Not just "KPI status," but short but meaningful management sessions: what was important, what was difficult, what we learned, what we're changing.

Risks and safeguards (to prevent the system from becoming a demotivator). Risk 1: digital reduction of personality to metrics. Fuse: mandatory contextual commentary on key assessments + channels for recording invisible contributions. Risk 2: The illusion of recognition (a badge instead of respect). Safety precaution: the rule "meaningful recognition = meaning + personalization + next step." Risk 3: Reputational dependence (living for the rating).

Safety net: limiting public comparisons + focus on team results + rotating criteria. Risk 4: Lack of trust in the algorithm. Safety net: transparency of calculations + right to clarification + regular review of metrics.

A hybrid model of non-material motivation isn't a compromise between the old and the new, but a managerial upgrade. Algorithms provide scalability and fairness, but they don't create meaning. Meaning is created by managers—through context, trust, recognition, and the protection of autonomy. Therefore, in a digital organization, the main motivation KPI sounds cynical but honest: it's not how much we measure, but how much a person feels they have an impact and that their contribution is understood.

Digital recognition has become the default standard: corporate portals, HRIS, and performance systems Management systems automatically record task completion, award points, assign statuses, and create ratings and achievement ribbons. The problem is that recording ≠ recognition. The system can say "completed," but it can't say "you did something important," "this changed the outcome," "we

trust you," or "you're growing." Therefore, first-generation digital recognition often provides a nice showcase but has little motivational effect—lots of badges, little inner energy.

The Digital Recognition 2.0 model addresses this problem by redefining the role of technology: the algorithm ensures transparency and regularity, while the manager provides the value. As a result, recognition ceases to be a "plus sign" in the interface and becomes a management tool that strengthens the employee's professional agency.

Three levels of digital recognition. In the 2.0 model, recognition is structured as a hierarchy, with different formats applied to different types of contributions.

Level A – operational progress recording (often automatic):

These include notifications, “ done ” marks, scorecards, and brief digital signals. Their purpose isn't to motivate deeply, but to maintain rhythm and transparency.

Level B – Professional Recognition (less commonly, personalized):

This is managerial feedback with context: what was difficult, what was done smartly, what contribution to team/business results, what the employee learned. This is where meaning emerges.

Level C – status- role recognition (rare, but significant):

These are decisions that the employee experiences as trust: expanded authority, participation in a key project, the role of an expert/mentor, influence on decisions, public recognition at the management level. This recognition changes the individual's "position" in the system.

If you do everything at level A, inflation occurs: badges become meaningless. If you only do level C, recognition becomes rare and "for the elite." Balance between the three levels is the key to sustainability.

Five principles of the Digital Recognition 2.0 model.

1) Meaningfulness instead of formality. Any numerical indicator that claims to have a motivational effect should answer the question: why is this important? Recognition 2.0 always links the result to the context: customer, safety, quality, speed, resource savings, risk reduction, process improvement.

2) Personalization instead of templates. Templated "well done" quickly turns into noise. The minimum standard for Model 2.0: recognition must contain at least one unique element—specific contributions, solutions, approaches, initiatives, or behavior.

3) Proportionality instead of gamification fever. Not every little thing should be turned into a reward. Digital rewards are distributed according to clear rules, otherwise employees start gaming the system rather than working for the meaning. Recognition 2.0 introduces "significance limits": too much recognition means less status, too little recognition means more weight.

4) Fairness instead of "the algorithm said so. " If an employee sees that the system doesn't take into account the context (task complexity, external constraints, invisible work), recognition becomes demotivating. Therefore, the 2.0 model necessarily includes a management adjustment: the ability to add contextual comments and record contributions not captured by metrics.

5) Development instead of one-time rewards. Strong recognition doesn't end with praise. It should lead to the next step: training, a new level of challenge, a role, mentoring, or project participation. Otherwise, it's just "sugar" without a strategy.

Recognition channels: vertical + horizontal + self-recognition. Model 2.0 expands recognition beyond the manager-employee channel. Vertical recognition (leader/company): confirms the significance of the contribution to the business and culture. Horizontal recognition (peers/teams): strengthens social belonging and reduces dependence on a single management point of view. Reflective recognition (self-assessment of results): Short self-review mechanics help maintain internal motivation and meaning, especially in a hybrid work format. Important: horizontal recognition shouldn't turn into a popularity contest. In the 2.0 model, it's tied to clear criteria: assistance, expertise, solution quality, and contribution to the overall result.

Management Recognition Protocol 2.0 (short but to the point). To ensure that recognition is sustainable and doesn't become a lame joke, a simple protocol is introduced (can be integrated into a 1:1 or sprint summary culture): Fact: what exactly has been done (without generalities). Context: why

it is important (for the outcome/client/risk/quality). Competence: what was demonstrated in this (initiative, systematicity, accuracy, responsibility). Trust: what we are willing to delegate/what role to strengthen. Next step: development, project, zone of influence. This turns recognition into a management tool rather than an emotional fireworks display.

KPI for the quality of recognition (so as not to measure the "quantity of thanks"). The goal of recognition is not "frequency," but impact. Therefore, not only events but also quality are assessed: the proportion of level B and C recognitions (not just level A); perception of fairness (survey/pulse); the connection between recognition and development (how many recognitions were converted into new roles/training/delegation); a decrease in "window display efficiency" (when people optimize indicators instead of results). It's important to be honest here: if you have "a lot of recognition" and at the same time engagement is falling, then recognition has become an interface, not a meaning.

Digital Recognition 2.0 isn't about abandoning platforms and metrics, but rather about maturing them. The algorithm records and makes visible, and the manager "packages" the contribution into meaning, trust, and development. In such an architecture, recognition once again becomes an intangible incentive—not because it's "not digital," but because it can't be reduced to digital.

Digital transformation has radically increased the role of reputation in organizations. While in the traditional model, professional status was built gradually—through seniority, expertise, management trust, and informal recognition—in the digital environment, it is increasingly expressed through measurable indicators: ratings, public KPIs, performance dashboards, and digital achievement profiles.

Reputation becomes visible, comparable, and quickly updated. On the one hand, this enhances transparency and fairness. On the other, it creates a new dependency: motivation begins to rely less on the meaning of work than on position in the digital hierarchy.

These conditions necessitate a management model capable of maintaining a balance between beneficial transparency and the risk of reputational damage. This model can be described as a reputational resilience model.

The digital environment enhances the effect of comparability. Every result can be displayed, ranked, and made public. This results in three characteristic biases: Goal shift: the employee begins to focus on the metric rather than the substantive result. Behavioral bias: actions that are "highly visible to the system" are strengthened, while those that are more difficult to measure are weakened. Shift in motivation: intrinsic interest is gradually replaced by the desire to maintain or improve a digital position. A phenomenon of window dressing emerges—activities are designed to fit an evaluation algorithm rather than the strategic value of the work. In the short term, this may improve performance. In the long term, it reduces the depth of engagement and the quality of decisions.

Principles of Reputational Sustainability. The reputational sustainability model is built on four principles: 1. Limited publicity. Not all indicators should be public and comparable. Excessive openness increases social comparison and competition for ratings. It is advisable to keep team results and strategic achievements public, while individual indicators are used primarily for management purposes. 2. Contextualizing ratings. Any digital reputation must be accompanied by context. Algorithms do not always reflect the complexity of tasks, non-standard conditions, crises, or invisible contributions. Managerial interpretation reduces the risk of mechanical comparison and a sense of unfairness. 3. Multifactorial assessment. Reputation shouldn't be built on a single type of metric. A sustainable model takes into account: result (what was achieved), process (how it was achieved), contribution to the team, development of competencies, adherence to values. This reduces the risk of narrow optimization of behavior. 4. Separate status from scores. Numerical scores and ratings are a feedback tool. Status and trust are a management decision. When status is entirely dependent on a numerical position, motivation becomes fragile. In a sustainable model, key decisions (role, delegation, project participation) are made based on a comprehensive assessment, not solely on numerical metrics.

Digital reputation can be a powerful motivator. It enhances the feeling of visible contribution, a fair distribution of opportunities, and transparency in career decisions. However, without managerial constraints, it becomes a source of constant comparison and anxiety.

Reputational sustainability implies that digital visibility: supports development rather than competitive anxiety; enhances team synergy rather than individual isolation; serves as a guideline for growth, not as an instrument of pressure. In this logic, the digital rating becomes an indicator of progress, rather than a definition of individual value.

To implement the reputational sustainability model, it is advisable to: use combined assessment profiles (outcome + behavioral aspects + contribution to culture); limit the frequency of updating public ratings, reducing the effect of constant comparison; implement regular management sessions on contextual interpretation of indicators; Strengthen team-based forms of recognition so that reputation is not reduced to an individual race. Of particular importance is training managers in working with digital reputation: the ability to explain metrics, correct distortions, and return the focus to professional meaning.

In the context of digitalization, reputation is becoming a structural element of non-material motivation. However, excessive algorithmization of this motivation can transform motivation from an intrinsic desire for professional development to a dependence on one's position in the digital hierarchy.

reputational sustainability model offers a balance: Algorithms provide transparency, governance provides fairness and meaning. It is this combination that allows us to maintain a healthy motivational dynamic, in which digital visibility enhances an employee's professional agency rather than replacing it with a race for ratings.

In a digital environment, autonomy ceases to be a lack of control. Control is built into the system. Therefore, the task of management is not to eliminate it, but to preserve the employee's sense of agency [4]. The model of internal autonomy assumes three principles. The first is transparency of the rules. If the algorithms for assessing and distributing tasks are clear, employees perceive the system as fair, not arbitrary. The second is the zone of controlled choice. Even in a regimented environment, employees should have the space to make independent decisions: choosing the method for completing a task, participating in projects, and creating an individual development plan. Third, prioritizing meaning over metrics. Metrics remain a tool, not a goal. Leaders systematically return their focus to meaningful results, not to the numerical reflection of activities. Maintaining internal autonomy is becoming a strategic factor in sustainable motivation. In a world where algorithms can measure almost everything, it's especially important to leave room for professional initiative and personal responsibility (Table 3).

Table 3 - Management models of non-material motivation in the context of digital transformation

Model	The purpose of the model	Key elements	Management mechanism for implementation	Expected effect	Potential risks	Performance evaluation indicators

Hybrid model of non-material motivation	Ensuring a balance between algorithmic transparency and preserving the personal meaning of work	Dual-loop structure (digital and human loop), contextual interpretation of indicators, personalized feedback	Integrating HRIS systems with regular management sessions to interpret results; adjusting numerical assessments based on context	Increasing perceived fairness and sustainability of intrinsic motivation	Formalization of motivation, reduction of the manager's role to that of a performance controller	Engagement level, fairness index, share of contextual adjustments
Digital Recognition Model 2.0	Increasing the meaningfulness of digital recognition and preventing its inflation	Recognition hierarchy (operational, professional, status), personalization, connection with development	Implementing recognition protocols, separating the frequency and "weight" of rewards, integrating recognition with career decisions	Strengthening professional identity and trust	Inflation of digital awards, formalization of gratitude	The share of personalized recognition, the relationship between recognition and career advancement, and subjective assessment of the significance of recognition
Reputational Sustainability Model	Reducing the dependence of motivation on digital ratings and public comparison	Limited publicity, multi-factor assessment, contextualization of ratings	Separation of public and management indicators; comprehensive assessment of contribution (result, process, teamwork, values)	Stabilization of the motivational structure and reduction of showcase effectiveness	Competition for ratings, distortion of behavior for metrics	Trust index in the rating system, share of team indicators, reduction of conflicts due to ratings

Model of internal autonomy	Maintaining employee agency in the context of digital control	Transparency of algorithms, zone of controlled choice, priority of semantic interpretation	Providing clear rules for calculating indicators; creating space for independent decisions and initiatives	Increasing internal motivation and responsibility	The illusion of autonomy under strict algorithmic control	Autonomy Index (survey), share of initiative projects, level of participation in decision-making
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The analysis revealed that digital transformation does not eliminate non-material motivation, but significantly alters its architecture. Classic mechanisms—recognition, status, autonomy, and participation in decision-making—remain significant, but their form and mode of influence are transformed by the algorithmic environment.

The hypothesis about the redistribution of non-material motivation structures in the context of digitalization has been confirmed. Digital infrastructure enhances transparency, accelerates feedback, and enables the personalization of management decisions. However, it also creates the risk of devaluing symbolic incentives, standardizing recognition, and shifting motivational focus toward digital reputation.

The main change is that non-material motivation becomes partially measurable. This increases its manageability, but simultaneously calls into question its intrinsic nature. If recognition is reduced to a digital value and autonomy is limited to an algorithm, the motivational effect weakens. In a digital environment, the number of tools is not as important as their meaningful integration into management logic.

Practical recommendations for HR departments and senior management boil down to the need to transition from mechanical digitalization to a hybrid management model. Algorithms should ensure transparency and data, but not replace human interpretation. Digital recognition should be accompanied by meaningful feedback, personalization should take into account professional meaning, and metrics should not replace the real value of work.

The study's findings indicate that the sustainability of non-material motivation in the digital age depends on a balance between technological rationality and the preservation of employee autonomy. Excessive digitalization can lead to the formalization of motivational mechanisms, while the conscious design of management models can enhance employee engagement and strategic sustainability [4,11,10,12].

Future research opportunities lie in empirically validating the proposed models across various industries, as well as analyzing the long-term impact of algorithmic management on professional identity values. Ultimately, the question is broader: can a digital organization preserve the human dimension of work without losing control and efficiency?

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## **INSTITUTIONAL TURBULENCE DURING OWNERSHIP CHANGE: TRANSFORMATION OF THE MANAGEMENT STRUCTURE AND THE RISKS OF DESTRUCTION OF ORGANIZATIONAL STABILITY**

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**Abstract:** *A change in ownership in a large organization is traditionally viewed as an opportunity for accelerated modernization, a reassessment of management priorities, and increased control over financial and operational flows. However, in the context of established business processes, such transformations can be accompanied not only by an update of the management architecture but also by the emergence of institutional turbulence. This article analyzes the risks arising from an aggressive management change model. The focus is on the relationship between the demonstrative change of management structure, the redistribution of authority, and the potential loss of operational stability in certain areas. It is hypothesized that an unjustified focus on replacing the management layer without first assessing the distribution of competencies can lead to latent destabilization: increased transaction costs, a slowdown in management cycles, a breakdown in horizontal ties, and a gradual weakening of production coordination.*

*Based on systemic and institutional approaches, an analytical model for assessing the vulnerability of organizational units during control transitions is developed. The findings allow us to clarify the conditions under which transformation strengthens an enterprise's strategic position and identify the limits of management intervention beyond which modernization begins to generate risks of structural weakening. This article aims to develop a balanced approach to institutional transition, combining strategic renewal with maintaining operational resilience.*

**Key words:** *change of ownership; institutional turbulence; management rotation; organizational sustainability; operational fragility; organizational memory; critical competencies; latent destabilization; management transformation; risks of institutional transition.*

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In a context of global competition and increasing investment mobility, ownership changes have become a common stage in the life cycle of large enterprises. The entry of a new investor is typically accompanied by expectations of accelerated development, increased efficiency, and strengthened management control. However, in organizations with established business processes and a complex system of internal relationships, such changes can affect not only the strategic vector but also the underlying institutional mechanisms of operation.

Experience shows that following a change in control, there is often a large-scale turnover of management personnel, a redefinition of areas of responsibility, and a strengthening of the vertical decision-making structure. Formally, such measures are aimed at increasing transparency and controllability. However, in large systems, where a significant portion of coordination is based on accumulated experience, informal connections, and distributed expertise, abrupt intervention in the

personnel architecture can create additional risks. Areas where critical competencies are concentrated in a limited number of specialists are particularly vulnerable [1,2].

The problem lies not in the transformation itself, but in its pace and implementation methods. Without a preliminary assessment of the distribution of competencies and the operational coherence of departments, management decisions can lead to latent destabilization: increased internal coordination costs, decreased response time to production deviations, a breakdown in horizontal communication, and a gradual weakening of the stability of individual areas.

Despite the existence of research on corporate governance and post-investment integration, the mechanisms for maintaining institutional resilience during radical management turnover remain underexplored. Insufficient attention has also been paid to the phenomenon of organizational memory as a distributed resource that ensures stability in the face of external change.

A large enterprise cannot be described solely through a formal hierarchy or a set of regulations. It is a complex adaptive system in which stability is ensured not only by regulatory procedures but also by the density of internal connections, the accumulated experience of interaction, and the distributed competence of employees. In such systems, the outcome of activities is determined not by the sum of individual management decisions, but by the quality of coordination between elements [3,4].

Complex organizational structures are characterized by a high degree of interdependence between departments. Production, financial, logistics, and HR processes form a network in which changes in one node can trigger cascading effects in adjacent areas. At the same time, many relationships are informal: they are based on experience working together, trust, familiarity with the specifics of counterparties, and an understanding of internal procedures. These elements are not always reflected in official documents, but they play a significant role in ensuring operational resilience.

In the context of a change in ownership, a new management team, seeking to improve transparency and controllability, may assume the linear nature of the organizational system: if the management framework is changed, the structure will continue to function according to the same algorithms. However, in complex adaptive systems, such an approach has limitations. Management intervention, especially in the form of radical leadership rotation and redistribution of authority, can disrupt existing coordination mechanisms faster than a new stable configuration can be created.

The systemic effect manifests itself in the fact that formal controllability may temporarily increase, while actual operational coherence decreases. Strengthening control, centralizing decisions, and revising procedures do not guarantee the preservation of functional integrity if, in parallel, network connections between key process participants weaken [5,6].

The limits of management intervention are determined not only by the legal authority of the owner but also by the structural density of the system. The higher the concentration of unique competencies and the lower the level of duplication, the more sensitive the organization is to abrupt personnel changes. Ignoring this characteristic increases the likelihood of institutional turbulence—a condition in which a formally stable structure begins to show signs of internal disorganization [7-9].

One of the key elements of the resilience of a large enterprise is organizational memory. In management practice, this phenomenon is often reduced to regulations, databases, and formalized procedures. However, in reality, organizational memory is much broader and includes a collection of accumulated knowledge, informal interaction algorithms, experience in overcoming crisis situations, and hidden coordination mechanisms that ensure process continuity.

Organizational memory is distributed. It is not concentrated in a single structural unit and is not limited to corporate documentation. A significant portion of it is embedded in the professional experience of employees, in stable horizontal connections between units, and in an understanding of the context of decisions. In large enterprises, it is precisely these elements that ensure prompt responses to deviations, reduce approval times, and lower transaction costs [6,10,11].

With ownership changes and subsequent management rotation, there's a risk of partial loss of this memory. Managerial changes and pressure on key employees can lead to a breakdown in knowledge transfer channels and the disruption of informal coordination mechanisms. Processes formally continue to function, but their effectiveness gradually declines due to an increase in clarifying approvals, a growing number of errors, and longer decision-making cycles.

Organizational memory is particularly important in areas of high technological or procedural complexity, where practical experience plays no less a role than regulatory guidelines. The loss of critical competencies in such areas can create a disproportion between the formal management structure and the system's actual ability to maintain a given level of operational stability.

It should be emphasized that the transformation of a management model is not, in itself, destructive. Risk arises when changes are implemented without a prior assessment of the distribution of competencies and the degree of duplication. In the absence of mechanisms for the systematic transfer of knowledge and the institutionalization of experience, an enterprise becomes more vulnerable to personnel fluctuations [3].

Organizational memory is not a subsidiary resource, but a strategic one. During periods of control transition, its preservation and structured transfer become key conditions for maintaining operational stability and preventing latent destabilization of individual areas of activity.

A change of ownership in a large organization is not only a legal or financial act, but also an institutional event capable of altering the internal governance architecture. In economic theory, the transfer of control is viewed through the prism of the redistribution of property rights and the strengthening of agency control mechanisms. However, at the operational level of the enterprise, this process often takes on the character of an institutional shock—a sharp disruption of the established system of norms, roles, and coordination mechanisms [12,13].

Capital logic is focused on accelerating results, increasing transparency, reducing costs, and enhancing controllability. A new investor seeks to minimize information asymmetry, strengthen the chain of command, and demonstrate strategic control over the asset. These actions are rational within the framework of the investment behavior model. However, the enterprise's operating system operates according to a different logic—the logic of process continuity, accumulated expertise, and distributed responsibility [13,15].

Conflict arises at the intersection of these two logics. Radical management rotation can be seen as a tool for renewal, but it simultaneously affects stable elements of the organizational structure, including informal channels of coordination and professional networks. Without a gradual integration of new management practices and without taking into account the density of internal connections, the system may experience a temporary loss of coherence.

Institutional shock does not manifest itself immediately. Initially, the enterprise is able to maintain external stability, as formal processes continue to function. However, signs of stress gradually accumulate within the system: decision approval times increase, dependence on a limited number of specialists increases, and uncertainty in the distribution of responsibility increases. These effects form the basis for latent destabilization.

A change in ownership triggers a structural restructuring, in which the key risk factor is the misalignment between the pace of management transformation and the adaptive capacity of the operating system. Understanding this contradiction allows us to analyze the mechanisms of institutional turbulence and develop tools for assessing the enterprise's operational vulnerability during the transition of control.

During a change of ownership, one of the most common management decisions is rotation or dismissal of part of the management team. From an investment perspective, this step is aimed at establishing a new accountability system, eliminating potential loyalty conflicts, and accelerating the implementation of the updated strategy. In some cases, such measures actually contribute to the restart of processes and the reduction of managerial inertia.

However, in a large enterprise with a stable operational configuration, rotation and dismissal of executives take on a more complex meaning. The management layer performs not only a control

function but also a coordination function—it connects strategic decisions with daily practice, acting as a mediator between formal regulations and real production situations. Massive or accelerated replacement of these links can lead to the breakdown of stable communication chains.

A distinction should be made between planned rotation and forced dismissal. Rotation, which involves a gradual transfer of functions and the maintenance of institutional continuity, reduces the likelihood of destabilization. Conversely, the sudden dismissal of managers without a knowledge transfer mechanism increases uncertainty and increases the burden on related departments. Particularly sensitive areas are those where the manager simultaneously holds unique information about the specifics of processes, contractors, or internal risks.

An additional risk factor arises when personnel decisions are accompanied by increased pressure on key mid-level specialists. If the management structure changes simultaneously at several levels, the system loses the "points of support" that once ensured operational continuity. Under such conditions, an institutional vacuum develops: formal positions are filled, but actual coordination capacity is temporarily weakened.

It's important to emphasize that rotation or dismissal in and of themselves are not destructive actions. The risk stems from the scale, speed, and lack of prior assessment of the organization's structural density. Without assessing the degree of competence concentration and the level of duplication, personnel decisions can trigger latent destabilization, the consequences of which manifest with a time lag and are often interpreted as operational failures rather than the result of management intervention [7,8].

Analyzing management rotation and dismissal requires a systematic approach that takes into account the networked nature of the enterprise and the distributed nature of organizational memory. Only by maintaining a balance between renewal and continuity can the risks of institutional turbulence during transformation be minimized.

Within the structure of a large enterprise, there are positions that function as critical nodes—elements through which a significant portion of coordination, information, and management flows pass. Such nodes may occupy both formally high and middle levels of the hierarchy. Their importance is determined not by title, but by the degree of network connectivity and the concentration of unique competencies [4,8,9].

During a change of ownership, these positions often come under increased scrutiny. Rotation, redistribution of authority, status reduction, or dismissal are seen as ways to strengthen control and accelerate managerial renewal. However, in the network logic of an organization, impacting a critical node has a disproportionately high impact compared to changes in peripheral elements.

When a critical node is under pressure, several interrelated processes arise. First, the density of horizontal connections is disrupted, as a significant portion of informal coordination was tied to a specific specialist. Second, the speed of decision-making in non-standard situations, which required accumulated context, is reduced. Third, the burden on adjacent units, forced to compensate for the resulting gap, increases.

Rotation within the system can mitigate the impact if accompanied by a gradual transfer of knowledge and maintaining access to expertise. However, forced dismissals without a mechanism for institutional succession increases the likelihood of cascading failures. The network nature of the organization means that the loss of one node can alter the workload balance in adjacent areas, creating a chain reaction.

A particularly dangerous situation arises when pressure is exerted simultaneously on several interconnected nodes. In this case, it's not just a single function that is disrupted, but the entire coordination system. Formally, the structure remains fully staffed, but its ability to maintain the previous level of coordination is reduced. Latent disorganization arises, which in the early stages may be unnoticed by senior management.

The pressure, rotation, or dismissal of critical system nodes should be considered a strategic intervention in the enterprise's network architecture. Without prior assessment of the degree of coupling and concentration of competencies, such decisions can trigger structural turbulence, the

consequences of which are manifested in decreased operational resilience and increased systemic risks.

The main risk during a change of ownership and a large-scale management restructuring is not so much immediate disruptions as a gradual, subtle weakening of the system [3]. This isn't an open crisis, where everything collapses at once. On the contrary, the company continues to function on the surface: positions are filled, decisions are made, and performance indicators are formally maintained. However, the internal strength of the structure begins to decline. This process can be divided into several stages.

The first phase is the illusion of stability. After rotation or dismissal of some management, the company appears to be under control. New faces have been appointed, oversight has been strengthened, and goals have been defined. A sense of order and discipline is created. However, some of the connecting functions previously provided by key employees are already beginning to weaken. The second phase is the accumulation of minor glitches. Small deviations gradually appear: approvals take longer, the number of clarifications increases, and the workload on the remaining experienced specialists increases. This is usually explained as a "transition period" and is not directly linked to personnel decisions. The third phase is the weakening of horizontal connections. When changes affect several interrelated positions, informal working relationships begin to break down. Processes become more formal but less flexible. Reactions to non-standard situations slow down, and the workload at the upper management level increases. The fourth phase is the departure of second-level employees. Growing uncertainty and pressure can lead to the departure of specialists who previously kept the system from collapsing. This increases vulnerability: problems no longer affect individual functions, but entire areas. The fifth phase is the crisis of direction. At this stage, a decline in efficiency becomes noticeable: costs rise, projects are implemented more slowly, and the likelihood of errors increases. Formally, the crisis appears to be a problem of ongoing management, although its roots lie much earlier—at the personnel decision stage.

The key feature of this process is the time lag between the decision to terminate or rotate and its consequences. This makes it difficult to immediately see the cause-and-effect relationship and correctly diagnose the source of the problem.

Therefore, when analyzing management transformations, it's important to consider that the weakening of the system occurs gradually. Understanding this logic allows us not only to react to the crisis, but also to proactively assess risks and calculate the consequences of personnel decisions before they are implemented. In management, as in engineering, destruction rarely begins with a loud bang. More often, it begins with a barely noticeable crack. And the ability to spot this crack is a key skill of mature leadership.

The transition to an analytical assessment of institutional turbulence risks requires clarification of one key parameter: the concentration of critical competencies within the organization. In large enterprises, competencies are unevenly distributed: some knowledge and management skills are duplicated, while others are concentrated in a limited number of employees. It is this concentration that determines the system's sensitivity to rotation or dismissal of individual positions.

A critical competency is a set of knowledge, skills, and contextual experience without which the performance of a specific task becomes difficult or significantly slows. Unlike formalized functions, such competencies often include an understanding of internal dependencies, historically established agreements, and the specifics of interactions with external partners. Their value is revealed in non-standard situations when formal regulations prove insufficient [8-11].

High concentration of competence means that a significant portion of management or technological information is assigned to a specific employee or a narrow group of specialists. Under such conditions, rotation or dismissal creates not just a personnel vacuum but also a disruption of the information flow. Even with formal documentation, reproducing the full scope of practical experience requires time and additional resources.

To assess vulnerability, it's important to consider three parameters. First, the level of uniqueness of a competency—its rarity within the organization. Second, the employee's level of connectivity—

the number of areas in which their knowledge is used. Third, the ability to replace—the availability of a trained talent pool or duplicate functions. The combination of these factors determines the scale of potential risk during personnel changes.

In the context of ownership change, analyzing the concentration of competencies takes on strategic importance. If a management system is transformed without first mapping critical nodes, the system becomes dependent on chance—stability is maintained only as long as the most sensitive elements are not affected.

The concentration of critical competencies is one of the key indicators of an enterprise's operational vulnerability. Understanding the distribution of these competencies allows for a transition from intuitive HR policies to a sound management decision model that minimizes the risks of latent destabilization during institutional transition.

If the concentration of competencies indicates where knowledge is concentrated, then network connectivity demonstrates how this knowledge is integrated into the system. In large organizations, stability is determined not only by the quality of individual specialists but also by the density of connections between them. An enterprise functions as a network of interdependent nodes, in which each element participates in multiple flows—information, management, and production.

Network connectivity reflects the number and intensity of work interactions between a specific position and other departments. The higher the degree of connectivity, the more processes pass through a given node. In such a configuration, employee rotation or dismissal has a multiplier effect: the impact extends not only to a single direction, but to the entire interaction cycle [4].

Positions that serve as the liaison between the strategic and operational levels are particularly sensitive. These employees ensure that management decisions are translated into action, schedules are synchronized, resources are coordinated, and interfunctional conflicts are resolved. While their duties may be formally described in their job descriptions, their actual role is determined by the density of their connections.

For an analytical assessment of network connectivity, it is advisable to take into account the following parameters: the number of areas in which the employee is involved simultaneously; the degree of dependence of related processes on its decisions; frequency of interactions with other key nodes; availability of alternative coordination channels.

High structural density without duplication creates a high-risk zone. In the event of rotation or dismissal of such a unit, the workload is redistributed, which can lead to overload of adjacent units. Initially, this results in increased response times; later, it results in increased system costs.

Network logic also explains why the effects of personnel decisions manifest with a time lag. The disruption of a single node does not cause an immediate crisis, as the system has a certain degree of adaptability. However, when several interconnected positions are simultaneously impacted, stress accumulates, reducing overall operational resilience.

Network connectivity analysis complements the assessment of competence concentration and provides a more accurate picture of an enterprise's structural vulnerability. In the event of a change in ownership, this approach makes it possible to identify sensitive elements before rotation or dismissal, thereby minimizing the risk of latent destabilization.

In management practice, the risk of losing a key employee is rarely determined by a single parameter. Highly unique competence is not critical if knowledge is distributed and enshrined in procedures. Strong network centrality is not dangerous if decentralized coordination loops are present. Even weak formalization is not destructive if there are trained successors and a stable team environment. Operational vulnerability arises not from individual characteristics, but from their intersection. It is the combination of factors that creates a point of systemic dependence.

For this reason, the assessment must be holistic and reduce the multidimensional dependence on a specific employee to a single indicator suitable for making decisions about the pace and format of rotation. This indicator is the Index of Operational Vulnerability (IOU) [10,11,16,17].

In basic logic, it is expressed as the ratio of dependence factors to stability factors:

**IOU = (C<sub>c</sub> \* N<sub>s</sub> \* D<sub>k</sub>) / R<sub>f</sub>.** Where C<sub>c</sub> is the concentration coefficient of critical competence; N<sub>s</sub> is the network connectivity coefficient (degree of centrality in coordination flows); D<sub>k</sub> — coefficient of substitution deficit; R<sub>f</sub> — coefficient of formalization and reproducibility of processes.

Conceptually, the formula reflects a simple management principle: the higher the concentration of knowledge, the greater the role of a node in coordination, and the greater the difficulty of replacing it, the greater the system's dependence on a specific individual; the higher the level of formalization, the lower this dependence. However, a multiplicative model without weights and adjustments is excessively sensitive to extreme values and does not scale well across industries.

Therefore, the practice-oriented version of the index is based on a weighted design:

**IOU=(W<sub>c</sub>\*C<sub>c</sub>+W<sub>n</sub>\*N<sub>s</sub>+W<sub>d</sub>\*D<sub>k</sub>)\*(1-W<sub>r</sub>\*R<sub>f</sub>)\*K<sub>p</sub>,** where W<sub>c</sub>, W<sub>n</sub>, W<sub>d</sub>— weights of dependence factors (their sum is close to 1); W<sub>r</sub>— the weight of formalization as a compensating factor; K<sub>p</sub> is the external pressure coefficient, which takes into account the probability of departure, management turbulence, or the intensity of personnel changes.

This model addresses several methodological challenges. First, it eliminates the "explosion" effect of the index when formalization is low. Second, it allows for the weighting of factors to be calibrated based on the specifics of the industry: in R&D and IT, the weighting of knowledge concentration increases; in matrix structures, the weighting of network connectivity increases; and in conditions of labor market shortages, the weighting of substitution increases. Third, the inclusion of a pressure coefficient reflects the reality of a transformational period, when risk is determined not only by the structure of competencies but also by the likelihood of their loss.

operationalized on a 0-1 scale based on objective criteria. Competency concentration is determined by the degree of knowledge distribution within a function and the actual irreplaceability coefficient, which reflects the minimum number of employees whose simultaneous loss would lead to a significant reduction in controllability or process shutdown. Network connectivity is recorded through a process map and cross-functional interaction loops. Replacement gap is calculated based on the actual time it takes to restore controllability when an employee is replaced. Process formalization is measured by the proportion of regulated, standardized, and digitally recorded operations.

The resulting index typically ranges from 0 to 1.5 and allows for the establishment of management thresholds. Low values allow for rapid turnover without significant risks. Medium values require a phased knowledge transfer and concurrent successor training. High values indicate the need for preliminary institutionalization of competencies before personnel changes.

Thus, the Operational Vulnerability Index transforms the intuitive concept of a "key person" into a measurable managerial category. It shifts the dependence on individuals from subjective assessments to quantitative analysis, enabling decision-making based on a structural assessment of the organizational resilience rather than a reactive approach.

After developing an operational vulnerability model, the next logical step is to develop a preliminary diagnostic procedure. Experience shows that management rotation or dismissal during ownership changes is often carried out at an accelerated pace. However, it is precisely the speed of transformation without structural analysis that increases the likelihood of latent destabilization [7,10,15].

Institutional resilience assessments should precede large-scale personnel decisions. Their purpose is to identify critical nodes, assess the density of network connections, and determine the degree of competence concentration in each area. Unlike a classic audit, this is not about verifying compliance with regulations, but about mapping the actual architecture of interactions.

The first stage of the diagnostic involves identifying key areas that ensure the company's strategic and operational stability. For each area, the following are analyzed: level of dependence on specific specialists; degree of duplication of functions; availability of documented procedures; density of interdepartmental connections.

The second stage involves assessing the indicators included in the operational vulnerability index. This allows us to create a risk map—a distribution of departments based on their sensitivity to

staff rotation or dismissal. This map identifies not only the most vulnerable areas but also those areas where transformation can be implemented without significant consequences.

The third stage involves analyzing institutional continuity. The system's readiness for knowledge transfer is assessed, including the presence of a talent pool, mentoring programs, the degree of process formalization, and the digitalization of management information. The higher the level of knowledge institutionalization, the lower the risk of operational resilience being disrupted by personnel changes. The key conclusion is that diagnostics are not aimed at maintaining the status quo. Their function is to ensure manageability of transformation. With an analytical framework, the owner gains the ability to differentiate personnel decisions: in some areas, rapid rotation is possible, while in others, gradual integration or temporary retention of key components is required. Institutional resilience diagnostics become a tool for reducing uncertainty during a change of control. It transforms the transformation from an intuitive management intervention into a systemic and predictable process, minimizing the risk of latent destabilization of the enterprise.

After conducting an institutional stability assessment, the key step is the integration of the new management team. During a change of ownership, the nature of the new team's implementation determines whether the transformation will become a source of strength or a factor of hidden destabilization.

Experience shows that the greatest risks arise when several interconnected management positions are replaced simultaneously without maintaining institutional continuity. Under such conditions, the system loses not only specific leaders but also the connecting elements between strategy and operations. Therefore, managed integration presupposes not a refusal to implement changes, but rather their phased implementation.

The first principle is parallelism of circuits. During the transition period, it is advisable to retain some existing management nodes as context carriers and operating memory. This allows new management to gain access to the actual process architecture before making radical decisions.

The second principle is gradual rotation. Personnel changes must take into account the operational vulnerability index. In areas with a high concentration of competencies and dense network connectivity, replacements should be accompanied by knowledge transfer, duplication of functions, and temporary distribution of responsibilities. In less sensitive areas, a more rapid transformation is permissible.

The third principle is the controlled reduction of uncertainty. Increased pressure that accompanies rotation or dismissal can lead to secondary staff migration and a decline in initiative. During the transition period, it is important to ensure predictability of management signals and clarity of performance evaluation criteria. This reduces the risk of demotivation and maintains the adaptability of the system.

The fourth principle is the institutionalization of knowledge. Regardless of personnel decisions, the company must minimize reliance on personalized competencies. Formalizing key procedures, digitalizing management information, and developing a talent pool reduce the likelihood of systemic disruption during future changes.

The managed integration of a new management structure represents a balance between strategic renewal and maintaining operational stability. A change in ownership can become a development impetus if the transformation is based on an analytical assessment of structural density and is implemented with due regard for the network nature of the organization. Otherwise, the risk of latent destabilization increases significantly, with the consequences becoming apparent only after the formal rotation phase has concluded [1-4].

To ensure manageability of the transformation during a change of ownership, it is advisable to formalize a sequence of actions aimed at reducing the risk of latent destabilization. Such an institutional stabilization protocol does not limit the investor's strategic freedom, but rather establishes a framework within which personnel decisions are made, taking into account the company's structural stability [1,3].

Step 1. Mapping critical nodes. Based on an analysis of competency concentration and network connectivity, a list of positions with a high operational vulnerability index is compiled. The degree of dependence of areas on specific employees is determined, and potential gaps in the event of rotation or dismissal are identified.

Stage 2. Evaluation of transformation scenarios. For each sensitive position, alternative options are considered: retention during a transitional period, phased rotation, replacement with preliminary transfer of functions, or accelerated dismissal if there is sufficient overlap. Scenario analysis allows us to assess the likely consequences of each decision.

Stage 3. Knowledge transfer mechanisms. Before implementing personnel changes, a structured context transfer is organized: documenting key processes, forming temporary joint working groups, mentoring, and parallel performance of functions. This reduces dependence on individual experience.

Step 4. Control of secondary effects. Following rotation or dismissal, coordination indicators are monitored: approval deadlines, frequency of adjustments, level of interfunctional conflicts, and second-level staff turnover. An increase in these indicators may signal the onset of latent destabilization.

Step 5. Corrective measures. When signs of systemic weakening are identified, compensatory mechanisms are introduced: redistribution of the workload, temporary restoration of the advisory role of former employees, and strengthening of horizontal coordination.

The institutional stabilization protocol is based on the principle of managed continuity. Its goal is not to preserve the existing structure at any cost, but to ensure predictability of the transformation. By adhering to the algorithm, the enterprise gains the opportunity to update its management structure without disrupting its operational integrity.

Rotation and dismissal during a change of ownership can become tools for strategic strengthening if accompanied by an analytical vulnerability assessment and systematic efforts to maintain coordination links. The absence of such a protocol increases the likelihood that the transformation will move from the modernization stage to a phase of institutional turbulence.

Transformation almost always begins with a demonstration of control. The new team strengthens the chain of command, restructures the structure, updates regulations, introduces more frequent reporting, and centralizes decision-making. Externally, this appears as "restoring order." Discipline indicators improve, reporting becomes regular, and communication is formalized. The effect of visual controllability arises.

However, formal control and actual manageability are different categories. Formal control establishes a chain of command. Actual manageability is determined by the speed of approval, the quality of decisions, and the system's ability to adapt to non-standard situations.

In the context of enterprises with a high concentration of competencies (where key employees have critical context, technical connections, and informal channels of coordination), a sharp increase in formal control can trigger the opposite effect: loss of horizontal coordination; lengthening of the management cycle; decreased quality of decisions due to lack of context; Overload of the upper management level.

This results in a management paradox: control is strengthened, but the system's coordination capacity is reduced. From a complex systems theory perspective, a densely networked enterprise is not a hierarchical machine, but an adaptive structure with multiple interconnected nodes. Increasing pressure on key nodes (through rotation or dismissal) can reduce the overall system capacity even while maintaining the formal structure.

This is especially critical during a change of ownership, when the following occurs in parallel: revision of strategic priorities; change in budget flows; re-design of investment decisions; redistribution of responsibility. If at this point there is an aggressive rotation of management or the dismissal of key employees without a gradual transfer of knowledge, the system loses some of its operational memory. Formally, the regulations remain, but practical coherence weakens.

The phenomenon of "regulated inefficiency" arises: processes formally exist, but the actual speed and accuracy of execution decrease. On the strategic horizon, this manifests itself not as an

instantaneous crisis, but as a gradual accumulation: project delays; increased budget adjustments; decreased forecasting accuracy; an increase in the number of management conflicts. Thus, the illusion of controllability is formed through the apparent strengthening of control, while the real stability of the enterprise is determined by maintaining a balance between the formal structure and informal coordination.

In the context of ownership change, it makes strategic sense to view control not as a tool of pressure, but as a synchronization mechanism. Control that is not integrated into the enterprise's institutional logic creates accountability discipline, but does not create stability.

This is why aggressive transformation requires preliminary diagnosis: density of informal connections; concentration of competencies; the degree of dependence of directions on specific management units; level of operational autonomy of units. Without such diagnostics, strengthening formal control can become a factor in the hidden slowdown of the system. And in strategic management, a slowdown always means a decrease in competitiveness, even if the reporting looks perfect.

Aggressive transformation rarely destroys an enterprise instantly. More often, it triggers a gradual decline in the asset's strategic value. This is not an operational failure, but a structural erosion—slow, difficult to diagnose, but systemic.

During an ownership change, a company's value is shaped not only by its material resources, but also by its configuration of competencies, internal relationships, accumulated decision-making context, counterparty trust, and management reputation. These elements are not directly reflected in financial statements, yet they ensure stable cash flow.

Aggressive turnover and dismissal of management and key personnel leads to a decline in the quality of intangible capital. Unlike physical wear and tear of equipment, this depreciation is not formally recorded. It manifests itself through: decrease in the accuracy of strategic forecasts; deterioration of negotiating positions with counterparties; increasing uncertainty in investment decisions; weakening of internal self-organization mechanisms. The peculiarity of this process is that financial indicators can remain stable over the short term. Contracts continue to be fulfilled, operating budgets are met, and reporting demonstrates formal stability. However, the company's ability to create new value gradually declines. This can be defined as the effect of invisible depreciation of management capital [8,9]. From a strategic perspective, this is reflected in three directions: decreased adaptability; weakening of innovative potential; increasing strategic vulnerability.

It's important to emphasize: the risk arises not from the mere fact of management change, but from the asynchronous pace of renewal and the system's ability to replicate knowledge. If the rate of layoffs exceeds the rate of institutional adaptation, a gap develops between the structure and actual competence.

At the corporate finance level, this is reflected in a gradual decline in company valuation multiples. Investors may not immediately see a decline in EBITDA, but the market begins to price in the company's higher risk profile. The cost of borrowed capital increases, attracting partners becomes more difficult, and the strategic planning horizon shrinks.

Thus, the economic consequences of aggressive transformation manifest themselves not so much in direct costs as in a reduction in the asset's strategic premium. The company continues to operate, but its ability to create long-term added value is reduced.

In the context of a change of ownership, the key question becomes: is the transformation an investment enhancement of the asset or a process of its accelerated institutional depreciation? The answer depends on the depth of the preliminary diagnosis, the sequence of personnel decisions and the availability of mechanisms for the reproduction of management capital. It is precisely in this distinction that the line between strategic renewal and strategic weakening lies.

Aggressive management transformation affects not only the company's structure but also the nature of the unspoken psychological contract between the organization and its employees. Under a change of ownership, employees evaluate signals more than strategy: who is leaving, how decisions are made, and how rotation or dismissal is handled.

Every personnel decision during a period of turbulence becomes an indicator of management philosophy. If transformation is accompanied by high pressure, unpredictable decisions, and a lack of transparent criteria, a reputational gap develops within the organization. Employees begin to perceive the enterprise as an environment with an increased risk of personal instability. This changes behavior [6,11]. The following effects arise: reduction of long-term involvement and orientation towards strategic results; transition to a short-term adaptation model (“work until the first signal”); decreased initiative due to fear of personal vulnerability; growth of latent search for alternative possibilities. This doesn't manifest itself as an immediate churn. More often, a cautious attitude develops. The system becomes less proactive, more formalized, and less inclined to accept responsibility.

Externally, a similar signal is detected by the labor market. In professional communities, information about sudden turnover or dismissals of key specialists spreads quickly. This creates a reputational profile for the company as an employer with a high level of management turbulence.

For companies operating in a skills-deficit environment, this is of strategic importance. Qualified specialists choose environments with predictable rules of the game. Given alternatives, they avoid companies with high talent volatility.

Furthermore, the departure of managers and key employees is accompanied by a transfer of social capital to the external environment. This involves not only knowledge but also networks: contacts with suppliers, contractors, and industry experts. As a result, the company may face a weakened bargaining position and a loss of informal leverage.

Strategically, this means the following: aggressive transformation changes the structure of trust within and outside the organization. If transparent communication mechanisms, rotation criteria, and a managed transfer of authority are not established, a persistent reputational footprint develops. Restoring it requires significantly more resources than maintaining trust during the transformation phase. Thus, personnel decisions during a change of ownership become not only a tool for strategic adjustment, but also a factor in shaping the company's long-term brand—both internally and in the marketplace. It is at this point that aggressive rotation or dismissal of management can transform from a tactical management move into a strategic reputational risk.

Any change of ownership presupposes adjustments to the management structure. However, the key question is not the fact of rotation or dismissal itself, but the scale and pace of change relative to the stability of the system. A strategic error occurs when transformation is viewed as a linear replacement of management units, whereas the enterprise is a complex interconnected structure [1-3,18].

The transformation limit is determined by the ability of the system to retain three basic properties: functional continuity; institutional memory; Strategic adaptability. If personnel decisions undermine even one of these properties, the transformation exceeds the limits of strategic feasibility. In practical terms, this means the need for a preliminary assessment: concentration of competencies in specific management units; the degree of formalization of key processes; the level of dependence of directions on personal leadership; the availability of a trained personnel reserve; the readiness of the new management team to assume operational responsibility.

The pace of change is particularly important. Even structurally justified rotation can become destabilizing if it occurs faster than institutional adaptation. The system doesn't have time to redistribute functions and build new connections. Consequently, the strategic feasibility of transformation is determined not by the scale of renewal, but by the synchronization of three processes: personnel renewal; knowledge transfer; stabilization of management communications. The absence of such synchronization increases the likelihood of latent destabilization even in the presence of a formally correct organizational structure. Thus, transformation boundaries are not a constraint for investors, but a risk management tool. A rational change model entails the phased integration of a new management structure, the preservation of critical competencies, and a managed transfer of responsibility. It is the balance between renewal and sustainability that determines whether a

transformation will become a strategic asset enhancement or a source of hidden systemic vulnerability.

The conducted research allows us to consider a change of ownership not only as a legal and financial act, but also as a profound institutional transition affecting the management architecture, distribution of competencies, and internal coordination of a large enterprise. In the context of established business processes, the transformation of the management framework takes on a systemic nature and requires consideration of the network nature of the organization [12,14].

Analysis has shown that rotation and dismissal of management, as well as pressure on key employees, are not destructive in themselves. Their effectiveness is determined by the scale, speed, and degree of analytical preparation of decisions. Without preliminary assessment of the concentration of critical competencies and the network connectivity of departments, the risk of latent destabilization increases—a process of gradual weakening of the system's coordination capacity with a time lag before negative effects manifest themselves [6].

The article argues that organizational memory, a distributed resource anchored in practical experience and informal channels of interaction, is a key factor in resilience. The loss of critical nodes without knowledge transfer mechanisms can lead to increased transaction costs, longer management cycles, and decreased enterprise adaptability.

The proposed operational vulnerability assessment model and institutional stabilization protocol form the instrumental basis for managed transformation. Their application allows for differentiation between zones of acceptable rapid rotation and areas requiring the phased integration of a new management framework [10,15].

The investor's strategic objective is not only to update the management structure but also to maintain the operational integrity of the system. The balance between renewal and continuity becomes the criterion for the effectiveness of institutional transition. Ignoring the organization's network logic and the concentration of competencies increases the likelihood of structural weakening of the asset, whereas an analytically sound approach allows for ownership changes to become a source of sustainable development.

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## SYSTEMIC VULNERABILITIES OF HR ARCHITECTURE: BREAKDOWN POINTS IN DIGITAL HR PLATFORMS

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**Abstract:** *In the context of digital transformation, HR platforms have become a key organizational infrastructure, integrating payroll, data management, performance evaluation, analytics, and integration with other systems. This increases the speed of processes, but dramatically increases the dependence on the stability of the digital architecture. Algorithmic errors, integration failures, access violations, or the concentration of knowledge among a small group of specialists can cause cascading operational failures. This article identifies systemic vulnerabilities in HR architecture, describes technological, algorithmic, organizational, and cognitive risks, introduces the concept of critical nodes, and proposes a structural resilience assessment model (HRRSI). The results highlight the need to shift from process optimization to strategically ensuring the resilience of the digital HR system as an element of the enterprise's critical infrastructure.*

**Keywords:** *HR digitalization, HR architecture, HR platforms, systemic vulnerability, organizational resilience, algorithmic risks, critical nodes, risk management, digital transformation of HR management*

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In recent years, digital transformation has radically altered the nature of HR processes within organizations. While the HR function was previously associated primarily with document management, payroll, and labor relations administration, today it is integrated into the enterprise's digital infrastructure and tightly integrated with financial, production, and analytical systems [1]. Modern HR platforms provide automated accrual calculations, employee data management, performance monitoring, reporting, and real-time management decision support.

However, increasing digital maturity inevitably increases an organization's dependence on the stability of its HR architecture. An error in the payroll algorithm, a failure in integration between modules, a database access breach, or the loss of a key specialist with critical system knowledge can lead to large-scale operational consequences. However, such risks often remain outside the focus of management analysis, as the digital system is perceived as a stable and "self-evident" element of the infrastructure [2].

The problem with systemic vulnerability in HR architecture is that its failure can not only disrupt HR procedures but also affect the financial sustainability, social stability, and reputation of the organization. In a highly integrated information environment, the HR platform becomes a critical node in the corporate environment. However, in scientific and management practice, the focus is often

on efficiency and automation, while the issue of sustainability and potential points of failure remains underdeveloped.

The purpose of the article — to identify the structural vulnerabilities of digital HR platforms, define their critical nodes, and propose a conceptual approach to assessing the resilience of HR architecture. This article analyzes technological, algorithmic, and organizational risk factors, and develops a model for mapping systemic failure points. This approach allows us to consider HR not only as a personnel management tool but also as an element of the enterprise's critical infrastructure, requiring strategic attention and systemic risk management [3].

Digital transformation has changed not only the tools used by HR, but also the very logic of its operations. While in the pre-digital model, HR activities were built around individual procedures—hiring, firing, payroll, and personnel file management—in the digital environment, they are now being developed as a holistic architecture of interconnected modules and information flows. This is no longer a set of functions, but a systemic design in which data, algorithms, and management decisions are integrated into a single digital framework.

, HR architecture is defined as a structured set of digital solutions, processes, and integration links that support the full cycle of human capital management. It includes modules for payroll, personnel records, performance assessment, analytics, electronic document management, and interfaces for employee interaction with the system. A key characteristic of modern HR architecture is its integration with other corporate platforms—financial, production, and management systems [2].

A distinctive feature of digital HR architecture is that it operates on the basis of algorithms and rules enshrined in software logic. Accrual formulas, KPI parameters, automatic statuses, and reporting mechanisms shape a management reality in which personnel decisions are increasingly made based on system calculations. Thus, the HR platform becomes more than just a data recording tool, but an active participant in the management process [4].

An architectural approach involves analyzing not only the system's functionality but also its structure: the distribution of roles, data redundancy, the degree of centralization of competencies, the level of dependence on external contractors, and the nature of integration links. The greater the degree of digital connectivity between elements, the more important the stability of the entire structure becomes.

Any complex organization functions as a system, where resilience is determined not only by the effectiveness of individual elements but also by the strength of the connections between them. In classical systems theories, resilience is understood as the ability of a structure to maintain functionality when exposed to external and internal factors. For digital platforms, this means the ability to continue functioning even in the face of partial failures, errors, or changes in operating conditions [3].

In a management context, resilience is often associated with redundancy, diversification, and risk sharing. However, as organizations digitalize, a new category of vulnerability emerges: latent system dependency. The higher the level of automation and integration, the more so-called "critical nodes" emerge, the failure of which can cause disproportionately severe consequences. In engineering logic, such elements are called single points of failure—situations where the failure of one component paralyzes the entire system [5].

This risk is particularly significant for HR architecture. Payroll calculation, personal data storage, reporting, and employee-employer interactions are all centralized within a single digital system. If this system is disrupted, the consequences extend beyond a technical failure: they affect financial obligations, legal aspects, and the social stability of the team.

From an organizational theory perspective, vulnerability manifests itself not only in the technological realm but also in the managerial realm. The concentration of system knowledge among a limited number of specialists, the lack of documented algorithms, dependence on an external contractor, or the opacity of calculation formulas create additional risks. Externally, a system may appear stable and manageable, but internally it remains sensitive to targeted impacts [6].

Analyzing the resilience of HR architecture requires a comprehensive approach that considers technological, organizational, and behavioral factors. Understanding these relationships allows us to move beyond an intuitive assessment of reliability to a systematic mapping of vulnerabilities and the development of preventative mechanisms.

The development of digital HR systems has gone through several stages. In the early stages, automation was localized: programs were used primarily for payroll and personnel records. These solutions operated in isolation and did not form a unified digital environment. Failures in their operation were significant, but generally did not affect other management functions within the enterprise.

The next stage involved integrating HR modules into corporate information systems. HR data began to be used by financial services, production departments, budgeting systems, and management analytics. Centralized platforms emerged that combined accounting, calculations, performance assessment, training, and internal employee services. This increased process transparency and decision-making speed, but simultaneously increased the interdependence of system elements [1].

The current stage is characterized by a transition to a platform and service model. HR platforms integrate via APIs, utilize cloud infrastructure, and incorporate analytical modules and predictive assessment elements. Employee data becomes the foundation for strategic management decisions. In this configuration, the HR system ceases to be ancillary and becomes a core component of the corporate architecture.

However, as functionality increases, so does the level of structural dependency. Any software update, change in calculation algorithms, or adjustment to integration links can affect related processes. The more complex the architecture, the more difficult it is to isolate the consequences of a failure. Thus, the evolution of digital HR platforms leads to a paradoxical situation: increased efficiency is accompanied by increased potential vulnerability.

Technological vulnerabilities are the most obvious, yet difficult to manage, type of risk in digital HR architecture. They are associated with the technical infrastructure upon which HR platforms are built: server hardware, databases, software, communication channels, and integration modules. In a highly automated environment, even a short-term failure can disrupt payroll processing, employee access to personal accounts, or the generation of mandatory reporting.

One of the key problems is dependence on a unified information environment. If the HR system is hosted in a cloud infrastructure or integrated with a corporate ERP system, its failure can cause a chain reaction. Interruptions in data exchange between payroll modules and financial systems, incorrect synchronization of software versions, or a failed update can temporarily paralyze HR processes. The consequences are not only technical but also organizational: payment deadlines are missed, legal risks arise, and social tensions within the team increase.

A significant factor in technological vulnerability is the lack of redundancy. Insufficient server redundancy, irregular data backups, or the absence of a proven disaster recovery plan increase the likelihood of large-scale data loss. The issue of protecting personal data is particularly critical, as its loss or compromise entails not only reputational but also legal consequences [7].

Moreover, technological risks increase with the complexity of the architecture. The more integration points and external services a system uses, the higher the likelihood of disruption of the connections between them. A seemingly stable platform may contain hidden dependencies that only become apparent under load or in unusual situations.

While technological failures are immediately noticeable, algorithmic vulnerabilities often remain hidden and therefore pose a more complex risk. Modern HR platforms operate based on predefined formulas, rules, and calculation logic. Payroll calculation, bonus calculations, the application of coefficients, the determination of task statuses, and KPI assessment are all determined by algorithms built into the system.

The problem is that an algorithm error may not immediately cause the system to fail, but it can gradually distort the management picture. An incorrectly defined formula, an incorrect coefficient, uncontrolled rounding, or a change in parameters without proper testing can affect calculations for

hundreds or thousands of employees. Meanwhile, the system continues to operate "correctly" from a technical standpoint, creating the illusion of stability [4].

A particular challenge is the dependence on complex calculation models and integrations. When the HR platform receives data from external modules—production indicators, financial units, or analytical systems—any input error can translate into an incorrect management decision at the output. The algorithm doesn't evaluate the context; it reproduces the embedded logic. As a result, a management error can be perceived as an objective result of an automated calculation.

An additional risk factor is the lack of transparency in algorithms. If calculation formulas or performance evaluations are known to a limited number of specialists and are not properly documented, the system becomes dependent on specific individuals. If they leave or the configuration changes, the risk of incorrect changes increases significantly.

In addition to technological and algorithmic risks, organizational vulnerabilities play a significant role, originating not in the software code but in the system's management structure. A digital HR platform can be technically stable and properly configured, yet remain extremely sensitive to personnel and management factors.

One of the most common risks is the concentration of critical knowledge in the hands of a limited number of specialists. Often, system architecture, calculation logic, integration procedures, and configuration details are effectively the responsibility of a single administrator or a small group of employees. In the event of their dismissal, prolonged absence, or conflict of interest, the organization faces a situation of managerial dependence. The system formally continues to function, but the ability to properly support and develop it is jeopardized [8].

The lack of regulations and documented procedures creates additional vulnerabilities. If changes to accrual algorithms, KPI settings, or integrations are implemented without a formal approval and testing process, the likelihood of unpredictable consequences increases. In a highly digitally connected environment, even a local adjustment can impact related processes.

Dependence on external contractors also poses a serious risk. Outsourcing the administration or maintenance of an HR platform to a third-party company may be cost-effective, but without transparency, redundant competencies, and access to the underlying system logic, the organization loses some management control. In a critical situation, this can lead to delays in troubleshooting or the inability to quickly change the configuration.

The least visible, yet strategically significant, form of risk is cognitive vulnerabilities that arise in the perception and interpretation of digital HR system data. As platforms' analytical capabilities grow, management decisions increasingly rely on metrics, reports, and dashboards. While the digital environment creates a sense of precision and objectivity, it does not inherently eliminate distortions.

One problem is the overreliance on numerical indicators. If a system automatically calculates KPIs or generates employee ratings, there's a tendency to perceive these results as definitive. This often leaves unaddressed the limitations of the source data, the specifics of the calculation methodology, or the context in which the indicators were generated. The digital format lends the information a neutral appearance, although in fact it reflects the underlying management logic [9].

An additional risk is associated with the simplification of management thinking. When complex HR processes are reduced to a set of metrics, the likelihood of decisions being made based on formal criteria increases. Numbers replace analysis, and status in the system replaces professional judgment. In the long term, this can lead to a decline in the quality of strategic decisions and a loss of managerial flexibility.

Cognitive vulnerability also manifests itself in the interpretation of system signals. Managers and HR specialists may interpret the same data differently, increasing the risk of erroneous conclusions. Without a culture of analytical verification and critical analysis, the digital environment begins to create a distorted picture of reality.

Digital HR architecture is vulnerable not only at the technology and algorithm level, but also at the perception level. To minimize such risks, transparency in calculation methods, user training in

analytics, and the development of a management culture that views data as an analytical tool rather than a final decision are essential.

To analyze the resilience of a digital HR system, it is necessary to move from a general description of risks to identifying specific structural elements whose failure could cause systemic consequences. This article introduces the concept of an operational criticality node. This node is defined as an element of the HR architecture whose malfunction significantly limits the organization's ability to perform key HR and related management processes.

The criticality of a node is determined not by its technical complexity, but by the scale of the consequences of a failure. For example, a payroll module is considered a highly critical node, as its failure directly impacts the employer's financial obligations and the social stability of the staff. Similarly, a personal database or the integration channel between the HR system and the financial system can act as a point of systemic risk [5].

It's important to note that a critical operational node can be either technological or organizational in nature. A technological node is a server, database, software module, or calculation algorithm. An organizational node is a unique competency holder responsible for system administration or configuration. In both cases, a failure leads to a decrease in manageability.

Criticality also increases with a high degree of integration. If the HR platform is integrated into a unified corporate architecture, its nodes begin to act as connecting elements between departments. In this case, a local failure can transform into a cross-functional problem.

After identifying operational criticality nodes, the next stage of analysis is their systemic mapping. Mapping, as used in this article, refers to the structured identification and assessment of HR architecture elements in terms of the likelihood of failure and the scale of potential consequences. This approach allows for the transition from an abstract understanding of risk to concrete management diagnostics.

Mapping begins with identifying the system's key modules and connections: payroll, HR, analytics, integration channels, server infrastructure, administration, and external services. Each element is analyzed based on three basic parameters: operational importance, degree of dependency on other components, and the presence of redundancy. If a node performs a critical function, is connected to multiple systems, and lacks redundancy, it is considered a high-risk zone.

Particular attention is paid to integration links. Experience shows that failures often occur not in the modules themselves, but at the interfaces between systems—during data transfers, version updates, or format changes. These intersections often become hidden vulnerabilities, as each system may formally function correctly, but their interactions are disrupted.

Mapping also involves human factors analysis. If a critical component is maintained by a single specialist or knowledge of the system configuration is undocumented, the risk level increases regardless of the platform's technical stability.

The mapping process results in a failure point matrix that identifies the most sensitive architectural elements. This allows for prioritization of audits, backups, and response scenarios. Thus, mapping becomes a strategic management tool for HR system resilience rather than a one-time diagnostic procedure (Table 1).

Table 1 - Digital HR Architecture Breakdown Point Mapping Matrix

Node category	An example of an HR architecture element	Operational significance	Degree of intersystem dependence	Availability of reservations	Potential failure type	Structural risk level
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Calculation module	Payroll system	High (financial obligations)	High (finance, taxes, reporting)	Partial / absent	Massive distortion of accruals	Critical
Accounting contour	Personal data base	High (legal and personnel processes)	Medium-high	Depends on the backup policy	Data loss or corruption	High
Analytical module	KPI calculations and HR dashboards	Medium-high (management decisions)	High (integration with production/finance)	Low	Algorithmic distortion of indicators	High
Integration node	API connection to an ERP or financial system	High	Very high	Limited	Data transmission failure	Critical
Infrastructure level	Server / cloud platform	High	Systemic	Depends on SLA	Technical failure	Critical
Organizational node	HR System Administrator	High (configuration, updates)	Average	Often absent	Loss of control over the system	High
External contour	Support contractor	Medium-high	High	Limited influence	Delay in recovery or changes	Medium-high

After identifying critical nodes and mapping vulnerabilities, it becomes necessary to evaluate possible scenarios in the event of their failure. Scenario analysis allows us to model not only the failure itself but also the chain of consequences it could cause within the organizational environment. This approach is important because digital HR architecture functions as an interconnected system, where a local problem can become systemic [3].

The first type of scenario involves a technological failure—for example, loss of access to the database or disruption of integration between the calculation modules and the financial system. In the short term, this leads to delayed payments, the inability to generate reports, and the blocking of employee services. In the medium term, it creates reputational and legal risks.

The second scenario is algorithmic in nature. An error in the calculation formula or an incorrect change in the coefficients may not cause an immediate technical failure, but will lead to a systemic distortion of calculations. The widespread discovery of such errors could undermine trust in the digital system and management decisions in general.

The third scenario involves organizational dependency. The departure of a key administrator or loss of access to an external contractor can paralyze the company's ability to quickly modify or maintain the system. While the platform may formally continue to function, its development and adjustments become difficult.

Scenario analysis shows that system failure rarely occurs suddenly. Rather, it develops through the accumulation of vulnerabilities that eventually intersect. Therefore, the resilience of HR architecture is determined not by the absence of errors, but by the system's ability to localize the consequences of a failure and prevent its spread to other systems.

To move from a qualitative, descriptive analysis of vulnerabilities to a quantitative, formalized assessment of the state of the digital HR architecture, it is proposed to introduce the Human Resources Structural Resilience Index (HRRSI) Resilience The HRRSI (Structural Risk Index) is an analytical tool designed for comparative analysis of various systems or the states of a single system. It allows for an objective assessment of risk concentration, identification of critical vulnerability areas, and monitoring of resilience dynamics over time. It is important to emphasize that the HRRSI does not replace management decisions, but rather serves as an analytical support for them, providing data for informed strategic choices.

Index formula.

In general terms, the index is calculated using the following formula:

$HRRSI = (R_d \times D_i \times B_c \times K_s) - C_f$ , where all parameters are normalized to a range from 0 to 1 (or from 1 to 10 for scaling convenience) to ensure comparability. The product of the resilience factors ( $R_d$ ,  $D_i$ ,  $B_c$ ,  $K_s$ ) reflects the cumulative effect of system strengthening, while subtracting  $C_f$  adjusts the result for the level of concentration risks. If the product exceeds 1 (on a normalized scale), the index can be capped to avoid overestimation; similarly, negative values signal critical vulnerability.

Description of parameters: -  $R_d$  (data redundancy level): Evaluates the presence and effectiveness of redundancy of critical data. For example, the scale could be as follows: 0 – no redundancy; 0.5 – partial redundancy (e.g., only key databases); 1 – full redundancy with geographic distribution. This parameter measures the system's ability to maintain access to information during failures, minimizing losses.

-  $D_i$  (Degree of integration link diversification): Characterizes the diversity of integration channels and protocols between HR modules (e.g., APIs, web services, cloud interfaces). Scale: 0 – exclusive dependence on one type of connection; 0.5 – moderate diversification (2–3 options); 1 – high diversification with alternative routes. This facilitates load balancing and reduces the risk of cascading failures.

-  $B_c$  (backup and recovery mechanisms maturity): Assesses the quality of backup systems, including backup frequency, recovery time, and testing. Scale: 0 – no or ineffective mechanisms; 0.5 – basic backups with manual recovery; 1 – automated systems with minimal RTO (less than 1 hour) and regular auditing. This parameter focuses on prompt recovery after incidents.

-  $K_s$  (competency distribution coefficient within the organization): Measures the decentralization of knowledge and skills among employees (e.g., the number of specialists capable of managing the HR system). Scale: 0 – competence concentration among one or two people; 0.5 – distribution across the team with cross-training; 1 – complete decentralization with role rotation and documentation. This reduces risks associated with human factors, such as the departure of key employees.

-  $C_f$  (Dependency Concentration Factor): Reflects the level of dependence on a single critical element (technological—for example, a single vendor or cloud provider, or human resources—for example, a single system administrator with unique rights). Scale: 0—minimal concentration (full diversification); 0.5—moderate (dependence on 2–3 sources); 1—high concentration (single source).  $C_f$  is subtracted, since such concentration sharply increases systemic risks.

The index's logic is based on the principle of balance: the multiplicative component ( $R_d \times D_i \times B_c \times K_s$ ) emphasizes the synergistic effect of resilience factors—a weakness in one factor (e.g., low  $R_d$ ) significantly reduces the overall system resilience. Subtracting  $C_f$  introduces a concentration penalty, simulating real-world scenarios where bottlenecks can lead to systemic collapse. For example, if all resilience factors equal 0.8 and  $C_f = 0.6$ , then  $HRRSI \approx (0.8^4) - 0.6 \approx 0.41 - 0.6 = -0.19$ , indicating the need for urgent action.

For calculation, it is recommended to use normalized values (0–1), where the resulting HRRSI is interpreted as follows:  $>0.5$  — high resilience;  $0-0.5$  — moderate;  $<0$  — critical vulnerability. In practice, the formula can be refined by adding weights (e.g.,  $HR-RSI = w_1 R_d \times w_2 D_i \times \dots - C_f$ ) if the analysis reveals unequal values among the parameters.

**Adaptation and Application.** The HRRSI is conceptual in nature and requires customization: assessment scales should be adapted to the specifics of the organization (e.g., for IT companies, an emphasis on  $D_i$ , for manufacturing, on  $K_s$ ) and the industry (finance and education). Absolute values are less important than relative dynamics: monitoring changes over time or comparing between departments/stages of digital transformation. It is recommended to integrate the index into dashboards for automated calculations based on data from HR systems (e.g., via an API).

The practical value lies in the transformation of the approach to HR architecture management: it enables regular monitoring of the system's maturity, identifying trends before crises arise. Instead of perceiving the HR platform as a static technological environment, the index positions it as a dynamic, manageable infrastructure with resilience parameters. This shifts the risk discussion from a reactive perspective (responding to failures) to a proactive one of system control, strategic planning, and design of the digital HR infrastructure, contributing to an increase in the overall resilience of the organization.

Assessing vulnerabilities and calculating a resilience index are only practical if they are followed by changes in architectural solutions. A resilient HR system does not emerge automatically through digitalization; it requires targeted design. In this regard, a number of principles can be identified on which a mature HR platform should be built [5,3].

The first principle is redundancy of critical functions. This applies not only to technical infrastructure but also to process logic. Databases must have regular backups, key servers must be duplicated, and calculation algorithms must have test loops to verify changes. A lack of redundancy turns any failure into a potential systemic one.

The second principle is transparency of algorithms and documentation of the architecture. Calculation formulas, KPI parameters, integration dependencies, and update procedures should be documented in regulatory documents. Transparency reduces the risk of erroneous changes and decreases dependence on specific specialists.

The third principle is the distribution of competencies. System resilience increases when knowledge about its configuration and operating logic is not concentrated in a single person. Rotation of responsible persons, knowledge transfer, and the development of an internal administrator pool help minimize organizational dependency.

The fourth principle is architecture stress testing. As in the financial sector, the HR platform should be periodically tested for resilience to various scenarios: massive data changes, module updates, peak loads, or the shutdown of individual components. This allows for the identification of hidden points of failure before they manifest themselves in a real-world situation.

Finally, strategic recognition of HR as part of the company's critical infrastructure is becoming an important element. As long as the HR system is perceived solely as a service function, issues of its architectural sustainability remain secondary. However, in the context of digital integration, the sustainability of the HR platform becomes a factor in the financial, legal, and social stability of the organization.

A resilient HR architecture is not simply a system that can withstand failures, but a structure that is strengthened through vulnerability identification, regular auditing, and deliberate risk redistribution.

Understanding resilience principles must be supported by concrete management actions. Without the implementation of practical mechanisms, even a well-designed architecture remains a theoretical construct. This section examines key tools for systematically reducing the vulnerability of a digital HR platform.

First and foremost, a regular architectural audit is essential. This includes checking the relevance of integration links, the correctness of calculation algorithms, the availability of backups, and the degree of process documentation. Such an audit should be conducted not sporadically, but on a scheduled basis, especially after significant system updates or regulatory changes.

The second mechanism is the introduction of a controlled change procedure. Any adjustment to accrual formulas, KPI parameters, or data structure must be tested in a separate environment. This

reduces the likelihood of an error propagating throughout the entire calculation set. Experience shows that most systemic distortions arise not at the development stage, but through subsequent targeted changes.

The third tool is the development of a HR continuity plan. It should define actions to take in the event of a key module failure, the data recovery procedure, the assignment of responsibilities, and alternative channels of communication with employees. Having such a plan helps minimize the social and financial impact even in the event of a serious disruption.

Training system users also plays a crucial role. Managers and HR specialists must understand the limitations of digital tools, the specifics of calculation logic, and potential sources of bias. Conscious use of analytics reduces the risk of making decisions solely based on formal metrics.

In the context of deep digital integration, the HR function is no longer a support function but rather a vital part of the organization's critical infrastructure. The timely payment of wages, the fulfillment of tax and social obligations, the generation of management reports, and the stability of internal communications with staff depend on the proper functioning of the HR platform. Disruption of these processes affects not only operational activities but also the company's financial stability and reputation [6,7,10].

Digital HR architecture is now integrated into the overall corporate framework. Personnel data is used in budgeting, production planning, and strategic analytics. An error or failure in the HR system can distort management information in adjacent units. Thus, the HR platform becomes the hub through which the company's financial, legal, and social obligations flow.

The unique feature of critical infrastructure is that its failure has a disproportionately large impact compared to the scale of the technical problem. In the case of HR, this is particularly evident: delayed payments, incorrect calculations, or personal data leaks immediately impact the trust of employees and external partners. Therefore, the resilience of the HR system should be assessed equally with the resilience of financial or production systems.

Recognizing HR as a critical infrastructure element inevitably changes the requirements for the HR function's managerial role. In a digital environment, HR directors can no longer limit themselves to overseeing HR procedures and staff development. They become responsible for the sustainability of the architecture upon which key employee engagement processes are built.

A modern HR platform integrates calculations, data, algorithms, and analytical tools. This means that the HR manager effectively manages not only people but also the logic of the digital system, which influences their assessment, motivation, and financial results. Configuration errors, opaque formulas, or the concentration of competencies within a narrow group of specialists become strategic risks rather than technical details [2].

In these circumstances, the HR director's role is transformed into that of an architectural coordinator. They must understand the integration structure, redundancy principles, module update procedures, and the mechanism for assigning responsibilities. Furthermore, they are responsible for ensuring algorithm transparency and maintaining a balance between automation and management oversight.

This transformation requires the development of new competencies systems thinking, an understanding of digital risks, and the ability to collaborate cross-functionally with IT and finance. The HR director becomes a participant in strategic infrastructure design, not just an implementer of HR policy.

Despite the proposed analysis model and structural resilience index, the study has several limitations. First, the HR-RSI concept is framework-based and requires empirical testing across specific organizations. The level of digital maturity, enterprise scale, industry requirements, and regulatory environment significantly impact the structure of vulnerabilities, so there can be no universal indicator value.

Secondly, the degree of integration of HR platforms with other corporate systems varies. In some companies, the HR system operates relatively independently, while in others, it is fully

integrated into the unified ERP architecture. This influences the nature of risks and the weighting of individual parameters in the resilience index.

Thirdly, the study focuses primarily on architectural and management aspects, while issues of information security and cyber threats require separate in-depth analysis involving technical expertise.

The proposed approach opens the basis for further scientific and applied development aimed at forming a more mature model for designing and managing digital human resources infrastructure (Table 2).

Table 2 - Management consequences and strategic implications of systemic vulnerability of HR architecture

Analytical direction	Manifestation of systemic vulnerability	Management implications	Strategic implications
HR as an infrastructure circuit	High dependence of settlements, reporting, and HR services on the digital platform	Potential destabilization of financial and social processes in the event of system failure	Institutionalization of the HR platform as an element of the enterprise's critical infrastructure
Scale of operational impact	Disproportionate impact of local disruptions on employee trust and regulatory obligations	Growing reputational and legal risks	Incorporating HR architecture into business continuity strategy and corporate risk management systems
Transformation of the HR management role	Expanding responsibility for the architectural integrity and algorithmic correctness of the system	Redistribution of functions between HR, IT and the financial block	Formation of architectural competence of HR managers and development of interfunctional interaction
Competency-based evolution of an HR leader	The need to understand the integration links and logic of digital calculations	Increasing demands on systems thinking and digital literacy	Integration of HR system sustainability indicators into the management performance assessment system
Limitations of the sustainability assessment model	The conceptual nature of the HRRSI index and industry differences	The difficulty of universalizing the methodology	Conducting empirical testing and adapting the model to various organizational contexts
Variability of HR platform integration	Varying degrees of connectivity with ERP and financial systems	Different risk profiles and levels of criticality	Development of typological profiles of HR architecture sustainability
Insufficient integration with the information security framework	Limited analysis of architectural and organizational aspects	Increased sensitivity to cyber risks	Synchronizing HR resilience assessment with information security programs

Digital transformation has radically altered the role of the HR function within an organization. The HR platform has ceased to be a supporting accounting tool and has become a structural element of the corporate infrastructure, the stability of which determines financial discipline, management analytics, and the social stability of the team. At the same time, increased functionality and integration inevitably comes with increased system dependency.

The vulnerability of digital HR architecture is multilayered. Technological failures, algorithmic errors, competence concentration, and cognitive biases form an interconnected risk structure. The most dangerous are not isolated technical failures, but hidden critical nodes that can trigger a chain reaction and lead to large-scale consequences.

The introduction of the concept of an operational criticality node and the HR-RSI structural resilience index enables a shift from a descriptive approach to systemic diagnostics. This creates the basis for regular monitoring of the platform's status, assessing dependency concentrations, and making management decisions on redundancy and responsibility allocation. An important conclusion is the need to recognize HR architecture as part of an enterprise's critical infrastructure.

The sustainability of a digital HR system should be viewed not as a technical challenge, but as a strategic priority. Only through deliberate design, transparent algorithms, and systematic dependency monitoring can an HR platform fulfill its function without the risk of transforming from an efficiency tool into a source of organizational instability.

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## TEAM PERFORMANCE LIFE HACKS FROM DIFFERENT COUNTRIES: A COMPARATIVE ANALYSIS OF PRACTICES AND TRANSFER CONDITIONS

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**Abstract:** *Team effectiveness has long ceased to be an abstract management category. In the context of digitalization, distributed teams, and accelerated business processes, it is becoming a matter of organizational survival. Meanwhile, so-called "life hacks"—short-form management techniques promising a quick boost to team performance are actively circulating in the professional community. However, the simplicity of these solutions often conceals deep institutional and cultural assumptions, without an understanding of which, their mechanical replication will not produce the desired effect. This article aims to comparatively analyze team effectiveness practices developed in different countries and to identify the conditions for their effective transfer to other organizational contexts. It examines management approaches related to the culture of continuous improvement, decision-making models, accountability structures, the nature of feedback, and the level of trust within the team. Particular attention is paid to how national communication patterns, institutional environments, and management traditions influence the sustainability of these practices. The results show that there are no universal "life hacks": the same practice can boost productivity in some contexts and cause resistance or formalization in others. Team effectiveness is determined not by a set of trendy tools, but by alignment of goals, clarity of responsibility, and the system's ability to learn from its own mistakes.*

**Keywords:** *team effectiveness, cross-cultural management, organizational practices, psychological safety, Kaizen, agile, high-performance teams, decision making.*

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Contemporary research in organizational psychology and management emphasizes the importance of factors that go beyond formal regulations: psychological safety, goal clarity, role transparency, and a balance of autonomy and control [1,2]. It is the combination of these elements that determines a team's ability not only to achieve results but also to remain resilient in the face of external change [3,4]. In the context of digitalization and distributed work, the importance of these factors is heightened, as teams become increasingly dependent on the quality of communication and the speed of decision-making. The concept of psychological safety, actively developed in [1,2,5], demonstrates a direct link between the ability to speak up and a team's ability to learn. In the context of digitalization and distributed work, the importance of trust and openness is increasing, which is also confirmed by research by international organizations [6-8].

Discussing team effectiveness is impossible without clarifying the conceptual framework. In scientific literature, team effectiveness is typically defined as a combination of three interrelated

parameters: achievement of goals, efficient use of resources, and sustainability of results over time. In other words, an effective team doesn't simply "deliver a project" but does so predictably, with acceptable costs, and without disrupting internal relationships.

It's important to distinguish between productivity and efficiency. Productivity reflects the volume of output produced, while efficiency reflects the ratio of output to resources expended. A team can be highly productive in the short term but simultaneously ineffective in the strategic perspective if it achieves goals through employee overload, chaotic processes, or a constant "firefighting mode." Team effectiveness as a combination of goal achievement, rational use of resources and sustainability of results over time is considered in the works of J. Hackman [3] and J. Katzenbach and D. Smith [4]. The stages of team development (formation, conflicts, norms, productivity) are described in the classical model of B. Tuckman [9], which allows us to take into account the maturity of the group when implementing management practices.

Psychological safety as a factor in team dynamics is revealed in the studies of E. Edmondson [1,2], as well as in the more applied context of organizational culture [5]. Organizational culture as a systemic factor of effectiveness is analyzed in the works of E. Schein [10] and D. Denison [11]. Cross-cultural differences in management and power distance are described in detail by G. Hofstede [12]. The mechanisms of organizational learning and behavioral adjustment are revealed in the concept of the double learning loop of K. Argyris and D. Schön [13]. Within the framework of organizational theory, several key factors influencing team dynamics are distinguished: structural, Psychological, cognitive, and institutional factors. International experience shows that sustainable teamwork practices are formed at the intersection of these factors. For example, continuous improvement models presuppose high process discipline and collective responsibility for quality; personal responsibility models clearly identify the decision owner; and consensus management models foster a developed culture of negotiation and trust. The phenomenon of psychological safety—the ability of team members to freely express opinions, ask questions, and admit mistakes without fear of sanctions deserves special attention. Research on organizational dynamics shows that this factor significantly influences the quality of collective decisions and the speed of team learning. However, psychological safety does not arise on its own: it requires clear rules of interaction and a mature managerial position.

A comparison of national management practices reveals that differences lie not so much in the set of tools as in the logic of their application. Seemingly simple techniques—short meetings, regulations, visual boards, or strict assignment of responsibility—always conceal a specific model of attitude toward power, time, risk, and error. The most characteristic management approaches that have influenced modern understandings of team effectiveness are examined.

The Japanese model of team effectiveness emerged in the post-war period amid resource scarcity, intense competition, and the need to rapidly expand industrial capacity. Under these circumstances, management philosophy focused not on sudden breakthroughs, but on the consistent reduction of waste and the systemic stabilization of processes. It was within this logic that the concept of Kaizen —continuous improvement through small, daily changes— developed [14]. Crucially, Kaizen is not a tool in the narrow sense. It is not a meeting technique or a set of regulations. It is a management paradigm in which every employee is viewed as a bearer of process knowledge, and waste elimination becomes part of everyday work. The team in this model does not expect external reform; it systematically seeks out deviations and improves standards [14,15].

The key mechanism for improving efficiency here is related to reducing variability. The more stable the process, the fewer random failures, and the lower the cost of error correction. Repeatability of operations allows deviations to be identified not by intuition, but by actual deviations from the standard. As a result, the team operates not in a reactive ("firefighting") mode, but in a controlled adjustment mode.

Process visualization is especially important. Information transparency—status boards, standardized procedures, and deviation tracking—reduces reliance on subjective interpretations. This

reduces cognitive load and allows efforts to be focused on improvement rather than on assigning blame.

It should be emphasized that the Japanese model assumes collective responsibility for quality. Errors are viewed not as individual misconduct, but as indicators of a systemic defect. This approach creates an environment in which identifying a problem does not lead to sanctions, but rather becomes the beginning of improvement. This is why Kaizen is closely linked to a certain level of psychological safety, albeit expressed in a different cultural form than in Western models [10,11].

However, transferring this model to a different institutional environment faces several limitations. First, Kaizen requires the discipline of standards. In organizations with low process maturity, standardization can be perceived as excessive bureaucracy. Second, the philosophy of small improvements presupposes a long-term focus. Under short-term financial pressure, managers may expect immediate results, which contradicts the gradual logic of change. Third, collective responsibility for the process requires a mature corporate culture; otherwise, standards become mere formal controls.

The Japanese model emphasizes such team effectiveness factors as stability, predictability, and execution quality. It is less focused on maximizing decision-making speed but ensures long-term sustainability of results. In highly turbulent environments, this sustainability becomes a strategic advantage if the organization is able to maintain a balance between standardization and adaptability.

The American management tradition historically developed in a highly competitive environment, characterized by entrepreneurial dynamics and a focus on rapid market entry. Under these conditions, the key factor in efficiency is not so much the perfection of the process as the speed of decision-making and implementation. Teamwork is built around the principle of individual responsibility, with each significant area of activity assigned to a specific owner of the result [3,4].

Personalization of responsibility in the American model is not a formal assignment of roles, but a structural mechanism for overcoming the diffusion of responsibility. When decisions are made collectively without a designated final owner, a blurring effect occurs: discussions drag on, implementation is delayed, and ultimate responsibility becomes uncertain. Designating a specific responsible person reduces uncertainty and moves the discussion into the realm of action [16].

A key element of this model is the separation of discussion and decision-making processes. While the discussion can be broad and include diverse points of view, at a certain point the decision is finalized and moves into the implementation phase. This logic reduces managerial turbulence and allows the team to move forward even without full consensus.

The efficiency-enhancing mechanism here is based on reducing the time lag between the task's formulation and the start of its implementation. The team does not strive for absolute information completeness before launching an action; decisions are made with sufficient, but not exhaustive, data. This creates an advantage in a dynamic environment where excessive analysis can lead to missed opportunities [9]. An additional characteristic of the American model is its focus on measurable results. Those responsible for a given area are assessed based on the achievement of specific indicators, which enhances control and makes each participant's contribution transparent. A key requirement is the alignment of authority and responsibility: the decision-maker must have the tangible tools to implement their decision.

However, this model also has structural limitations. First, excessive individualization of results can increase internal competition and weaken horizontal connections between team members. Second, a focus on speed can lead to an underestimation of systemic risks in the absence of sufficient process discipline. Third, in cultures with high power distance, personalization of responsibility can be perceived as a redistribution of power, which leads to resistance. Translating the American model into a different institutional environment requires several conditions: clear performance criteria, a transparent evaluation system, a clear delineation of authority, and a culture that allows for decision-making with incomplete information. Without these elements, personalized responsibility becomes either a formal status or a source of conflict.

The German management model is traditionally associated with a high degree of structure, regulation, and a focus on quality. However, reducing it solely to "rigid bureaucracy" would be an oversimplification. In reality, the German approach is based on a desire for systemic predictability: processes are designed to minimize uncertainty and reduce the likelihood of deviations from the intended outcome.

Team effectiveness in this model is achieved through clear role assignments, formalized approval procedures, and strict monitoring of key milestones. Each team member understands the boundaries of their responsibilities and the procedures for interacting with other departments. This reduces the risk of conflicts at the intersection of functions and minimizes the likelihood of rework.

The key mechanism for increasing efficiency here is related to change management. Unlike models focused on improvisation or rapid hypotheses, the German tradition emphasizes careful preparation and documentation of decisions. Process change follows an established procedure: risk analysis, approval, implementation, and monitoring. This sequence reduces the likelihood of systemic errors and ensures sustainable results [10,11].

Quality plays a special role as an institutional value. In manufacturing and engineering, this manifests itself in standards, tolerances, inspections, and certifications. In a management context, it manifests itself in the pursuit of complete analysis and logical consistency of decisions. The team works not only for speed, but also for reliability.

However, a high degree of formalization also has a downside. In highly turbulent market conditions, excessive approvals can slow down response times. A team focused on fully developing a solution risks losing out on speed to more flexible competitors. Thus, the model's strength predictability becomes a limiting factor under certain circumstances.

Transferring the German model to other organizational contexts requires a mature culture of procedural adherence and respect for established rules. Without this, regulations become mere declarations, and formalization becomes an additional burden. Furthermore, the introduction of process discipline must be accompanied by a clear explanation of its purpose: not control for control's sake, but the reduction of variability and risk.

In a comparative perspective, the German approach enhances performance parameters such as reliability, quality of execution, and error tolerance. It is particularly effective in industries with high defect costs—manufacturing, engineering, and infrastructure projects—where errors can have serious consequences.

The German model demonstrates that team effectiveness can be built on institutional discipline and manageability of change. Its value lies in its ability to ensure long-term stability and quality, but to maintain competitiveness, it requires a balance between formalization and adaptability [12].

The Scandinavian management model (Sweden, Denmark, Norway, Finland) developed in an institutional environment with a high level of social trust, a developed culture of interest alignment, and a relatively low power distance. In such an environment, team effectiveness relies less on the rigid formalization of processes than on the maturity of interactions and the autonomy of participants.

A key feature of this model is the horizontal communication structure. The manager does not act solely as a decision-maker, but rather as a coordinator and facilitator. Team members have the authority to make decisions within their areas of expertise, significantly reducing the need for vertical approvals. This reduces transaction costs and accelerates local response to change.

The mechanism for increasing efficiency here is linked to trust as a managerial resource. In an environment where employees assume each other's integrity, the need for excessive control is eliminated. High levels of trust reduce the number of checks, reports, and interim confirmations. The team spends less energy defending its actions and more on achieving results [7].

The Scandinavian model also embraces transparency. Access to data on goals, indicators, and project status is not limited to a small circle of managers. This openness fosters cognitive alignment and creates a shared understanding of direction. As a result, autonomy does not degenerate into chaos, as participants focus on the big picture [3].

However, managed autonomy requires mature conditions. First, goals must be clearly defined and have measurable achievement criteria. Second, team members must demonstrate professional competence and accountability. Third, the feedback culture must be constructive: mistakes are discussed as part of the process, not as grounds for sanctions.

The systemic limitations of this model manifest themselves in situations of crisis turbulence or the need for rapid centralized decisions. In conditions requiring strict coordination, excessive horizontality can slow down the adoption of strategically significant decisions. Therefore, even in Scandinavian practice, autonomy is combined with clearly defined areas of managerial responsibility [10].

In a comparative perspective, the Scandinavian approach enhances team effectiveness parameters such as initiative, engagement, and resistance to micromanagement. It creates conditions in which employees not only perform tasks but also participate in decision-making. However, transferring this model to other institutional contexts is only possible with trust, transparency of goals, and a mature corporate culture.

The Dutch management model is often described through the so-called *polder model* — a system for coordinating the interests of various parties before making a final decision. Historically, this approach developed in response to the need for collective resource management and compromise between different social groups. In the corporate environment, this logic has transformed into a sustainable practice of structured discussion and the search for an acceptable balance of positions [9].

In this model, team effectiveness is achieved not through the speed of individual decisions, but through reducing subsequent resistance to implementation. It is assumed that a decision made with diverse perspectives in mind has a higher degree of legitimacy. As a result, the team is less likely to encounter sabotage, hidden disagreement, or passive resistance during implementation.

A key mechanism for increasing effectiveness is the controlled inclusion of stakeholders in the discussion process. Unlike informal consensus, the Dutch model involves structured discussion with the recording of positions, arguments, and a final compromise. Thus, the discussion is not chaotic but integrated into the management process.

Transferring the Dutch model requires two conditions. First, the discussion process must be time-limited and have a clear end point. Second, after a decision is made, the team must move to the implementation phase without reopening the discussion. Without these conditions, consensus devolves into managerial inertia. In a comparative perspective, the Dutch approach enhances such performance parameters as sustainability, collective responsibility, and the reduction of post-facto conflicts. It is particularly effective in organizations where decision implementation depends on horizontal collaboration and interdepartmental alignment.

Israeli management culture is often characterized by a high degree of directness, intense debate, and a willingness to openly challenge ideas. In the business environment, this manifests itself in vigorous debate, a rapid exchange of arguments, and minimal distance between hierarchical levels. Formally, the manager retains authority, but discussions of decisions can be quite rigorous and critical [16].

In this model, team effectiveness is achieved through the early identification of weaknesses. Ideas are tested immediately, during the discussion phase, rather than after the project launch. Conflict is viewed not as a threat to stability, but as a tool for intelligently testing hypotheses. The earlier a vulnerability is identified, the lower the cost of fixing it.

A key mechanism for increasing efficiency is reducing the time to error detection. This is especially important in an innovative environment: rapid hypothesis testing cycles allow for the rapid rejection of unviable solutions and the focus on promising areas. The team does not waste resources defending an idea that fails to withstand scrutiny [2].

However, managed conflict requires mature rules of engagement. Direct communication should focus on the content of the discussion, not on personal judgment. Without respect for the participants, the model quickly degenerates into aggressive interactions and undermines trust within the team.

A systemic limitation of the Israeli approach manifests itself in cultures with high power distance or a pronounced emphasis on formal subordination. In such environments, open criticism can be perceived as a violation of hierarchy. Without adaptation, directness becomes a source of tension.

To transfer this model, several conditions must be met. First, a clear distinction must be made between discussing an idea and treating the individual. Second, the stages of hypothesis testing must be formalized to prevent the discussion from degenerating into endless arguments. Third, the leader must demonstrate a willingness to accept criticism equally with other participants. In a comparative perspective, the Israeli model enhances team effectiveness parameters such as learning speed, innovation, and adaptability under uncertainty. It is particularly effective in projects involving new product development and technological solutions.

The Singaporean management model developed in a context of limited natural resources, high population density, and the need to build a competitive economy within a short timeframe. In this environment, measurability has become a key management resource. Organizations build processes around clear performance indicators, transparent reporting, and systematic performance monitoring.

Team effectiveness in this model is achieved through clear performance criteria. Each participant understands the metrics by which the team's and individual's contributions to the project will be assessed. These metrics are defined in advance, aligned with organizational goals, and regularly analyzed. This reduces uncertainty and allows for the rapid identification of deviations.

A key mechanism for improving efficiency is related to the manageability of execution. Measurability creates a structure in which results become concrete quantities rather than abstract categories. The team is empowered to adjust actions based on data rather than subjective assessments. This approach is particularly effective in projects where synchronizing the efforts of different departments is essential.

A strength of the Singapore model is its strategic alignment. Team performance indicators are aligned with the broader national and corporate strategy. This ensures vertical integration of goals and reduces the risk of local optimization, whereby a department achieves its own metrics at the expense of the overall objective.

However, focusing on metrics also carries potential risks. With excessive focus on numerical indicators, employees may strive to formally achieve KPIs, without always considering the qualitative aspects of their work. This creates the risk of substituting meaning for numbers, when achieving the indicator becomes an end in itself [6].

Translating the Singapore model requires a well-thought-out metrics architecture. Indicators should be linked to real results and not incentivize manipulative behavior. Furthermore, the evaluation system should consider both quantitative and qualitative parameters to maintain a balance between manageability and meaningful work.

In a comparative perspective, the Singapore approach enhances such team effectiveness parameters as predictability, execution discipline, and strategic coordination. It is particularly effective in environments that require a high degree of synchronization and clear process control. The Singapore model demonstrates that, when properly designed, measurability becomes a tool not only for control but also for strategic development. Team effectiveness in this case is built on the transparency of goals and regular analytical course correction (Table 1).

Table 1 - Comparative model of national approaches to team effectiveness

Country / management model	Dominant management principle	Key performance parameter	The strength of the model	System limitation	Condition for successful transfer
Japan ( Kaizen, standardization )	Continuous improvement through	Stability and predictability of quality	Reducing variability	Slowing down due to over-regulation	Having a process culture and

	process discipline		and hidden losses		tolerance for gradual change
USA (personal responsibility)	Clearly identifying the owner of the solution	Speed of decision making	Minimizing diffusion of responsibility	The risk of individualization of success and competition	Alignment of authority and responsibility
Germany (process precision)	Formalization of roles and quality control	Controllability and system stability	High predictability of execution	Loss of flexibility in a turbulent environment	Balance between regulations and adaptability
Scandinavia (trust and autonomy)	Delegation and low power distance	Speed of local solutions	Reducing transaction costs of control	Misalignment with unclear goals	Transparent metrics and a mature team culture
Netherlands (structured consensus)	Alignment of interests before making a decision	Sustainability of execution	Minimizing hidden resistance	Increased time spent on discussion	Limiting time for discussion
Israel (direct discussion)	Constructive confrontation of ideas	Innovative speed	Rapid identification of weak hypotheses	Conflicts in the absence of behavioral boundaries	A clear distinction between criticism of an idea and a person
Singapore (performance discipline)	Controllability through measurability	Predictability of the result	High transparency of execution	Formalization and KPI-centricity	Balance of quantitative and qualitative indicators

Despite cultural differences, an analysis of national practices reveals recurring mechanisms underlying team effectiveness. These mechanisms are not country-specific; they reflect fundamental patterns of organizational dynamics. Only the ways they are institutionalized vary.

Any team operates within a system of goals. Without a clearly defined outcome, even a high level of competence doesn't guarantee productivity. Clarity of goals implies: specificity of the expected result; measurability of progress; understanding priorities. Experience shows that teams with a limited number of simultaneous tasks demonstrate higher concentration and lower error rates. Limiting "work in progress" reduces cognitive overload and decreases the likelihood of misalignment. A prerequisite for adapting this mechanism is a mature goal-setting system and a transparent metrics system. Without this, clear goals become mere declarations.

Role blurring is one of the most common causes of decreased effectiveness. When responsibility is distributed abstractly ("the team is responsible"), no one is actually responsible [3,4]. Personalized responsibility doesn't mean authoritarianism. It's about clearly assigning ownership to a decision or process. This reduces the number of approvals and speeds up execution. However, this mechanism only works if decision-making authority exists. Appointing someone in charge without granting them authority creates a managerial paradox and reinforces bureaucracy.

A team in which employees are afraid to ask questions or point out mistakes loses the ability to learn. Psychological safety ensures the free exchange of information and improves the quality of collective decisions [5,1,2]. The mechanism for increasing efficiency here is linked to the reduction of hidden losses. Errors are identified earlier, problems are discussed openly, and decisions are made based on real data. Adaptation requires: clear rules for discussions; separation of criticism of the idea and the individual; a management position that allows for the possibility of error. Without these conditions, attempts to implement “open communication” lead to formal feedback without real effect.

Repeatability of operations reduces variability and increases predictability of results. Standards free up the team's cognitive resources for solving more complex problems. At the same time, standardization should not suppress initiative. Its function is to provide a stable foundation on which improvements are possible [14,15]. The key to adaptation is a balance between regulations and flexibility. Excessive formalization slows down the team, while a complete lack of standards creates chaos. Autonomy speeds decision-making, but without transparent metrics, it leads to inconsistency. Control ensures manageability, but when excessively rigid, it reduces motivation and initiative.

Effective teams operate at a balance point: the goals are clearly defined; the indicators are transparent; The team determines the method for achieving the result independently. This balance is one of the key variables of organizational sustainability. The analysis allows us to identify six universal mechanisms of team effectiveness: Clarity of goals. Personalization of responsibility. Psychological safety. Short feedback cycles. Standardization of key processes. Balance of autonomy and control (Table 2). Various national practices represent variations of these mechanisms, adapted to specific institutional environments. Consequently, the successful transfer of "life hacks" is only possible with an understanding of the specific mechanism they implement and the structural conditions that ensure its operation.

Table 2 - Universal mechanisms of team effectiveness and conditions for their institutionalization

Universal mechanism	Impact level (what it affects)	Organizational effect	Minimum conditions of applicability	Efficiency limit (when it stops working)	Sign of institutionalization
Clarity of goals	Team cognitive alignment	Reducing the misalignment of actions	Limited number of priorities and measurable outcome criteria	When overloaded with parallel tasks	The team independently filters out secondary tasks
Personalization of responsibility	Structural definition of roles	Accelerating the implementation of decisions	Alignment of authority and responsibility	In the absence of the right of final decision	Decisions are made without repeated approvals
Psychological safety	Behavioral openness	Early identification of risks and errors	Protection from sanctions for honest error	When punished for raising a problem	Participants voluntarily raise sensitive issues
Short feedback cycles	System adaptability	Quick action adjustments	Regular analysis of deviations	When turning the analysis into a	The team independently adjusts the plan

				formal report	without external pressure
Standardization of key processes	Process stability	Reducing variability and defects	Identification of critical stages	With excessive regulation of all operations	Standards are used as a basis for improvements
Balance of autonomy and control	Systemic stability	Increasing initiative without losing control	Transparent goals and performance metrics	When there is a bias towards total control or complete freedom	The manager performs a coordinating function, not a micromanager

The popularity of management "life hacks" is largely due to their apparent simplicity. Introducing a new meeting format, assigning a decision owner, or installing a visual task board is much easier than restructuring the accountability system and corporate culture. However, this is precisely where the main risk arises: the form is copied without changing the structure. Organizations often adopt practices without understanding their internal logic [13]. Cargo cult in management manifests itself in three signs: maintaining the previous system of responsibility when changing instruments; lack of measurable criteria for the effectiveness of the implemented practice; resistance to change at the level of informal norms. As a result, the "life hack" turns into an additional burden rather than a source of increased productivity. Practices based on direct and firm communication can enhance innovation in a low-power-distance environment. In a hierarchically oriented organization, the same model can be perceived as a breach of subordination. Similarly, consensus procedures in a fast-decision-making culture may be perceived as a delay in the process. Clear metrics and regulations do improve manageability. However, when overly focused on reporting, employees begin to optimize numbers rather than processes. This is manifested in: concentration on quantitative indicators at the expense of quality; creating the appearance of activity; decreasing confidence in the evaluation system. This situation is especially typical when implementing KPIs without preliminary process diagnostics.

In an effort to increase transparency, organizations often increase the number of meetings and approvals. As a result, employees waste time synchronizing instead of completing tasks. The paradox is that too much communication reduces productivity just as much as too little. The optimal rhythm is determined by the nature of the tasks and the degree of uncertainty in the environment.

Some practices require a high level of professional autonomy and responsibility. If the team lacks the necessary competencies or experience working together, this autonomy can lead to inconsistency. Therefore, the implementation of management tools should take into account the team's stage of development: formation; stabilization; high performance. Ignoring this factor creates structural tension and reduces efficiency.

Mechanical copying of management practices without analyzing the institutional environment and the level of maturity of the team not only does not increase efficiency, but can also aggravate internal contradictions [7]. Improving performance requires a systematic approach: diagnostics of the current organizational architecture; identifying key constraints; phased implementation of tools followed by an assessment of their impact. Team effectiveness is not a set of techniques, but the result of alignment of goals, structure and culture [9].

An analysis of international experience shows that effectiveness isn't created by tools alone. It emerges when tools are integrated into a clear management logic. Therefore, the implementation of teamwork practices should begin not with choosing a "fashionable approach," but with identifying organizational limitations.

Before implementing new practices, it is necessary to determine: how decisions are made in a team; who is actually responsible for the result; how information is distributed; where delays and losses occur. Diagnostics may include an analysis of decision-making time, the number of reworks, the number of approvals, and the level of conflicts. Without an understanding of these parameters, the implementation of new tools becomes an experiment without success criteria.

The key question is which mechanism needs to be strengthened: acceleration of decisions; increasing transparency; reducing the number of errors; increasing responsibility; improving communication. For example, if the problem is unclear responsibility, it makes sense to implement a personalized solution owner model. If the main challenge is recurring errors, it would be logical to introduce elements of standardization and regular reviews. This way, the tool is selected to suit the task, and not the other way around.

Experience shows that large-scale reforms often generate resistance. A more sustainable approach is to launch a pilot project within a single team or department. The pilot must have: a specific goal; measurable indicators; limited testing period; procedure for analyzing the results. This allows us to assess the real impact of the practice and adjust it before scaling.

Any management practice should be accompanied by impact measurement. Indicators may include: reduction of decision-making time; reduction in the number of reworks; reducing the number of conflicts; increased employee satisfaction; completing tasks on time. If no effect is observed, the practice must be adjusted or discontinued. Rejecting an ineffective tool is a sign of managerial maturity, not weakness.

After successful testing, the practice should be enshrined in regulations, standards, and the training system. Institutionalization includes: formalization of rules; training new employees; inclusion of the tool in the performance evaluation system. Without this, the changes are temporary and gradually disappear.

International experience allows us to formulate a universal rule: efficiency increases not when an organization copies best practices, but when it eliminates its own limitations.

Life hacks only work when coupled with managerial discipline, clear goals, and a willingness to correct mistakes. Otherwise, they become part of corporate decor (Table 3).

Table 3 - Systemic model for the implementation of international team effectiveness practices

Diagnosed organizational constraint	Management mechanism of influence	Local implementation format (pilot)	Key performance indicator	Critical risk of distortion
Slow decision making	Personalization of responsibility and fixation of the decision point	Appointment of a decision owner with formalized final approval rights	Reducing the average time from question to solution	Formal responsibility without real authority
Repeated errors and reworks	Standardization of critical process steps	Visualize the process and eliminate one system defect per cycle	Reducing the share of returns for revision	Increase in regulations without changing quality

Spread of priorities and overload	Limiting simultaneous tasks and focusing	Setting a task limit “in progress” at the team level	Stabilizing deadlines and reducing delays	Ignoring limits under external pressure
Hidden risks and late detection of problems	Psychological safety and structured feedback	Regulations for discussing risks at regular sessions	Increasing the proportion of problems identified at early stages	Imitating openness without changing behavioral norms
Excessive dependence on the leader	Delegation with measurable results	Transfer of direction with clear outcome criteria	Increase in decisions made without escalation	Delegation without an evaluation system
Over communication and “negotiation inflation”	Regulation of the meeting format	Limiting the time for discussion + mandatory recording of the next step	Reducing the number of repeat meetings on the same issue	Formalizing meetings without real decisions
Substitution of results with reporting	Transferring focus from an activity to a thread of execution	Introduction of lead indicators time and cycle time	Reducing the overall task execution cycle	Manipulating metrics instead of changing the process
Low adaptability to change	Short feedback cycles	Weekly analysis of deviations and plan adjustments	Acceleration of response to changes in the external environment	Transforming the analysis into a formal report

A comparative analysis shows that the phenomenon of team effectiveness "life hacks" is essentially a simplified representation of complex management mechanisms that have acquired a stable institutional form in various countries. In practice, they appear as shortcuts: limiting meetings, assigning decision ownership, visualizing tasks, standardizing operations, and providing regular feedback. However, their actual effectiveness is determined not by the tool itself, but by the extent to which it is integrated into the organization's management system and supported by cultural norms of interaction.

Differences between national teamwork models are not simply a matter of "better/worse." They reflect different ways of balancing four fundamental parameters: process formalization, participant autonomy, decision-making speed, and communication style. The Japanese culture of continuous improvement increases resilience through disciplined standards and waste reduction; the American model accelerates results through personalized responsibility and an action-oriented approach; German process rigor ensures quality and predictability, but requires caution in highly dynamic environments; Scandinavian autonomy accelerates decision-making, but only with mature goals and transparent metrics; the Dutch consensus-based tradition increases the sustainability of execution, but can lengthen the cycle; Israeli directness allows for quick "crushing of weak ideas," but requires a clear distinction between criticism of the idea and respect for the individual; Singaporean metric-driven governance increases predictability, but carries the risk of formalization and a shift in focus to reporting.

This leads to a practical thesis: there are no universal "life hacks," but there are universal mechanisms that implement them. The article identifies six such mechanisms: clarity of goals,

personalized responsibility, psychological safety, short feedback cycles, standardization of key processes, and a balance of autonomy and control. Each national practice represents a combination of these mechanisms in a certain proportion. Therefore, the management task is not to copy the external form ("like they do"), but to select the right mechanism for a specific organizational constraint ("what's holding us back?").

Of particular significance is the risk of cargo cults, which occurs when an organization implements tools without changing fundamental principles: accountability, authority, metrics, and discussion norms. In such cases, visual boards become mere displays of activity, retrospectives become rituals without conclusions, and KPIs become a system for simulating effectiveness. This is not only useless, but also increases internal costs and reinforces employee cynicism toward change. Therefore, the implementation of team effectiveness practices should be viewed as a controlled cycle: diagnosis → pilot → impact measurement → adjustment → institutionalization. Team effectiveness isn't a matter of "people's character" or "good chemistry." It's the controlled result of an organizational architecture in which goals are translated into clear priorities, decisions are recorded and executed, mistakes are transformed into learning, and processes ensure predictability without losing flexibility. This architecture enables teams to maintain productivity not only in stable conditions but also during periods of crisis, digital disruption, and structural restructuring.

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## IMPROVEMENT OF THE MANAGEMENT SYSTEM IN FIRE DEPARTMENTS OF INDUSTRIAL REGIONS (ON THE EXAMPLE OF PC-11 OF THE KARAGANDA REGION, TEMIRTAU CITY)

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**Abstract.** *The article considers the directions of improving the management system of fire departments in industrial regions using the example of Fire Department No. 11 in the Karaganda region (Temirtau). The need for a transition from a reactive model of operational response to a risk-oriented industrial safety management in conditions of a high concentration of hazardous industrial facilities is substantiated. A concept for transforming the fire department into an analytical center for managing technological risks in the region is proposed. The modernization model includes digitalization of management processes, implementation of a process approach, development of human capital, integration with industrial enterprises and the formation of a system for forecasting and ranking risks. The methodological basis of the study is formed by the principles of risk management [1], process approach [2], industrial safety systems [3], concepts of organizational development [4] and modern approaches to human resource management in conditions of increased professional risk [5]. The practical significance of the work lies in the possibility of a phased implementation of the proposed model in fire departments of industrial territories of the Republic of Kazakhstan. The implementation of the developed recommendations will increase the readiness of units, reduce response time, reduce the recurrence of incidents and strengthen the sustainability of the industrial infrastructure of the region [1], [3], [6].*

**Key words:** *management, fire department, industrial safety, risks.*

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Industrial regions are characterized by a high concentration of hazardous production facilities, complex technological infrastructure, and an increased risk of man-made accidents. In such conditions, the fire department functions not only as a rapid response unit but also as an element of the industrial risk management system [1,3].

Modern approaches to security involve a transition from a response model to a systemic risk management model based on threat identification, assessment, and forecasting [1,7]. In industrialized areas, the classical normative-hierarchical management model proves insufficient without analytical and process tools [2,8].

The traditional fire department management system is based on strict regulations, vertical management and control over the implementation of standards, which ensures stability and discipline [10].

Strengths of the model: clear structure of responsibility; algorithmization of actions; regulated reporting; high manageability of the unit.

However, this model is predominantly reactive in nature, since management is carried out after an incident [7,8]. Insufficient digitalization of processes and limited incident analytics reduce the potential for forecasting and preventive risk management [1].

Modern quality and safety management standards orient organizations toward a process-based approach and continuous improvement [2,3], which requires the transformation of the current fire department management system.

The proposed model is based on a risk-oriented approach, which complies with the international principles of ISO 31000 [1].

The fire department should be considered an analytical center for managing the region's man-made risks. This approach involves: systemic threat identification; assessment of probability and consequences; formation of a risk matrix; scenario modeling of emergency situations; analysis of "near incidents" (near miss) [1,7]. This logic corresponds to the Safety -II concept, where the emphasis is shifted from accident analysis to system stability management [7].

Digital transformation is a necessary element of a modern management system [2,9]. The implementation of electronic accounting systems and analytical dashboards allows for the following: analyzing response times; assessing equipment availability; forecasting workloads in risk zones; and tracking the recurrence of incidents.

The use of data in management is consistent with evidence-based principles management and requirements of systemic risk analysis [1,6].

Integration with digital databases of industrial enterprises (facility plans, hazardous substance data) increases the level of situational awareness and reduces uncertainty in response [3].

Firefighting in industrial areas involves high levels of occupational stress and physical strain. Effective personnel management must take into account the principles of strategic HR management [5].

The necessary measures are: continuous professional development; industrial accident scenario exercises; mentoring programs; psychological support for employees; a motivation system that takes into account the risk level [5]. Organizational changes require managed transformation, which is confirmed by theories of organizational development [4].

Modern occupational health and safety standards require coordination among all participants in the safety system [3]. The fire department and the enterprise must function as a single risk management ecosystem. This includes: joint risk maps; participation in industrial safety audits; regular exchange of analytical data; and agreed-upon response scenarios [1,3].

This approach is consistent with the principles of system safety and reduces the likelihood of organizational accidents [8]. According to ISO 9001, organizational management should be based on a process approach and measurable performance indicators [2].

For the fire department, this means: creating a process map; identifying bottlenecks; establishing KPIs (equipment preparation time, serviceability percentage, training completion rate); conducting internal audits [2]. Measurability of processes is a basic condition for system controllability [6].

The formation of a risk matrix and the ranking of objects by hazard level are consistent with international risk management recommendations [1]. Analysis of seasonal factors, technological peaks, and incident frequency allows for a transition from response to forecasting [6]. This approach enhances system resilience and reduces the likelihood of catastrophic scenarios [7,8].

Any modernization requires the managed implementation of changes. According to J. Kotter's model, transformation should include the formation of a change coalition, a strategic vision, and the institutionalization of new practices [4].

The implementation of digital and risk-oriented tools should be phased and accompanied by training of management staff [9].

At the same time, discipline and regulatory framework provided for by the legislation of the Republic of Kazakhstan [10] are preserved as the basis for the stability of the system.

The implementation of the proposed model will allow: to reduce response time; to reduce the recurrence of incidents; to increase the readiness of equipment; to increase resilience to personnel losses; to strengthen the industrial safety of the region [1,3,6].

Strategically, the fire department is being transformed from an operational unit into an element of the regional risk management system.

The implementation of the proposed model for modernization of the PC-11 management system assumes the achievement of measurable organizational and operational results corresponding to the principles of ISO 31000 and ISO 9001 [1,2], as well as the concept of sustainable safety Safety-II [7] (Table 1).

Table 1 - Forecast of changes in key operational indicators (implementation horizon – 2 years)

Indicator	Current status	Forecast after implementation	Expected change	Base
Average response time, min	8.5	7.2	↓ 15%	Digitalization of routing [1], [2]
Share of technically ready equipment, %	82	92	↑ 10%.	Process control of maintenance [2]
Repeat visits to the same site, %	18	11	↓ 39%	Incident analytics [6], [7]
Average time to prepare equipment for departure, min	4.0	3.2	↓ 20%	Standardization of processes [2]
Completion rate of training plans, %	76	95	↑ 19%	Personnel development system [5]

The reduction in response time and recurring incidents is due to the implementation of analytical risk management tools [1,6]. The improvement in technical readiness of equipment is associated with the implementation of process management and KPI control [2] (Table 2).

Table 2 - Assessment of strategic and systemic effects of modernization

Direction of change	Short-term effect (1 year)	Medium-term effect (2–3 years)	Strategic effect
Digitalization	Increasing data transparency	Reducing management uncertainty	Formation of an analytical risk center [1]
Human Resources Management	Increased motivation	Reducing staff turnover	Sustainable professional personnel reserve [5]
Integration with enterprises	Improving coordination	Reducing the likelihood of major accidents	Unified ecosystem of industrial safety [3]
Process approach	Optimization of operations	Stabilization of performance indicators	Continuous Improvement Culture [2]
Risk-based management	Formation of a risk matrix	Forecasting emergency peaks	Increasing the region’s resilience to man-made threats [7,8]

For a comprehensive assessment of implementation, the integral index of management system efficiency ( $I_{eff}$ ) can be used:

$I_{eff} = \sum (w_i \times K_i)$  Where:  $K_i$  is a normalized indicator of efficiency;  $w_i$  is the weighting coefficient of the indicator's significance ( $\sum w = 1$ ).

The use of integrated assessment corresponds to the methodology of quantitative analysis of risks and the effectiveness of management decisions [6].

The integrated implementation of digital, process and risk-oriented management tools will allow: to increase the operational resilience of the division; to reduce the variability of response indicators; to strengthen integration with industrial enterprises; to form a preventive model for managing man-made risks [1,3,7].

Thus, the fire department is being transformed from a rapid response structure into an element of the region's strategic industrial safety management system.

Table 3 shows the calculation of the seasonality coefficient for the PC-11 load analysis (using the average statistical data on the number of trips per year as an example). The methodology complies with the approaches of quantitative analysis and statistical normalization of indicators [1,6].

Calculation method. The seasonality coefficient is determined by the formula:

$K_{season, i} = Y_i / \bar{Y}$ , where:  $Y_i$  is the number of trips in the  $i$ -th month;  $\bar{Y}$  — average monthly number of departures;  $K_{sez, i}$  is the seasonality coefficient of month  $i$ . If  $K_{sez} > 1$  — increased load is observed; if  $K_{sez} < 1$  — decreased activity (Table 3).

Table 3 - Calculation of the seasonality coefficient based on the number of PC trips

No.	Month	Number of departures ( $Y_i$ )	Average monthly value ( $\bar{Y} = 2000 / 12 = 167$ )	Seasonality coefficient ( $K_{sez}$ )
1	January	140	167	0.84
2	February	150	167	0.90
3	March	165	167	0.99
4	April	175	167	1.05
5	May	185	167	1.11
6	June	210	167	1.26
7	July	230	167	1.38
8	August	220	167	1.32
9	September	180	167	1.08
10	October	170	167	1.02
11	November	160	167	0.96
12	December	135	167	0.81
	<b>Total</b>	<b>2000</b>	—	—

Seasonality analysis:

The peak load occurs in the summer period (June–August), where the seasonality coefficient reaches 1.26–1.38.

The minimum load is observed in the winter months (December–January), with a coefficient of 0.81–0.84.

The amplitude of seasonal fluctuations is:  $A = K_{max} - K_{min} = 1.38 - 0.81 = 0.57$ . The obtained results allow: planning the strengthening of duty shifts in the summer period; adjusting vacation

schedules; increasing the readiness of equipment during the peak season; taking seasonality into account when forming a risk matrix [1,6].

The use of the seasonality coefficient allows us to move from reactive response to predictive management of the division's resources, which corresponds to the principles of risk-oriented management [1], and quantitative analysis of efficiency [6].

Improving the management system of fire departments in industrial regions requires a transition from a reactive model to a risk-oriented management system based on international standards of quality management, safety and risk management [1,2,3].

The integration of digital tools, human capital development, process approach and systemic forecasting form the basis for the sustainability of industrial territories in the context of increasing technological complexity [6,7].

Thus, modernization of fire department management is a strategic factor in ensuring industrial and regional safety.

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**IMPROVING LENDING PROCESSES IN A MORTGAGE AND CONSUMER  
LOAN CONSULTING COMPANY (USING THE EXAMPLE OF IPOTEKA GROUP  
IN THE REPUBLIC OF KAZAKHSTAN)**

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**Abstract.** *This paper examines current issues and areas for improving lending processes in consulting firms specializing in mortgage and consumer loans. Using Ipoteka Group (Republic of Kazakhstan) as a case study, it analyzes the operations of a mortgage broker providing full transaction support services at various banks in Kazakhstan. Against the backdrop of high mortgage market growth in 2025 (record issuances, dependence on transfers from the Unified Accumulative Pension Fund (UAPF) and government support), but with tightened regulation, key challenges are identified: extended approval times, decreased application approval rates, dependence on preferential programs, and the digitalization of processes.*

**Keywords:** *mortgage lending, consumer lending, mortgage broker, Ipoteka Group, digitalization, Kazakhstan.*

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The lending market in the Republic of Kazakhstan in 2025–2026 is characterized by dynamic growth, but also significant regulatory restrictions. The volume of mortgage loans by the end of 2025 exceeded 7.4 trillion tenge (+19% year-on-year), while consumer lending slowed by half compared to 2024 due to stricter requirements for debt burden and terms [1,2].

Consulting companies (mortgage brokers) play a vital role as intermediaries between clients and second-tier banks (STBs), helping select optimal programs, collect documents, and support transactions. Ipoteka Group is a prominent player in the market, operating in Astana and Almaty, focusing on full support for mortgages, consumer loans, and car loans. Over the past 4.5 years, the team has helped more than 8,480 families purchase housing [3].

The goal is to analyze lending processes at Ipoteka Group and propose ways to improve them in today's environment.

Mortgages and consumer loans are key instruments of housing and consumer policy. In Kazakhstan, mortgages are heavily dependent on government programs (such as "7-20-25," "Otau," and others), which offer rates of 7%, down payments of 20%, and a financing limit of 100 billion tenge per year [4].

Consumer lending increased in 2025, but the regulator (ARFRFR and the National Bank of the Republic of Kazakhstan) introduced restrictions: a ban on loans over 5 years in case of overdue payments, limits on the debt burden (DTI) and high-risk loans [5].

The broker's role is to minimize refusals (in 2025, the approval rate of applications fell to 24% in some quarters), select a bank with the best conditions, and speed up the processing [6].

Ipoteka Group is a consulting company providing mortgage selection and support services at any bank in Kazakhstan, as well as consumer and auto loans. Our core principles include contractual work, consultations at all stages, real estate selection, and client legal protection [3].

The processes include: initial consultation (online/offline); credit history and income analysis; program selection (preferential/commercial); document collection and submission to the bank; support until the loan is issued and the collateral is registered.

In 2025, the company faced challenges: the suspension of disbursements at major banks (Halyk, BCC, Forte) in the fall due to the increase in the base rate to 18% and the introduction of a 20% annual interest rate limit [7]. This led to extended terms and a shift in focus to Otbas Bank's programs and certain preferential products.

Key challenges in 2025–2026:

High dependence on government programs and transfers from the ENPF (transfer growth +81% to 449.7 billion tenge) [1].

Tightening of regulations: the 20% limit on the effective interest rate makes commercial mortgages unprofitable for banks (required margin 4–6%) [8].

Declining approval rates and increasing refusals due to strict income and debt verification.

Long review periods (especially in programs like “7-20-25” – the waiting list is months long).

Insufficient digitalization: many processes remain paper-based, which increases time and errors.

Competition with digital platforms (OnayIpoteka, etc.) [9].

In the consumer segment, there is a slowdown in growth due to restrictions of the ARFR [5].

For Ipoteka Group we offer:

Digitalization of processes—implementing a CRM system and an online application platform, integrating with bank APIs and eGov for automated data verification. This will reduce processing time by 30–50%.

Strengthening risk analytics – developing internal client scoring based on credit history, income, and the Unified Accumulative Pension Fund (UAPF) data to increase approval rates by 15–20%.

Expansion of partnerships – deepening cooperation with Otbas Bank, ForteBank and new digital brokers; participation in 2026 programs (all banks will be able to work using the Otbas system ) [10].

Diversification of services—active development of support for consumer loans and auto loans to compensate for the decline in mortgages.

Staff training and marketing focus on online consultations and targeted advertising on Instagram / Telegram to attract younger clients.

Monitoring regulatory changes – prompt adaptation to new limits and programs.

Improving lending processes at consulting firms like Ipoteka Group requires a balance between digitalization, risk management, and adaptation to strict regulation. Implementing the proposed measures will improve efficiency, reduce refusals, and maintain market leadership. Stabilization is expected in 2026–2027 following a possible reduction in the base rate and the development of market mechanisms.

We have conducted a comparative analysis of the main mortgage programs in Kazakhstan, including “7-20-25”, “Baqytty” Отбасы" and "Шанырақ", as well as some other preferential and market products (Tables 1, 2).

Table 1 - Main Program Parameters

Program	Interest rate	Down payment	Loan term	Housing	Target audience
7-20-25	7%	20%	Up to 25 years old	Primary	Citizens without housing

Бақытты Basses (2-10-20)	2%	10%	Up to 20 years	New & recycled	Socially vulnerable families
Шаңырақ (5-10-20)	5%	10%	Up to 20 years	Primary	Youth/social groups
Нұрлы Zher (5-20-25)	5%	20%	Up to 25 years old	Primary	Different categories
Commercial mortgage	From $\approx 8\%$ to $>19\%$	20–50%	Up to 20–30 years old	Primary & secondary	Wide circle

1. "7-20-25"

Rate: fixed 7% per annum for the entire term.

Down payment: 20% of the cost of housing.

Duration: up to 25 years – one of the longest among state programs.

Housing: only primary market (new buildings).

Peculiarities:

The citizen and spouse must not have owned housing before the established deadline.

Always in demand, but due to funding limits, banks may regulate issuance.

Pros: relatively low rate and long term.

Cons: Requires a fairly large down payment and is limited to expensive properties.

2. « Бақытты Basses » (2-10-20)

Rate: very preferential - 2% per annum.

Down payment: 10% is less than "7-20-25".

Term: up to 20 years.

Housing: primary and secondary, and you can also build a house yourself.

large families, those on waiting lists, single-parent families, etc.

Pros: minimum rate, availability of the secondary market.

Cons: narrower social criteria for participation.

3. "Shanyrak" (5-10-20)

Rate: preferential - 5% per annum.

Initial payment: from 10%.

Term: up to 20 years.

Housing: only primary (new buildings).

Target audience: Often aimed at young citizens and quota groups.

Pros: moderate rate, small down payment.

Cons: loan amount limits are lower than those of 7-20-25.

4. « Нұрлы Zher »

Rate: usually around 5%.

Term: up to 25 years.

Features: Another government program with preferential terms for a wide range of citizens, but with specific features regarding housing availability and waiting lists.

5. Commercial mortgage products

Rate: from  $\approx 8\%$  to  $20\%+$  — higher than state programs.

Flexibility: it is possible to purchase primary and secondary housing, individual houses.

Requirements: often higher – collateral, income, payment history.

Pros: a wider selection of housing and loans for various purposes.

Cons: Significantly higher rates.

Comparison table 2 - key parameters

Program	Annual interest rate	Down payment	Term	Secondary is possible	Commercial banks
7-20-25	7%	20%	Up to 25 years old	✗	Yes
Бақытты Basset	2%	10%	Up to 20 years	✓	Through OtbasyBank
Шаңырақ	5%	10%	Up to 20 years	✗	Through regional programs
Нұрлы Zher	~5%	~20%	Up to 25 years old	✗	Yes
Commercial mortgage	From ~8%	~20–50%	~20–30 years	✓	Yes

Recommendations for selection:

If you want a favorable mortgage and meet the conditions: "Бақытты Otbasy" — the lowest rate (2%).

If you don't have a home and are planning to buy a new building: "7-20-25" is the optimal balance between rate and term.

For families with limited resources: "Shanyrak" and "Bakytty" Otbasy» more affordable with a down payment.

If government program requirements don't suit you, commercial mortgages offer more flexibility but are more expensive.

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## ANALYSIS OF NON-STATIONARY ELECTRIC DRIVE LOADS IN DRUM SHEARS BASED ON FINITE ELEMENT MODELING OF THE CUTTING PROCESS

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**Abstract.** *The paper presents a finite element modeling study of the power and energy parameters of the cutting process in drum shears of the 1700 hot rolling mill at QARMET JSC. The relevance of the research is determined by the need to improve the accuracy of load estimation for electric drives of metallurgical equipment operating under variable and impact torque conditions. The simulation was performed in the DEFORM-3D software environment, taking into account thermo-mechanical interaction, nonlinear stress-strain behavior, and the kinematic features of the inter-blade clearance variation.*

*As a result, time-dependent characteristics of vertical cutting force, torque, and power were obtained for both the upper and lower drums. It was established that despite similar values of vertical cutting force, the distribution of torque and power between the drums is significantly non-uniform, with the lower drum being subjected to higher loading. The cutting process demonstrates a pronounced non-stationary behavior and the presence of oscillatory components in the final stage, where peak torque and power values are formed.*

*The study shows that the design and analysis of drum shear electric drives should be based not only on the maximum cutting force but also on the time-dependent torque and power characteristics, which more accurately reflect the real loading conditions. The obtained results can serve as a computational basis for optimizing the structural and operational parameters of drum shears and improving electric drive control systems.*

**Keywords:** *drum shears, modeling, energy-force parameters, program*

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Determining the force and power parameters of a technological process is a key stage in investigating the load characteristics of drive motors in metallurgical equipment, since the deformation force, torque, and power consumption are directly related to the actual loading level of the electric drive [1, 2]. Recent studies have shown that predicting rolling force and torque improves the accuracy of process characterization, while accounting for motor loads in individual rolling stands makes it possible to use these data for load balancing, productivity enhancement, and reduction of excessive operating costs [1, 3]. In turn, analyzing the evolution of load torque and motor speed across the stands allows a more adequate assessment of the electrical variables of the drive under actual operating conditions of a metallurgical unit [2]. In this regard, the determination of force and power parameters should be regarded as a necessary scientific and practical basis for the modeling, analysis, and optimization of drive systems in metallurgical equipment [1–3].

This issue is of particular importance for flying shears used in rolling production, where the force and power parameters of the cutting process directly determine the variable and impact nature of the resisting torque on the electric drive shaft. For rotary shears, it has been shown that, at the

moment of cutting, a short-term shock cutting torque arises, which may reach values comparable to the rated motor torque; therefore, maintaining speed stability in the cutting zone becomes an independent task of the drive control system [4]. At the same time, the load imposed on the electric drive is determined not only by the dimensions of the rolled product, but also by a combination of technological factors, including the height of the fracture zone, the length of the cutting line, the critical shear stress of the material, its temperature state, and the cutting angle, since an increase in the cutting angle increases the effective fracture length and, consequently, the required cutting force. Therefore, any change in rolling and cutting conditions is directly transformed into a change in the required torque and motor current of the flying shear drive [5].

It has also been established that the interaction between the electric drive and the elastic multi-mass mechanical system of rotary crop shears causes significant speed oscillations during cutting, operation of the drive under the maximum permissible current for a substantial portion of the cycle, and an increase in the duration of transient processes. This adversely affects cutting quality and increases the requirements for the overload capacity of the motor, the dynamic response of the control loops, and the effectiveness of torque compensation algorithms. One recent study has shown that reducing the amplitude of speed oscillations directly improves the damping of mechanical vibrations and shortens the post-cut transient process [5].

Therefore, when investigating the electric drives of flying shears, the force and power parameters of the cutting process should be regarded as a key input set of parameters for calculating peak currents, assessing overload operating conditions, selecting motor power, and tuning the control system aimed at stabilizing speed and torque during the most heavily loaded phase of the technological cycle. This is consistent with studies in which the application of more accurate torque control in highly dynamic flying shear systems is considered as a means of improving cutting accuracy and reducing current-related emergency shutdowns [4, 6].

Given that the force and power parameters of the flying shear cutting process directly determine the level and nature of electric drive loading, their reliable determination becomes an important computational and analytical task. One of the effective approaches for determining the force and power parameters of cutting is the finite element method, since it makes it possible to investigate the process under conditions that are as close as possible to the actual interaction scheme between the knives and the rolled product. This is particularly important for flying shears, where cutting proceeds under conditions of highly localized plastic deformation and fracture, short-term contact interaction, variable tool kinematics, and pronounced nonlinearity of the stress–strain state. Under such conditions, direct experimental determination of stress, strain, and contact load distributions in the cutting zone is difficult, whereas three-dimensional finite element modeling makes it possible to trace the evolution of the process over time, including the stages of elastic indentation, plastic flow, crack initiation, and final separation of the metal [7, 8].

In this regard, one of the effective tools for the finite element determination of the force and power parameters of the cutting process is the DEFORM-3D software package, which implements the finite element method and enables the simulation of three-dimensional metal processing operations under conditions of large deformation, thermomechanical interaction, and complex contact relationships [9].

The present study considers the finite element determination of the force and power parameters of the cutting process in the DEFORM-3D software environment for the rotary crop shears of the 1700 hot rolling mill at QARMET JSC (Figure 1), which are intended for cropping the head and tail ends of the strip before it enters the finishing stand.

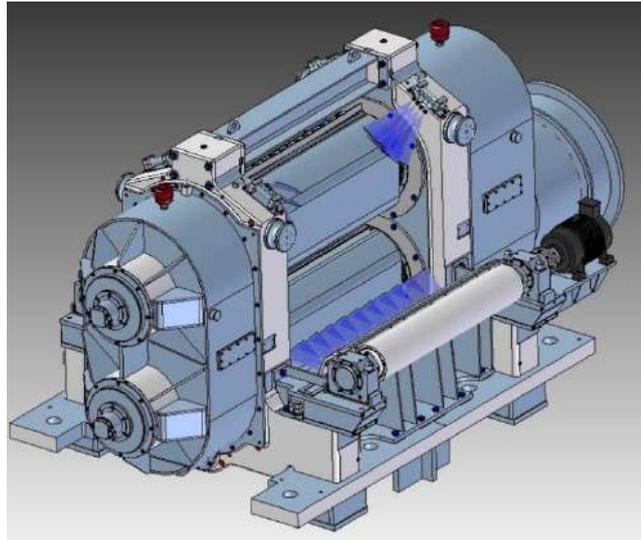


Figure 1 — Rotary crop shears of the 1700 hot rolling mill at QARMET JSC

Particular attention was paid to the cutting process with different knife speeds, in which, during the working rotation of the drums, the inter-knife gap changes sequentially according to the “minus – zero – plus” pattern, thereby ensuring complete metal separation (Figure 2). Taking this kinematic feature into account in finite element modeling makes it possible to determine the time-dependent cutting force, torque, and power, which are required for the subsequent assessment of the loading imposed on the shear electric drives.

	Knife radius	Cutting process			Sheared profile
Differential speed cutting crop shears	 $R_u > R_L$	Knife clearance: $g$ $g < 0$	$g = 0$	$g > 0$	
		1	2	3	
Conventional crop shears	 $R_u = R_L$	$g = 0$	$g > 0$	$g \gg 0$	

Figure 2 — Kinematic schemes of the cutting process

The preparation of the computational model and the numerical simulation of the cutting process were carried out in several stages. The geometric models of the shears and the workpiece were developed in the KOMPAS-3D computer-aided design system (Figure 3) in accordance with the technical documentation of the equipment, after which they were imported into the DEFORM-3D software package for subsequent finite element analysis.

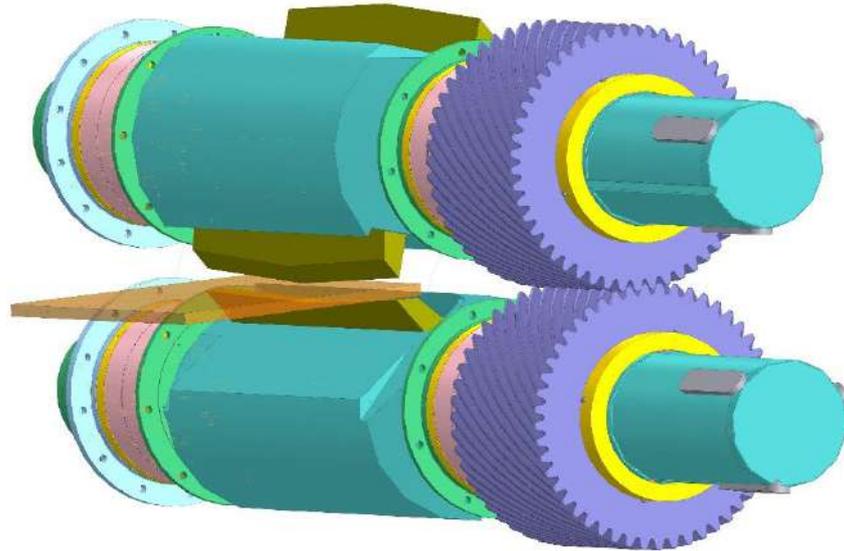


Figure 3 — Geometric model

When formulating the problem, assumptions similar to those adopted in a previously published finite element modeling framework were introduced [10]: the tool was treated as an absolutely rigid body with a constant surface temperature, the workpiece material was considered a homogeneous isotropic medium, and deformation was described within a viscoplastic formulation; the contact interaction was defined using the Siebel friction law.

In the computational model, the workpiece material was specified as AISI 1015 steel. The initial workpiece temperature was set to 900 °C. The contact between the tool and the workpiece was described by the Siebel friction law with a friction coefficient of 0.7. For the drums, angular velocities corresponding to a rotational speed of 46.25 rpm were prescribed, which ensured the reproduction of the required kinematic conditions of the process.

The computational domain was discretized using a finite element mesh comprising 313,578 elements. The numerical simulation was performed in 300 calculation steps with a time increment of 0.001 s. Thus, the total simulated duration was 0.300 s, which was sufficient to reproduce the complete cutting process and to obtain the time-dependent relationships of the investigated force and power parameters (Figure 4).

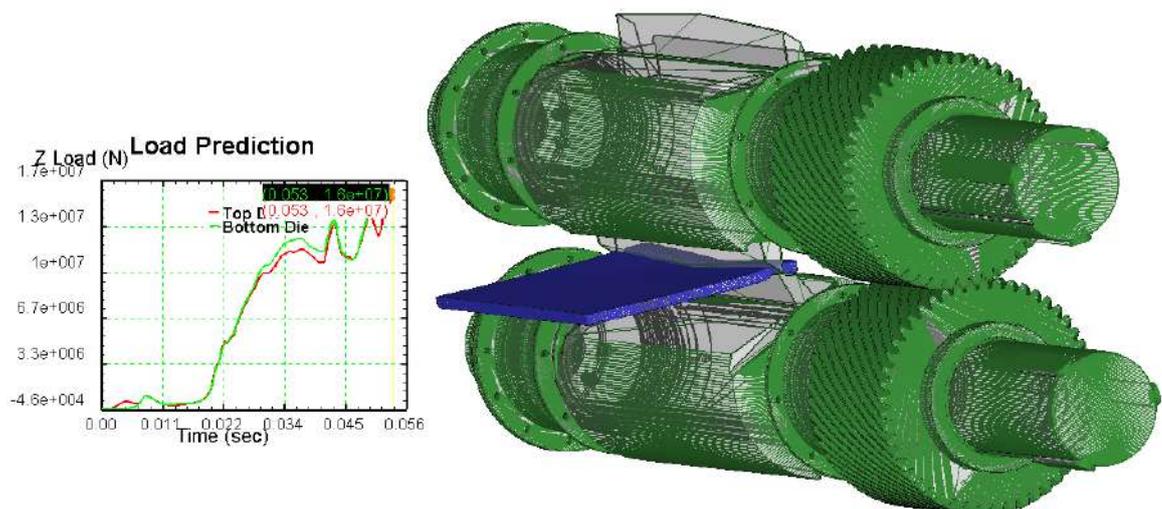


Figure 4 — Simulation of the cutting process

According to the results of the finite element simulation, the cutting process exhibits a distinctly non-stationary character and is accompanied by abrupt variations in the force and power parameters over time. In the plots of the vertical cutting force (Z) (Figure 5), torque (T) (Figure 6), and power (P) (Figure 7), the “Top die” curve corresponds to the knife of the lower drum with the smaller diameter, whereas the “Bottom die” curve corresponds to the knife of the upper drum with the larger diameter. At the same time, the upper knife has a convex profile, while the lower knife has a concave profile. As a result, during the mutual penetration of the knives and the deformation of the metal, the actual contact surface area, as well as the position of the resultant contact force, differs for each knife at specific moments in time. This leads to similar values of the vertical cutting force, while a pronounced difference is observed in torque and power.

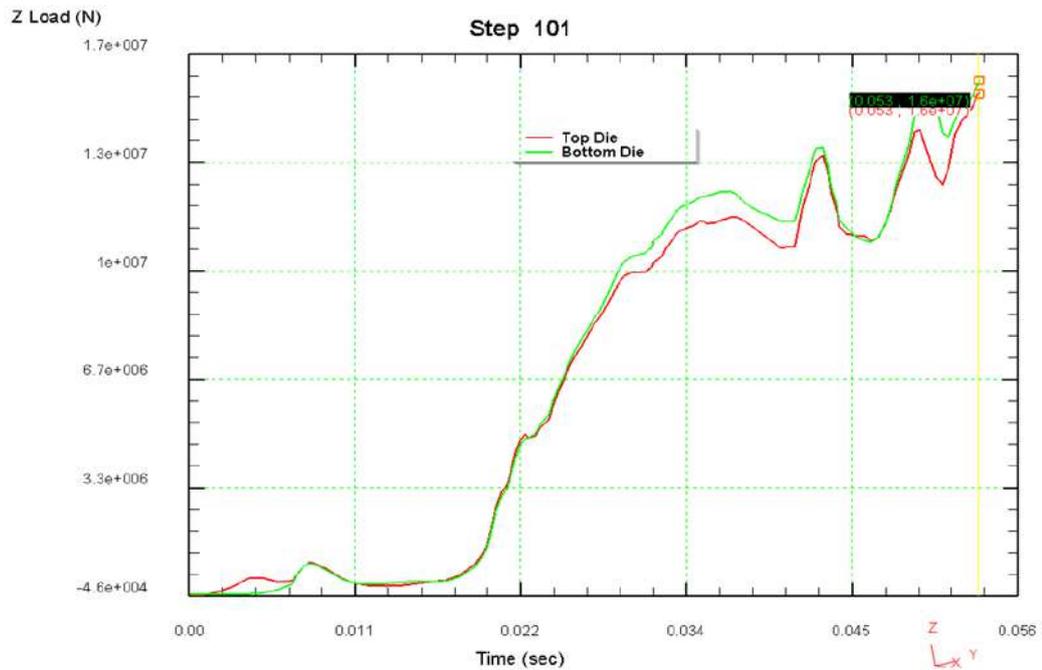


Figure 5 — Vertical cutting force (Z) versus time

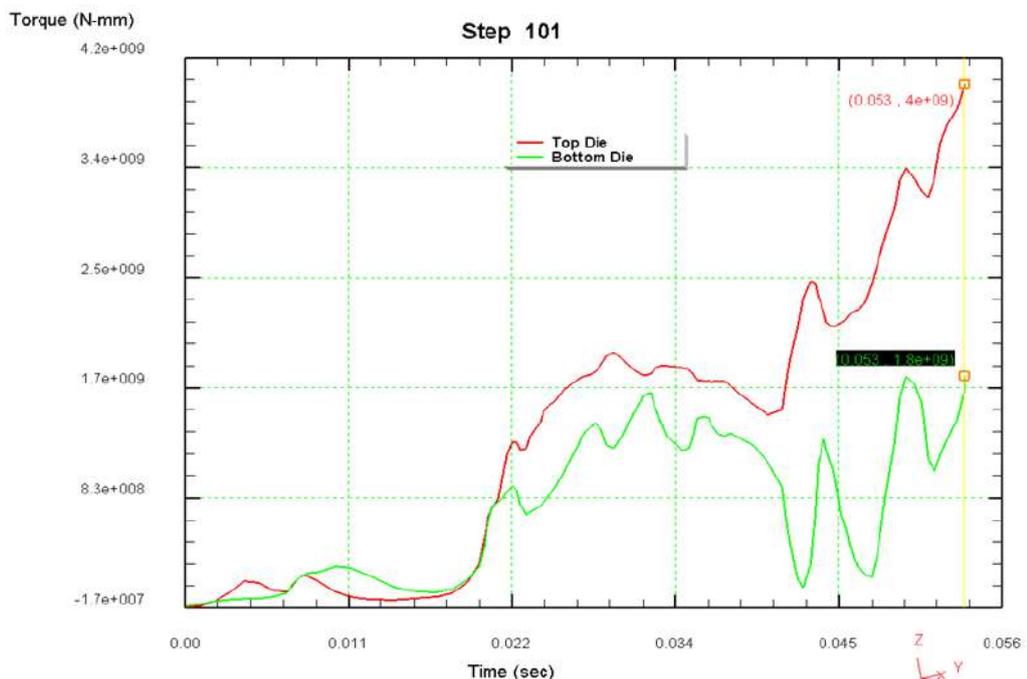


Figure 6 — Torque (T) versus time

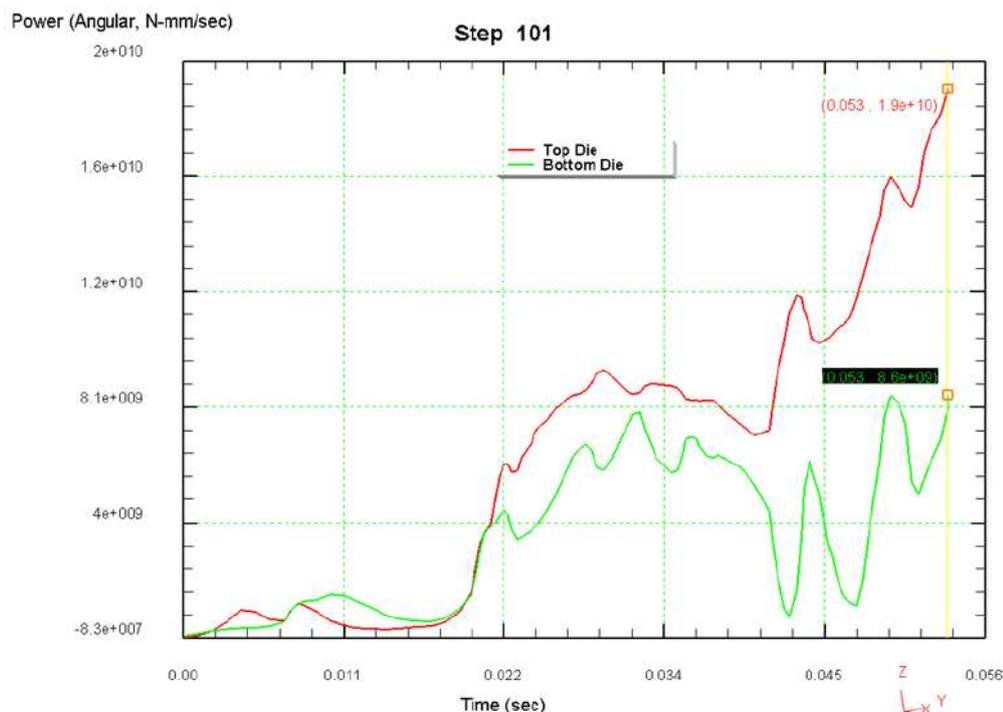


Figure 7 — Power (P) versus time

Analysis of the Z relationship (Figure 5) shows that up to approximately 0.018–0.020 s, the vertical cutting force remains insignificant, which corresponds to the stage of tool approach and initial contact. This is followed by a sharp increase in the load associated with the active penetration of the knives into the metal and the development of plastic deformation. Within the interval of 0.022–0.035 s, the force reaches a level of approximately  $(0.9–1.2) \cdot 10^7$  N, and by the end of the considered segment it increases to maximum values of about  $1.5 \cdot 10^7$  N for the knife of the lower drum and  $1.6 \cdot 10^7$  N for the knife of the upper drum. The closeness of these values indicates that the vertical component of the cutting force is, in general, borne by both drums in a comparable manner, while its variation is mainly governed by the resistance of the metal to plastic shear and fracture.

At the same time, the T relationship (Figure 6) reveals a substantially more non-uniform distribution of torque between the drums. After the onset of the active cutting phase, beginning at approximately 0.020–0.022 s, the torque acting on the knife of the lower drum increases more intensively and, throughout the main part of the process, exceeds that acting on the knife of the upper drum. In the final stage of cutting, the maximum value for the knife of the lower drum reaches approximately  $4.0 \cdot 10^9$  N·mm, whereas for the knife of the upper drum it is about  $1.8 \cdot 10^9$  N·mm. Thus, despite the comparable level of vertical cutting force, the torque on the lower drum is more than twice as high. This result is explained by the difference in knife geometry and the resulting asymmetry of the contact interaction: as the contact area and the position of the line of action of the resultant force change, both the load application arm and the ratio of its normal and tangential components vary, which directly affects the magnitude of the torque.

A similar pattern is observed in the P relationship (Figure 7), since at a given angular velocity of drum rotation, the power is determined by the magnitude of the generated torque. During the active phase of the process, the power associated with the knife of the lower drum increases more rapidly and reaches a maximum value of approximately  $1.9 \cdot 10^{10}$  N·mm/s, whereas for the knife of the upper drum the peak value is about  $8.6 \cdot 10^9$  N·mm/s. Consequently, at the most heavily loaded moment of the process, the energy load on the lower drum is also significantly higher. This leads to the conclusion that, in drive system calculations, the final stage of cutting is the governing one, since it is during this stage that the peak values of torque and power are formed.

It should also be noted that the T and P relationships exhibit an oscillatory character, which is especially pronounced for the knife of the upper drum in the interval of approximately 0.040–0.050 s. These oscillations are associated with the redistribution of contact pressures, changes in the length of the contact line, and the transition of the process from the stage of predominantly plastic indentation to the stage of intense shear fracture of the metal. The non-stationary nature of the loads in this region indicates the variable character of drum loading and confirms the need to account for the time-dependent dynamics of the force and power parameters when analyzing electric drive operation.

In general, the simulation results show that the vertical cutting force varies in a similar manner for both knives, whereas the torque and power are distributed unevenly between the drums. The knife of the lower drum with the smaller diameter is the most heavily loaded in terms of torque and power. Therefore, in the design and verification calculations of the electric drive of rotary crop shears, it is advisable to consider not only the maximum cutting force, but also the peak values of torque and power obtained for the most heavily loaded drum during the final stage of the process.

The obtained results confirm that, in the analysis and design of the electric drive of rotary crop shears, it is insufficient to focus solely on the cutting force. For a correct assessment of drive loading, it is necessary to take into account the entire set of force and power parameters of the process, primarily the time-dependent torque and power relationships, since these most fully reflect the actual operating conditions of the motor. Such an approach makes it possible to improve the reliability of calculations, to justify the selection of drive parameters, and to establish more accurate requirements for the control system.

Thus, the finite element determination of the force and power parameters of the cutting process is an effective tool for investigating the loading of electric drives in metallurgical equipment and may serve as a computational basis for the subsequent optimization of the structural and operating parameters of rotary crop shears.

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## ЦИФРЛАНДЫРУ ЖАҒДАЙЫНДА КӘСПОРЫН АУДИТІН ҰЙЫМДАСТЫРУДЫ ЖАСАНДЫ ИНТЕЛЛЕКТ ЖҮЙЕСІМЕН ЖЕТІЛДІРУ

**ЗАУРБЕКОВА ЛЯЗЗАТ ЕДИГЕЕВНА**

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**Андатпа:** Қазақстан экономикасы дамып келе жатқан жағдайда кәсіпорындардың қаржылық тұрақтылығын қамтамасыз ету және шынайы есептілікті ұсыну өзекті мәселелердің бірі болып отыр. Цифрландыру жағдайында кәсіпорын аудитін ұйымдастыруды жасанды интеллект (ЖИ) жүйелері арқылы жетілдіру – аудиттің сапасын арттыруға, тәуекелдерді дәл анықтауға және уақытты үнемдеуге мүмкіндік береді. Қаржылық ақпараттың бұрмалануы инвесторлар мен серіктестердің сенімін төмендетіп, нарықтағы беделге кері әсерін тигізеді. Сондықтан аудитті тиімді ұйымдастыру кәсіпорынның ашықтығын арттырып, ішкі және сыртқы мүдделі тараптардың сенімін нығайтады. Аудит тек бақылау құралы ғана емес, сонымен қатар кәсіпорынның стратегиялық даму бағыттарын бағалау мен экономикалық шешімдерді оңтайландырудың маңызды факторы болып табылады.

**Түйінді сөздер:** стратегиялық жоспарлау, критерий, қаржылық ақпарат, бұрмалану, мүдделі, факторы, инициативті, объектив, нормативтік актілер, инвесторлар, серіктестер, цифрландыру, жасанды интеллект.

**Аннотация:** В условиях развития экономики Казахстана обеспечение финансовой устойчивости предприятий и представление достоверной отчетности является одним из актуальных вопросов. Совершенствование организации аудита предприятия в условиях цифровизации посредством систем искусственного интеллекта (ИИ) - позволит повысить качество аудита, точно выявить риски и сэкономить время. Искажение финансовой информации подрывает доверие инвесторов и партнеров и негативно сказывается на репутации на рынке. Поэтому эффективная организация аудита повышает прозрачность предприятия и укрепляет доверие как внутренних, так и внешних заинтересованных сторон. Аудит является не только инструментом контроля, но и важным фактором оценки стратегических направлений развития предприятия и оптимизации экономических решений.

**Ключевые слова:** стратегическое планирование, критерий, финансовая информация, искажение, заинтересованность, фактор, инициативность, объективность, нормативные акты, инвесторы, партнеры, цифровизация, искусственный интеллект.

Қазіргі таңда аудит дәстүрлі құжаттық тексеруден деректерге негізделген, автоматтандырылған модельге көшуде. Машиналық оқыту модельдері өткен жылдардағы деректерді талдау арқылы болашақтағы ықтимал қателіктерді болжай алады. Цифрландыру жағдайында кәсіпорын аудитін жасанды интеллект арқылы жетілдіру – аудит қызметінің жаңа сапалық деңгейге көтерілуін қамтамасыз етеді. ЖИ аудитті тек тексеру құралы емес, басқарушылық шешім қабылдауға ықпал ететін стратегиялық құралға айналдырады.

Кәсіпорындардың қаржылық тұрақтылығын қамтамасыз ету және шынайы есептілікті ұсыну өзекті мәселелердің бірі болып отыр. Қаржылық ақпараттың бұрмалануы инвесторлар мен серіктестердің сенімін төмендетіп, нарықтағы беделге кері әсерін тигізеді. Сондықтан аудитті тиімді ұйымдастыру кәсіпорынның ашықтығын арттырып, ішкі және сыртқы мүдделі тараптардың сенімін нығайтады. Аудит тек бақылау құралы ғана емес, сонымен қатар кәсіпорынның стратегиялық даму бағыттарын бағалау мен экономикалық шешімдерді оңтайландырудың маңызды факторы болып табылады.

Кәсіпорындардың тиімді қызмет атқаруы мен олардың қаржылық тұрақтылығын қамтамасыз ету маңызды міндеттердің бірі болып табылады. Нарықтық қатынастардың дамуы, бәсекелестіктің күшеюі және жаһандану үдерістері кәсіпорын қызметінің ашықтығын, есептіліктің шынайылығын және басқару шешімдерінің негізділігін талап етеді. Осындай жағдайда аудит жүйесінің маңызы арта түсуде, өйткені ол кәсіпорын қызметінің заңдылыққа, есеп және қаржылық стандарттарға сәйкестігін тексеріп, сенімді ақпарат ұсынуға бағытталған.

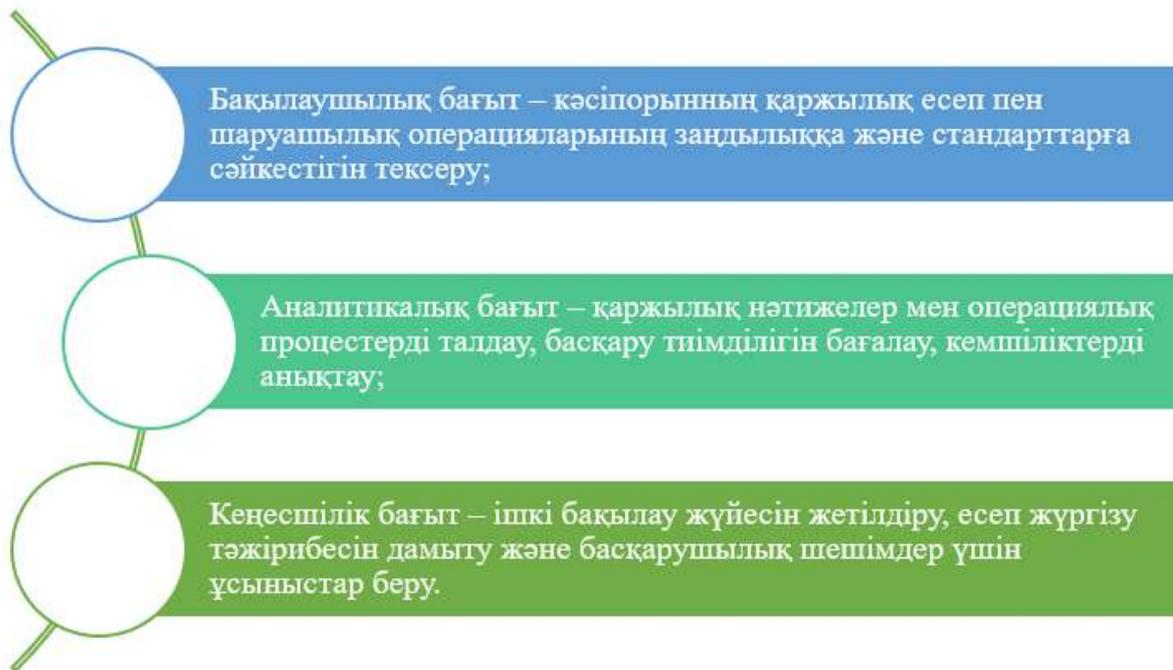
Аудит ұйымның басқару жүйесінде маңызды бақылау тетігі ретінде қарастырылады. Ол кәсіпорынның қаржылық есебінің дұрыстығын анықтап қана қоймай, басқарушылық шешімдердің тиімділігін арттыруға, тәуекелдерді төмендетуге және ішкі бақылау жүйесін жетілдіруге мүмкіндік береді. Аудит нәтижелері инвесторлар мен серіктестер үшін де шешім қабылдау барысында негізгі ақпарат көзі болып табылады.

Кәсіпорындарда аудитті ұйымдастырудың теориялық және тәжірибелік негіздерін зерттеу, сондай-ақ оның тиімділігін арттыру жолдарын айқындау.

Кәсіпорынның қаржылық есептілігін, бухгалтерлік құжаттарын және шаруашылық операцияларын тәуелсіз тексеру арқылы олардың заңдылыққа, нормативтік талаптарға және есеп стандарттарына сәйкестігін бағалау процесі. Қазіргі түсінікте аудит – кәсіпорынның қаржылық және операциялық қызметін кәсіби әдістер арқылы тексеру, бағалау және тұжырым жасау болып саналады.

Кәсіпорынның қаржылық жағдайын нақты бағалау, басқару шешімдерін қабылдау үшін объективті және дәл ақпарат ұсыну. Аудит тек қаржылық есептіліктің дұрыстығын растаумен шектелмей, ішкі бақылау жүйесінің тиімділігін талдау, ресурстарды дұрыс пайдалану және тәуекелдерді басқару мәселелеріне де ықпал етеді.

Аудит келесі негізгі бағыттарда жүргізіледі: (Сурет 1).



Сурет 1. Аудиттің негізгі бағыттары

Осы бағыттар аудиттің нақты мақсатын іске асыруға мүмкіндік береді. Аудиттің негізгі мақсаттары:

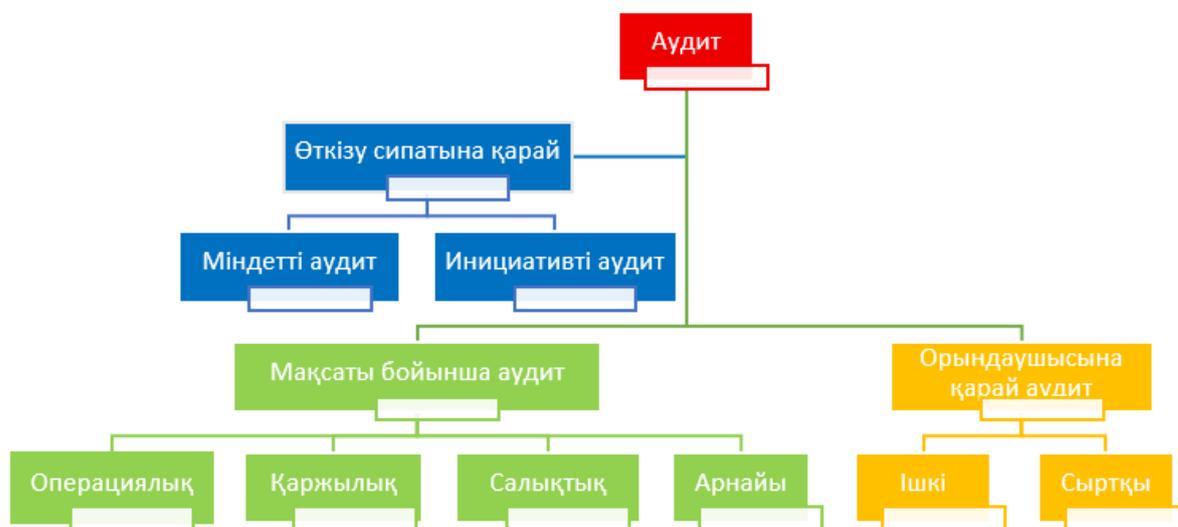
- кәсіпорынның қаржылық есептілігін, бухгалтерлік есеп пен операцияларын тексеру арқылы олардың дұрыстығы мен толықтығын анықтау;
- бухгалтерлік есеп пен есеп саясатының заңнама мен кәсіби стандарттарға сәйкестігін бағалау;
- есепте қателер мен бұрмалауларды табу және олардың себептерін анықтау;

– ішкі бақылау жүйесінің әлсіз тұстарын анықтау және оны жетілдіру жөнінде ұсынымдар жасау;

– аудит нәтижелері негізінде басқару шешімдерін қабылдауға нақты ақпарат беру.

Кәсіпорын қызметінің тиімділігін арттыру, қаржылық тәртіпті сақтау, тәуекелдерді азайту және басқарушылық шешімдердің негізділігін қамтамасыз ету. Ол кәсіпорынның ішкі бақылау жүйесін жетілдіру мен экономикалық тұрақтылыққа қол жеткізудің маңызды құралы болып табылады.

Аудит түрлері түрлі критерий бойынша жіктеледі (Сурет 2).



Сурет 2. Аудит түрлерінің жіктелуі

Аудит түрлері әртүрлі критерий бойынша жіктеледі. Өткізу сипатына қарай аудит міндетті және инициативті болып бөлінеді. Міндетті аудит заңмен белгіленген компаниялар үшін жүргізіледі. Мысалы, бұл аудит акционерлік қоғамдарда, мемлекеттік кәсіпорындарда, сақтандыру ұйымдарында және жинақтық зейнетақы қорларында міндетті түрде өткізіледі. Ал инициативті аудит компанияның өз бастамасымен жүргізіледі. Оның мақсаты – қаржылық тиімділікті бағалау, инвестицияларды тарту, менеджменттің сапасын тексеру немесе бухгалтерлік есепті алдын ала тексеру сияқты мәселелерді шешу болып табылады.

Аудит мақсаттарына қарай қаржылық, операциялық, салықтық және арнайы болып жіктеледі. Қаржылық аудит бухгалтерлік есеп пен қаржылық есептіліктің дұрыстығын тексереді, ал операциялық аудит кәсіпорынның бизнес-процестерінің тиімділігін, ресурстарды пайдалану сапасын және басқару жүйесінің жұмысын бағалауға бағытталады. Салықтық аудит салық есептілігінің заңнамаға сәйкестігін тексеріп, салықтық тәуекелдерді анықтайды және клиентті заң бұзушылықтардан қорғайды. Арнайы аудит бюджет қаражаты немесе экологиялық талаптарды пайдалану сияқты нақты бағыттар бойынша жүргізіледі.

Қазақстандағы аудит қызметі кәсіпорындардың ішкі бақылауын жетілдіру, қаржылық есептілікті тексеру және басқарушылық шешімдерді қолдау саласында маңызды рөл атқарады. «Аудиторлық қызмет туралы» Заңға қосымша ретінде Қаржы министрлігінің нормативтік актілері мен кәсіби стандарттар аудит процесін нақтылайды. Бұл құқықтық құжаттар аудиторларға тексеру жүргізу тәртібін, есеп жүргізудің сапасын және есептік ақпараттың сенімділігін қамтамасыз етуді реттейді. Сонымен қатар, нормативтік база кәсіпорындарға тәуелсіз аудит жүргізу мүмкіндігін береді және басқару шешімдеріне сенімді ақпарат ұсынуды қамтамасыз етеді. Осы негіздер кәсіпорындардың қаржылық тәртібі мен ашықтығын арттыруда маңызды рөл атқарады.

Қазақстандағы аудиттің дамуы тәуелсіздік алғаннан кейінгі кезеңде кәсіпорындардың қаржылық есебінің ашықтығын қамтамасыз ету, экономикалық тәртіпті күшейту, қаржылық

тәуекелдерді азайту және басқару шешімдерінің негізділігін арттыруға бағытталған. Аудиттің заңнамалық және нормативтік реттелуі кәсіпорындарға қаржылық есеп жүргізуді жетілдіру, тәуекелдерді басқару және есептің сапасын қамтамасыз етуге мүмкіндік береді.

Кәсіпорындағы аудиттің тиімділігі оның нақты ұйымдастыру құрылымына тікелей байланысты. Ірі кәсіпорындарда аудит қызметі тәуелсіз бөлім ретінде құрылып, басқарушы директор немесе қаржы директоры алдында есеп береді. Мұндай бөлімнің негізгі міндеті – қаржылық есептілікті тексеру, ішкі бақылау жүйесін бағалау және басқару шешімдерін қолдау. Мысалы, Қазақстандағы «ҚазМұнайГаз» ҰК АҚ-да ішкі аудит бөлімі жеке департамент ретінде жұмыс істейді және жыл сайын барлық филиалдардың қаржылық есептерін тексеруді жүзеге асырады. Бұл құрылым аудит қызметінің тәуелсіздігін сақтауға және тексеру нәтижелерінің объективті болуына мүмкіндік береді. Сонымен қатар, әр филиал бойынша аудит жоспарлары алдын ала бекітіліп, нақты тексеру мерзімдері мен жауапты қызметкерлер белгіленеді.

Кіші және орта кәсіпорындарда аудит қызметі бухгалтерия бөлімінің құрамында немесе сыртқы аудиторлық ұйым арқылы жүзеге асырылады. Мұндай жағдайда аудит қызметі тәуелсіз бөлім емес, бухгалтерлік есеппен тығыз байланыста жұмыс істейді, бірақ оның міндеттері айқын бөлінуі керек. Мысалы, компанияда ішкі аудит функциялары бухгалтерия бөлімінің құрамында жүзеге асырылып, әр ай сайын есептік деректер салыстырылады. Аудиторлық тексеру барысында бухгалтерлік есеп деректері және операциялық құжаттар қаралады, кемшіліктер анықталады және басқаруға ұсыныстар енгізіледі. Бұл тәжірибе аудиттің кәсіби стандарттарға сәйкес жүргізілуін қамтамасыз етеді және басқару шешімдерінің негізділігін арттырады.

Кәсіпорындағы аудит құрылымы бірнеше деңгейден тұрады және әр деңгейдің өз міндеттері мен рөлі бар.

Басқарушы деңгей кәсіпорындағы аудиттің стратегиялық негізін қалыптастырады. Бұл деңгейде аудит саясаты анықталып, тексеру жоспарлары бекітіледі және негізгі бақылау механизмдері белгіленеді. Басқарушы деңгейде кәсіпорынның мақсаттары мен стратегиясына сәйкес аудиттің негізгі бағыттары айқындалады, сонымен қатар аудит топтарының жұмыс жоспары жасалады. Бұл деңгей аудиттің әдістемелік базасын құруға жауапты және тексеру процесінде қолданылатын стандарттар мен процедураларды анықтайды. Сонымен қатар, басқарушы деңгей аудит қорытындыларының сапасын бақылауды жүзеге асырады және қорытынды есептердің нақты және объективті болуын қамтамасыз етеді. Басқарушы деңгейдің дұрыс ұйымдастырылуы кәсіпорынның барлық бөлімдерінде біртұтас аудит саясатын жүзеге асыруға мүмкіндік береді.

Атқарушы деңгейде нақты аудит тексерулері жүргізіледі. Бұл деңгейде аудиторлар қаржылық есеп пен операциялық деректерді салыстырады, есепте қателер мен бұрмалауларды анықтайды және кемшіліктерді талдайды. Атқарушы деңгейде аудит қорытындылары жазбаша түрде рәсімделіп, басқарушы деңгейге ұсынылады. Сонымен қатар, атқарушы деңгей аудиттің кәсіби стандарттарға сәйкестігін қамтамасыз етеді және барлық тексеру кезеңдерін жүйелі жүргізуге жауап береді. Мұнда тексеру процесінің барлық кезеңі толық бақыланады, бұл кәсіпорын қызметінің ашықтығын қамтамасыз етеді. Атқарушы деңгейдің ұйымдастырылуы аудиттің нақты, толық және сапалы жүргізілуіне бағытталған.

Қолдау қызметтері деңгейі аудит процесін ұйымдастыруға қажетті барлық ресурстар мен материалдарды қамтамасыз етеді. Бұл деңгей құжаттама, ақпараттық жүйелер, есепке алу жүйелері және әдістемелік құралдармен қамтамасыз етуге жауапты. Қолдау қызметтері аудит топтарына тексеру жүргізуге қажетті ақпаратты жинау, өңдеу және рәсімдеу жұмыстарын орындайды. Сонымен қатар, бұл деңгей аудит процесінің әдістемелік дұрыстығын бақылап, аудиттің кәсіби стандарттарға сәйкестігін қамтамасыз етеді. Қолдау қызметтері деңгейі аудиттің барлық кезеңдерін жүйелі және сапалы өткізуге мүмкіндік береді. Бұл деңгейдің дұрыс ұйымдастырылуы аудиттің сенімділігін арттырып, кәсіпорын қызметінің ашықтығын қамтамасыз етеді.

Практикалық тұрғыда, Қазақстандағы ірі кәсіпорындарда бұл құрылым нақты қолданысқа енгізілген. Мысалы, “ҚазМұнайГаз” ҰК АҚ, Қазақстан Темір Жолы” ҰК АҚ және “Kaspi Bank” АҚ сияқты компанияларда аудит үш деңгейлі жүйе бойынша ұйымдастырылған: басқарушы деңгей аудит саясатын бекітсе, атқарушы деңгей нақты тексерулерді жүргізеді, ал қолдау қызметтері барлық қажетті ақпараттық және әдістемелік қамтамасыз етуді ұсынады. Бұл құрылым аудит процесін тиімді, сенімді және кәсіби жүргізуге мүмкіндік береді. Сонымен қатар, барлық деңгейлердің өзара байланысы аудиттің толық және жүйелі жүргізілуін қамтамасыз етеді, кемшіліктерді дер кезінде анықтауға және оларды жою бойынша ұсыныстар жасауға жол ашады(Сурет 2).



Сурет 2. Аудит деңгейлерінің кәсіпорындарда қолданылуы

Кәсіпорындағы аудиттің ұйымдастыру құрылымы нақты, көпдеңгейлі және тәуелсіз болуы тиіс. Ол тек теориялық тұрғыдан емес, нақты өндірістік тәжірибеде де тиімділігін көрсетеді. Қызметкерлердің нақты міндеттері, әдістемелік және ақпараттық қамтамасыз ету, сондай-ақ басқарушы деңгейдің стратегиялық бақылауы кәсіпорынның қаржылық есептілігін толық және сапалы тексеруге мүмкіндік береді.

Кәсіпорында аудит жүйелі және мақсатқа бағытталған түрде жүргізілуі үшін бірнеше кезеңнен тұрады. Әр кезеңнің өз міндеттері, әдістемелік принциптері және нәтижелерін рәсімдеу тәртібі бар. Аудит процесі дайындық, негізгі тексеру және қорытындылау кезеңдерін қамтиды, сонымен қатар әр кезеңде әдістемелік қамтамасыз ету маңызды рөл атқарады. Дайындық кезеңінде аудиттің мақсаттары анықталып, тексеру жоспары жасалады. Негізгі тексеру кезеңінде нақты деректер зерттеліп, сәйкессіздіктер мен қателер анықталады. Қорытындылау кезеңінде алынған ақпарат жүйеленіп, қорытынды есеп дайындалады және басқарушы органға ұсыныстар беріледі. Әдістемелік аспектілер әр кезеңде аудиттің кәсіби стандарттарға сәйкес жүргізілуін қамтамасыз етеді және тексеру нәтижелерінің сенімділігін арттырады.

Қорыта келе жасанды интеллект жағдайда кәсіпорындардың қаржылық тұрақтылығы мен тиімді қызметі маңызды міндет болып табылады. Нарықтық қатынастардың дамуы және бәсекелестіктің күшеюі кәсіпорын қызметінің ашықтығын, есептіліктің шынайылығын және басқарушылық шешімдердің негізділігін талап етеді. Осы тұрғыдан аудит жүйесінің рөлі арта түседі, себебі ол кәсіпорынның қаржылық есептілігінің дұрыстығын тексеріп, сенімді ақпарат ұсынады.

Кәсіпорындарда аудиттің тәуелсіз, көпдеңгейлі құрылымын сақтау, әр кезеңде әдістемелік қамтамасыз етуді қамтамасыз ету, дәлелдемелерді жинау мен талдау тәсілдерін жетілдіру ұсынылады. Сонымен қатар қорытынды есеп тексеру нәтижелерін басқару шешімдеріне енгізіп, ішкі бақылау жүйесін нығайтуға бағытталуы қажет.

Жұмыстың нәтижелері аудиттің кәсіпорынның ашықтығын, қаржылық тұрақтылығын және басқару шешімдерінің сапасын арттырудағы рөлін көрсетті. Қойылған міндеттер толық шешілді, ал ұсыныстарды жүзеге асыру кәсіпорындардың қаржылық есептілігінің сенімділігін күшейтіп, ішкі және сыртқы мүдделі тараптардың сенімін нығайтуға мүмкіндік береді.

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## RƏQƏMSAL İQTİSADİYYATIN TƏNZİMLƏNMƏSİ SAHƏSİNDƏ İQTİSADI VƏ HÜQUQİ İDARƏETMƏ MEXANİZMLƏRİNİN TƏKMİLLƏŞDİRİLMƏSİ

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***Annotasiya.** Məqalədə rəqəmsal iqtisadiyyatın sürətli inkişafı fonunda iqtisadi və hüquqi tənzimləmə mexanizmlərinin yenilənməsi və institusional modernləşməsinin zəruriliyi araşdırılır. Rəqəmsal platformalar, süni intellekt, data əsaslı biznes modelləri və alqoritmik qərarvermə iqtisadi sistemə yeni imkanlarla yanaşı, rəqəmsal bərabərsizlik, kiber-risklər, vergi bazasının eroziyası və rəqabət mühitinin pozulması kimi çağırışlar gətirir. Tədqiqat beynəlxalq təcrübə fonunda Azərbaycanın normativ-hüquqi çərçivəsini təhlil edir və rəqəmsal iqtisadiyyatın tənzimlənməsi üçün zəruri olan institusional koordinasiya, rəqabət siyasətinin yenilənməsi, data idarəçiliyi, sandbox-lar, innovasiya dəstəyi və rəqəmsal hüquqların qorunması kimi istiqamətləri müəyyənləşdirir.*

***Açar sözlər:** rəqəmsal iqtisadiyyat, hüquqi tənzimləmə, iqtisadi idarəetmə, rəqabət siyasəti, data idarəçiliyi, süni intellekt, rəqəmsal transformasiya.*

## IMPROVING ECONOMIC AND LEGAL MANAGEMENT MECHANISMS IN THE FIELD OF REGULATING THE DIGITAL ECONOMY

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***Annotation.** The article examines the need for updating and institutional modernization of economic and legal regulatory mechanisms against the backdrop of the rapid development of the digital economy. Digital platforms, artificial intelligence, data-based business models and algorithmic decision-making bring new opportunities to the economic system, as well as challenges such as digital inequality, cyber-risks, erosion of the tax base and distortion of the competitive environment. The study analyzes the regulatory and legal framework of Azerbaijan against the background of international experience and identifies areas such as institutional coordination, competition policy renewal, data governance, sandboxes, innovation support, and digital rights protection necessary for regulating the digital economy.*

***Keywords:** digital economy, legal regulation, economic governance, competition policy, data governance, artificial intelligence, digital transformation.*

### Giriş

Rəqəmsal iqtisadiyyat istehsal, ticarət, maliyyə, xidmətlər və dövlət idarəçiliyi də daxil olmaqla, iqtisadi həyatın bütün sferalarını dəyişdirir. İnformasiya-kommunikasiya texnologiyalarının

və rəqəmsal platformaların sürətli inkişafı bir tərəfdən səmərəliliyi, innovasiyanı və rəqabətqabiliyyətliliyi artırır, digər tərəfdən isə bazar gücünün cəmlənməsi, şəxsi məlumatların sui-istifadəsi, rəqəmsal bərabərsizlik, vergi bazasının aşınması, kiber-risklər kimi yeni çağırışlar yaradır. Bu şəraitdə tənzimləmə yalnız məhdudlaşdırıcı nəzarət deyil, həm də inkişafı stimullaşdıran, innovasiyanı təşviq edən, ictimai maraqları qoruyan balanslaşdırılmış iqtisadi və hüquqi idarəetmə mexanizmlərini tələb edir.

Azərbaycan 2030 - sosial-iqtisadi inkişafa dair Milli Prioritetlər sənədində rəqəmsal iqtisadiyyatın inkişafı ölkənin əsas strateji istiqamətlərindən biri kimi müəyyən edilmiş, rəqəmsal transformasiyanın iqtisadi artım, səmərəlilik və inklüziv rifah üçün əsas alət olduğu vurğulanmışdır.[1] Növbəti proqram və sərəncamlarda rəqəmsal transformasiya üzrə idarəetmə və nəzarət mexanizmlərinin təkmilləşdirilməsi xüsusi hədəf kimi formalaşdırılmışdır. [2]

Bu məqalənin məqsədi rəqəmsal iqtisadiyyatın tənzimlənməsi sahəsində iqtisadi və hüquqi idarəetmə mexanizmlərinin mahiyyətini açıqlamaq, beynəlxalq təcrübə fonunda Azərbaycan üçün mövcud institusional çərçivəni təhlil etmək və bu mexanizmlərin təkmilləşdirilməsi istiqamətləri üzrə konseptual təkliflər irəli sürməkdir.

Rəqəmsal iqtisadiyyat ənənəvi sektorların “rəqəmsallaşması” ilə məhdudlaşmış; o, platforma biznes modellərinə, məlumatın (data) əsas resursa çevrilməsinə, süni intellekt və alqoritmik qərarverməyə əsaslanan yeni bir istehsal və mübadilə məkanıdır. OECD-nin Digital Economy Outlook hesabatlarında rəqəmsal transformasiyanın həm innovasiya və məhsuldarlıq artımı, həm də rəqəmsal infrastrukturun keyfiyyəti, bacarıqlar, məxfilik, rəqabət və inhisarlaşma riskləri ilə sıx əlaqədə olduğu göstərilir.[3] Qlobal təcrübə göstərir ki, tənzimləmə üç əsas məqsədi balanslaşdırmalıdır: innovasiya və rəqabətin təşviqi, istehlakçıların və ictimai maraqların qorunması, iqtisadi və sosial sabitliyin təmin edilməsi. Avropa İttifaqının Rəqəmsal Xidmətlər Aktı (Digital Services Act – DSA) və Rəqəmsal Bazarlar Aktı (Digital Markets Act – DMA) bu balansı tapmaq üçün yeni nəsil normativ çərçivəni formalaşdırır; burada platformaların məsuliyyəti, şəffaflıq, sistemli risklərin idarə olunması, uşaq hüquqlarının və şəxsi məlumatların qorunması, həmçinin bazar gücünün məhdudlaşdırılması üzrə detallı tələblər müəyyən edilir.[4]

Azərbaycan 2030 sənədi və 2022–2026-cı illər sosial-iqtisadi inkişaf strategiyası rəqəmsal transformasiyanı iqtisadi modernləşmənin, biznes mühitinin yaxşılaşdırılmasının və dövlət xidmətlərinin səmərəliliyinin əsas vektoru kimi müəyyən edir.[1] Sonrakı dövrdə qəbul edilmiş sərəncamlarla rəqəmsal transformasiya üzrə dövlət siyasətinin idarə olunması, əlaqələndirilməsi və nəzarət mexanizmlərinin təkmilləşdirilməsi üçün mərkəzləşdirilmiş institusional model formalaşdırılmışdır; bu model Rəqəmsal İnkişaf və Nəqliyyat Nazirliyi və digər aidiyyəti qurumlar vasitəsilə həyata keçirilir.[2] Dünya Bankının və digər beynəlxalq təşkilatların qiymətləndirmələrində Azərbaycan rəqəmsal inkişaf göstəricilərinə görə bir sıra sahələrdə irəliləmiş əldə etsə də, rəqəmsal idarəetmənin koordinasiyası, rəqabət və platforma tənzimlənməsi, data idarəçiliyi, kiber-təhlükəsizlik və insan kapitalının rəqəmsal bacarıqları üzrə institusional potensialın gücləndirilməsinə ehtiyac olduğu qeyd edilir.[5]

Rəqəmsal iqtisadiyyatın tənzimlənməsində iqtisadi mexanizmlər klassik fiskal və monetar alətlərdən daha genişdir və aşağıdakı istiqamətləri əhatə edir. Birincisi, vergi və fiskal mexanizmlər rəqəmsal biznes modellərinin xüsusiyyətlərini nəzərə almalıdır. Rəqəmsal platformaların transsərhəd fəaliyyəti, “daimi nümayəndəlik” anlayışının rəqəmsal mühitə adekvat olmaması, dəyərin daha çox intellektual aktivlər və data əsasında yaranması vergi bazasının eroziyasına və mənfəətin köçürülməsinə şərait yaradır. OECD və digər qurumlar rəqəmsal iqtisadiyyatın vergiyə cəlb edilməsi üzrə qlobal təşəbbüslər irəli sürür, ölkələr isə rəqəmsal xidmət vergisi, elektron ticarətin ƏDV rejimi kimi alətləri tətbiq edirlər.[6] Azərbaycan üçün bu sahədə əsas məsələ vergi bazasının genişləndirilməsi ilə innovasiyanın boğulmaması arasında balansın tapılmasıdır; bu, kiçik və orta rəqəmsal biznes üçün güzəştli rejimlər, startaplara vergi tətilləri, eyni zamanda iri qlobal platformalar üçün ədalətli vergi yükü mexanizmlərinin işlənməsini tələb edir. İkincisi, rəqabət siyasəti rəqəmsal platformaların iki- və çoxtərəfli bazar strukturlarını, şəbəkə effektlərini və data üstünlüyünü nəzərə almalıdır. Dünya Bankı, OECD və ITU-nun tədqiqatları göstərir ki, sırf ex post antimonopol

mexanizmləri çox zaman “qapıçı” (gatekeeper) platformaların bazar gücünü məhdudlaşdırmaq üçün yetərli olmur; buna görə ex ante tənzimləmə alətləri, davranış qaydaları, interoperabellik tələbləri, data paylaşımı üzrə standartlar formalaşdırılır.[7] Azərbaycan rəqabət qanunvericiliyinin və rəqəmsal platformalarla bağlı sektor tənzimləməsinin yenilənməsi vasitəsilə rəqəmsal bazarlarda qeyri-şəffaf üstünlüklərin, özünə məxsus xidmətləri üstün tutma (self-preferencing) və diskriminasiya risklərinin qarşısını ala bilər. Üçüncüsü, innovasiya və rəqəmsal sahibkarlığın stimullaşdırılması üçün dövlət maliyyə dəstəyi (qramtlar, güzəştli kreditlər, vençur fondları), eləcə də tənzimləyici risklərin azaldılması mexanizmləri zəruridir. OECD-nin e-leaders handbook sənədində rəqəmsal hökumətin və innovasiya siyasətinin uzlaşdırılması, rəqəmsal hökumət layihələrinin iqtisadi əsaslandırılması, həmçinin açıq data və GovTech ekosistemlərinin inkişafı xüsusi qeyd olunur.[8] Azərbaycanda startap eko-sisteminin və rəqəmsal innovasiya klasterlərinin inkişafı üçün dövlət–özəl tərəfdaşlıq mexanizmləri, universitet–biznes əməkdaşlığı və “regulatory sandbox” rejimləri ilə birgə düşünülmüş paket tələb olunur. Dördüncüsü, rəqəmsal infrastrukturun (şəbəkələr, data mərkəzlər, bulud xidmətləri) və insan kapitalının maliyyələşdirilməsi iqtisadi idarəetmənin əsas komponentidir. ITU-nun ICT Regulatory Tracker və Global ICT Regulatory Outlook materialları göstərir ki, ən uğurlu ölkələr rəqəmsal infrastruktur investisiyalarını tənzimləyici islahatlarla, spektr siyasəti ilə, universal xidmət mexanizmləri və rəqəmsal bacarıqlar proqramları ilə eyni vaxtda həyata keçirirlər.[9] Rəqəmsal iqtisadiyyatın hüquqi tənzimlənməsi normativ-hüquqi aktların məcmusu olmaqla yanaşı, institusional dizayn, hüquq-məhkəmə təcrübəsi və “yumşaq hüquq” (kodekslər, standartlar, tövsiyələr) elementlərini də əhatə edir.

Bir tərəfdən, istehlakçı hüquqlarının, rəqəmsal hüquqların və şəxsi məlumatların qorunması təmin edilməlidir. Avropa İttifaqının DSA çərçivəsi platformalar üçün qeyri-qanuni kontentə qarşı tədbirlər, şikayət mexanizmləri, risklərin qiymətləndirilməsi, şəffaflyq hesabatlılığı kimi öhdəliklər müəyyən edir və bu normaların yerinə yetirilməməsi bir sıra iri platformaların cərimələr və məhkəmə iddiaları ilə üzləşməsinə səbəb olur.[10] Digər tərəfdən, data qorunması, alqoritmlərin şəffaflyğı, uşaqların onlayn mühitdə müdafiəsi ilə bağlı tələblər gücləndirilir. Azərbaycan üçün bu sahədə əsas məsələ mövcud informasiya, telekommunikasiya və şəxsi məlumatların qorunması qanunvericiliyinin rəqəmsal platformalar, süni intellekt sistemləri, “bulud” xidmətləri, kibertəhlükəsizlik və transsərhəd data axınları nəzərə alınmaqla sistemləşdirilməsi və yenilənməsidir. “Azərbaycanda rəqəmsal transformasiya – 2023” bülleteni rəqəmsal iqtisadiyyatın dövlət tənzimlənməsinin əsas istiqamətlərini və mövcud normativ çərçivəni təhlil edir, burada hüquqi mexanizmlərin institusional koordinasiya və icra baxımından daha çevik olmasına ehtiyac vurğulanır.[11]

Hüquqi mexanizmlərin digər vacib hissəsi platforma və rəqəmsal xidmət təminatçıları üçün sektor-əsaslı tələblərdir. Beynəlxalq təcrübədə bu, e-ticarət, rəqəmsal maliyyə xidmətləri, paylaşılan iqtisadiyyat (ride-sharing, e-scooter-lər və s.), “fintech” və “bigtech” şirkətlərinin fəaliyyətinə dair xüsusi qanunların qəbulu ilə həyata keçirilir. Məsələn, Çində elektron ticarət haqqında qanun rəqəmsal iqtisadiyyatın hüquqi çərçivəsini formalaşdıraraq platformaların məsuliyyəti və monopoliya riskləri üçün aydın normalar müəyyən etmişdir.[12]

Süni intellektin və alqoritmik qərarvermənin tənzimlənməsi sahəsində də dünyada sürətlə yeni normativ təşəbbüslər yaranır. OECD rəqəmsal iqtisadiyyat hesabatlarında AI üçün prinsiplərin, qanunvericilik və standartların formalaşdırıldığını, bəzi dövlətlərin sektorlar üzrə, digərlərinin isə ümumi çərçivə əsasında tənzimləməni seçdiyini qeyd edir.([OECD][13]) Azərbaycan üçün perspektivdə süni intellektin etik istifadəsi, alqoritmik diskriminasiya risklərinin qabaqlanması, yüksək riskli AI sistemləri üçün xüsusi lisenziya və nəzarət mexanizmlərinin müəyyən edilməsi aktual olacaq.

#### *İdarəetmədə institusional koordinasiya və rəqəmsal tənzimləmə modelləri*

Rəqəmsal iqtisadiyyatın tənzimlənməsi yalnız tək bir nazirlik və ya tənzimləyici orqanın funksiyası deyil; burada iqtisadiyyat, rəqəmsal inkişaf, ədliyyə, daxili işlər, maliyyə, təhsil, təhlükəsizlik, rəqabət orqanları, eləcə də məhkəmə sistemi və müstəqil tənzimləyici agentliklər arasında koordinasiya tələb olunur. ITU və Digital Regulation Platform-un sənədləri bu sahədə

sübutlara əsaslanan tənzimləmənin, çoxşaxəli maraqlı tərəflərin iştirakı ilə qərar qəbul etmənin, tənzimləyici müstəqilliyin və şəffaflığın vacibliyini vurğulayır.[14] İnstitusional modellər üzrə qlobal təcrübəni şərti olaraq iki istiqamətə bölmək olar. Bir qrup ölkə mərkəzləşdirilmiş “rəqəmsal nizamlayıcı” qurum yaradır və bütün rəqəmsal xidmətlər üzrə əsas koordinasiya funksiyasını ora həvalə edir. Digər qrup isə sektor və funksiyalar üzrə bölüşdürülmüş, lakin güclü koordinasiya şurası və ya milli rəqəmsal transformasiya komissiyası ilə işləyir. Hər iki halda uğurun açarı aydın mandatlar, səlahiyyətlərin toqquşmaması, məlumat mübadiləsi və birgə qərarlı mexanizmlər, həmçinin parlament və ictimai nəzarət mexanizmlərinin mövcudluğudur.

Rəqəmsal tənzimləmədə innovativ alətlərdən biri də “regulatory sandbox” mexanizmidir. Bu mexanizm çərçivəsində fintech və digər rəqəmsal startaplar məhdud müddət və miqyasda, nəzarət altında sərt tənzimləmə tələblərindən qismən azad olunur, regulator isə real eksperimentdən öyrənərək gələcək qaydaları daha dəqiq və çevik şəkildə dizayn edə bilər. ITU və Dünya Bankı materiallarında bu cür sandbox-ların maliyyə texnologiyaları ilə yanaşı, rəqəmsal identifikasiya, smart city, e-səhiyyə kimi sahələrdə də tətbiqi tövsiyə edilir.[14]

Azərbaycanın milli prioritetləri və real institusional vəziyyəti nəzərə alınaraq rəqəmsal iqtisadiyyatın tənzimlənməsi sahəsində iqtisadi və hüquqi mexanizmlərin təkmilləşdirilməsi üçün aşağıdakı əsas istiqamətlər konseptual şəkildə ön plana çıxır. Normativ-hüquqi çərçivənin kodifikasiyası və sistemləşdirilməsi zəruridir. Rəqəmsal xidmətlər, elektron ticarət, şəxsi məlumatların qorunması, kiber-təhlükəsizlik, rəqəmsal maliyyə xidmətləri, elektron imza və e-hökumət üzrə mövcud qanun və qaydaların “rəqəmsal iqtisadiyyat haqqında” çərçivə qanun və ya vahid rəqəmsal tənzimləmə strategiyası ətrafında sistemləşdirilməsi həm hüquqi aydınlığı, həm də tətbiq praktikasını asanlaşdırır. Bu çərçivə qanun ümumi prinsiplər (rəqəmsal hüquqlar, rəqəmsal bərabərlik, data məsuliyyəti, kibertəhlükəsizlik, innovasiyanın təşviqi) və sektor-əsaslı bölmələrdən ibarət ola bilər. Rəqəmsal platformalar və bazarlar üzrə rəqabət və istehlakçı qorunması mexanizmləri gücləndirilməlidir. Rəqabət qanunvericiliyində “rəqəmsal platforma”, “qarıçı platforma”, “ekosistem”, “data üstünlüyü” kimi anlayışların hüquqi təriflərinin verilməsi, “self-preferencing”, “bundling” və eksklüziv müqavilə praktikasına dair daha konkret qaydaların müəyyənləşdirilməsi məqsədəuyğun olardı. Bununla yanaşı, istehlakçıların rəqəmsal mühitdə aldadıcı interfeyslərdən (dark patterns), qeyri-şəffaf alqoritmlərdən və şəxsi məlumatların sui-istifadəsindən qorunması üçün xüsusi normalar hazırlanmalıdır. Sübutlara əsaslanan tənzimləmə modelinə keçid vacibdir. Bu, rəqəmsal iqtisadiyyata dair statistik və analitik bazanın gücləndirilməsini, data-driven policymaking alətlərinin tətbiqini, tənzimləyici təsir qiymətləndirilməsi (Regulatory Impact Assessment) mexanizmlərinin institusionalaşdırılmasını tələb edir. ITU-nun ICT Regulatory Tracker, OECD-nin indikator sistemləri və Digital Regulation Platform kimi alətlərdən sistemli istifadənin milli səviyyədə metodikasının hazırlanması tənzimləyici qərarların keyfiyyətini yüksəldə bilər.[9] Rəqəmsal hüquq və rəqəmsal iqtisadiyyat üzrə milli ekspert potensialının gücləndirilməsi uzunmüddətli dayanıqlığın əsas şərtidir. Bu məqsədlə ali təhsil proqramlarında rəqəmsal iqtisadiyyatın iqtisadi və hüquqi aspektlərinə dair ixtisaslaşmalar, magistr proqramları, habelə hakimlər, tənzimləyici orqanların əməkdaşları və hüquqşünaslar üçün davamlı təlim mexanizmləri formalaşdırılmalıdır. Rusiya, AI və digər ölkələrin “rəqəmsal iqtisadiyyatın hüquqi tənzimlənməsi” üzrə monoqrafiya və tədris materialları bu sahədə metodoloji baza kimi istifadə oluna bilər.[15] Beynəlxalq əməkdaşlıq və normativ uyğunlaşma təmin edilməlidir. Rəqəmsal iqtisadiyyatın transsərhəd xarakteri Azərbaycanın həm regional, həm də qlobal platformalarda – o cümlədən, BMT, WTO, ITU, OECD ilə əməkdaşlıqda – aktiv iştirakını tələb edir. Qlobal təcrübədə formalaşan rəqəmsal tənzimləmə standartlarının izlənməsi, uyğunlaşdırılması və milli kontekstə inteqrasiyası həm xarici investorlar üçün şəffaf mühit yaradır, həm də yerli rəqəmsal biznesin beynəlxalq bazara çıxışını asanlaşdırır.

#### **Nəticə:**

Rəqəmsal iqtisadiyyatın tənzimlənməsi klassik iqtisadi siyasət və hüquqi tənzimləmə modellərini yenidən düşünməyi tələb edir. Rəqəmsal platformaların, data əsaslı biznes modellərinin, süni intellekt və alqoritmik qərarvermənin geniş yayılması həm böyük imkanlar açır, həm də iqtisadi,

sosial və etik riskləri kəskinləşdirir. Bu şəraitdə iqtisadi və hüquqi idarəetmə mexanizmləri yalnız ayrı-ayrı qanunlar və normativ aktlar toplusu kimi deyil, strateji baxımdan əlaqələndirilmiş, sübutlara əsaslanan, innovasiyaya açıq, eyni zamanda insan mərkəzli inteqrə edilmiş sistem kimi qurulmalıdır. Azərbaycan üçün rəqəmsal iqtisadiyyatın tənzimlənməsi sahəsində əsas vəzifələrdən biri milli prioritetlərlə uyğun vahid normativ çərçivə formalaşdırmaq, rəqabət və istehlakçı qorunması mexanizmlərini rəqəmsal bazarların spesifikasiyasına uyğunlaşdırmaq, süni intellekt və data idarəçiliyi üzrə qabaqlayıcı hüquqi mexanizmlər yaratmaq, institusional koordinasiya və insan kapitalını gücləndirməkdir. Beynəlxalq təcrübənin yaradıcı şəkildə mənimsənilməsi, milli kontekstin xüsusiyyətləri nəzərə alınmaqla rəqəmsal iqtisadiyyatın tənzimlənməsi sahəsində iqtisadi və hüquqi idarəetmə mexanizmlərinin təkmilləşdirilməsi ölkənin rəqabətqabiliyyətliliyini və dayanıqlı inkişafını təmin edən əsas sütunlardan birinə çevrilə bilər.

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<https://doi.org/10.5281/zenodo.19004382>

## КӘСІПОРЫННЫҢ ӘКІМШІЛІК ШЫҒЫНДАРЫН ТАЛДАУ: ЗАМАНАУИ ҚҰРАЛДАРДЫ ӘЗІРЛЕУ ЖӘНЕ ҚОЛДАНУ

АЙТМУХАНОВА ДИЛЬНАЗ ЕРЛАНОВНА

«Бухгалтерлік есеп және бизнес-аналитика» БББ

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**Аннотация:** Мақалада құрылыс индустриясындағы ірі диверсификацияланған холдингтердің әкімшілік шығындарын басқарудың теориялық-әдістемелік негіздері мен практикалық аспектілері зерттелді. Зерттеудің мақсаты — «BI Group» холдингінің мысалында Business Intelligence (BI) технологияларын қолдану арқылы әкімшілік шығындарды талдаудың заманауи моделін әзірлеу. Автор тарапынан деректерді декомпозициялауға негізделген үш деңгейлі аналитикалық архитектура ұсынылды. Зерттеу нәтижелері басқарушылық шешімдердің сапасын арттырудағы «Data-driven» концепциясының басымдылығын дәлелдейді.

**Тірек сөздер:** әкімшілік шығындар, басқарушылық есеп, бизнес-аналитика, Power BI, BI Group, цифрлық трансформация, дашборд.

Қазіргі экономикалық парадигма жағдайында кәсіпорынның қаржылық тұрақтылығы мен бәсекеге қабілеттілігі шығындарды оңтайландырудың жаңа инновациялық тетіктерін талап етеді. Әкімшілік шығындар (G&A) — басқару аппаратының тиімділігін көрсететін маңызды индикатор. Алайда, ірі құрылыс холдингтеріндегі дәстүрлі есеп беру форматтары ақпараттың «ретроспективті» сипатына ие болуына байланысты жедел шешім қабылдауға мүмкіндік бермейді. Осы орайда, бухгалтерлік есептің аналитикалық функциясын цифрлық құралдар арқылы трансформациялау мәселесі өзекті болып табылады.

Басқарушылық есеп теориясында әкімшілік шығындарды талдау Р. Каплан мен Д. Нортонның «Теңгерімді көрсеткіштер жүйесі» (BSC) концепциясы аясында қарастырылады [1]. Т. Дэвенпорт пен Дж. Харрис еңбектерінде аналитикалық құралдардың кәсіпорын рентабельділігіне әсері ғылыми негізделген [2]. Қазақстандық контексте бухгалтерлік есеп пен бизнес-аналитиканың түйісу нүктелері цифрландыру жағдайында жаңа ғылыми бағыт ретінде қалыптасуда. Зерттеу барысында «BI Group» холдингінің ішкі корпоративтік есептері «Big Data» аналитикасы тұрғысынан зерделді.

Зерттеу нысаны ретінде «BI Group» холдингінің әкімшілік шығындар құрылымы алынды.

Холдингтің «BI Ecosystem» шеңберіндегі деректер ағыны (Data Flow) келесі алгоритм бойынша модельденді:

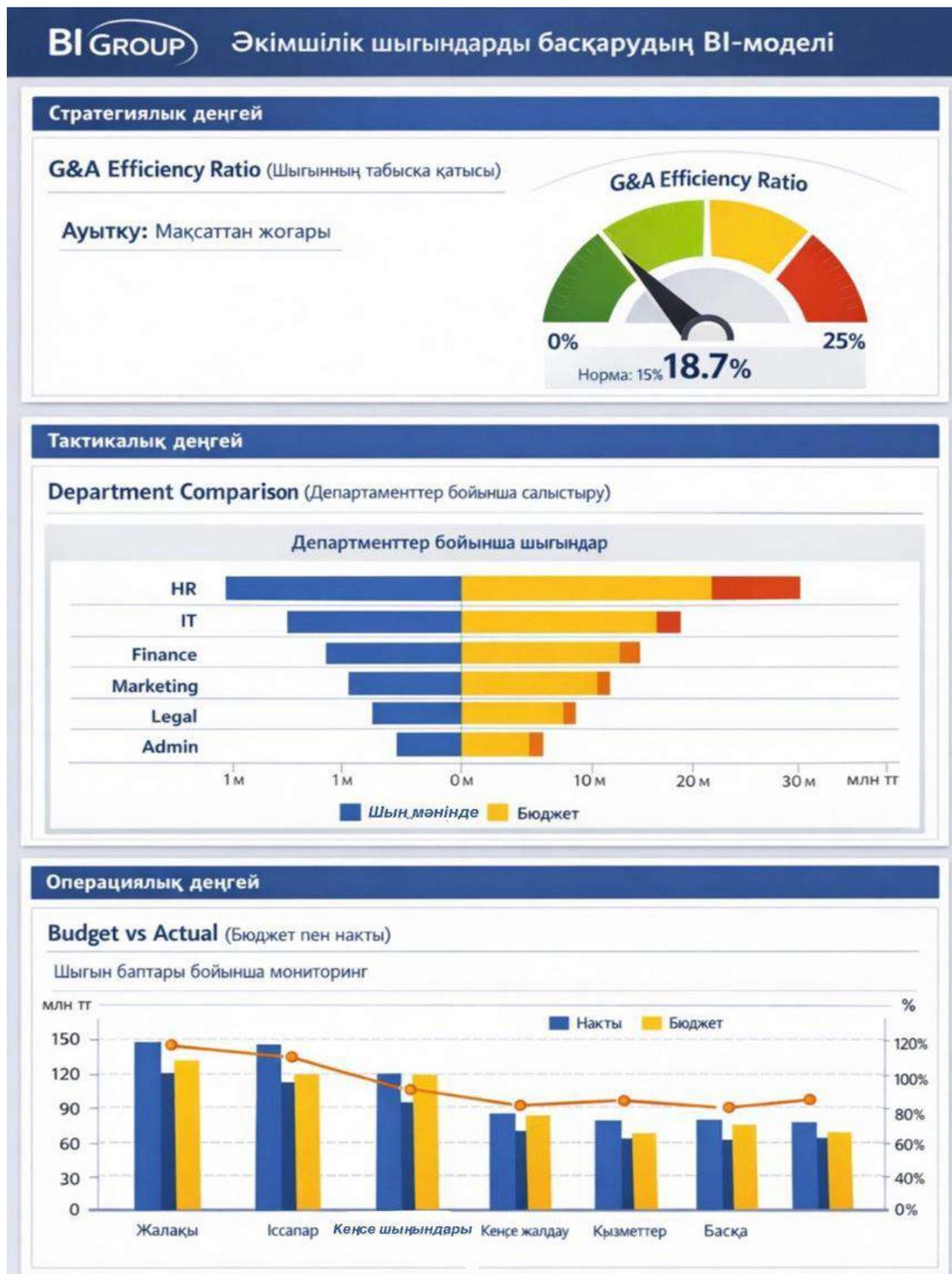
- SAP ERP және 1С жүйелерінен деректерді экстракциялау (ETL);
- SQL деректер қоймасында (DWH) ақпаратты верификациялау;
- Power BI платформасында визуалды аналитиканы қалыптастыру.

Әкімшілік шығындарды басқаруға арналған көпөлшемді аналитикалық матрица ұсынылды. Бұл модель шешім қабылдаудың когнитивті жүктемесін азайтатын үш деңгейлі дашборд жүйесінен тұрады:

1) Стратегиялық деңгей: G&A/Revenue коэффициентінің нормативтен ауытқуын бақылау.

2) Тактикалық деңгей: Департаменттер бойынша шығындардың үлесін салыстырмалы талдау (Variance Analysis).

3) Операциялық деңгей: Нақты уақыт режиміндегі транзакциялар декомпозициясы (Drill-down).



1-сурет. BI Ecosystem шеңберіндегі әкімшілік шығындарды талдаудың стратегиялық деңгейі.

Суретте ұсынылған деректерді талдау келесідей ғылыми тұжырымдар жасауға мүмкіндік береді:

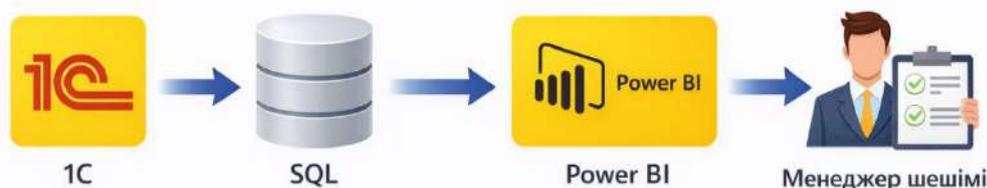
- Стратегиялық деңгейде: G&A Efficiency Ratio индикаторы бойынша нақты көрсеткіш 18.7% құрап, 15%-дық нормативтен ауытқуды (критикалық аймақ) көрсетіп тұр. Бұл ТОП-менеджмент үшін шығындарды шұғыл оңтайландырудың негізгі сигналы болып табылады;

- Тактикалық деңгейде: «Department Comparison» блогында HR, IT, Finance сияқты бөлімшелердің бюджет пен нақты шығындарының пропорциясы сараланады. Бұл ресурстарды департаменттер арасында тиімді қайта бөлуге негіз болады;

- Операциялық деңгейде: «Budget vs Actual» мониторингі барысында «Жалақы» бабы бойынша бюджеттен ауытқу деңгейінің 120%-ға жеткені айқын көрінеді.

Осылайша, ұсынылған BI-модель бухгалтерлік есептің статикалық деректерін динамикалық басқарушылық ақпаратқа айналдырудың тиімді құралы екенін дәлелдейді.

### Шығындарды классификациялау алгоритмі



2-сурет. «BI Group» әкімшілік шығындарын мониторингілеуге арналған интерактивті панель прототипі.

Суретте ұсынылған шығындарды классификациялау алгоритмі «BI Group» холдингіндегі деректерді басқарудың біртұтас циклін көрсетеді. Бұл процесс келесі технологиялық кезеңдерден тұрады:

- Деректерді генерациялау (1С жүйесі): Бастапқы бухгалтерлік ақпарат (шот-фактуралар, еңбекақы ведомостары, шаруашылық шығындар) 1С:Предприятие платформасында тіркеледі.

- Деректерді трансформациялау және сақтау (SQL базасы): 1С-тен алынған транзакциялық деректер SQL Server деректер қоймасына (DWH) интеграцияланады. Бұл кезеңде деректер тазаланады (Cleaning) және «BI Ecosystem» стандартына сәйкес бірыңғай классификациялаудан өтеді.

- Визуалды аналитика (Power BI): Өңделген деректер Power BI интерфейсіне жолданып, интерактивті дашбордтар түрінде визуалданады. Бұл кезеңде шығындардың «пайда болу ошақтарын» нақты уақыт режимінде (real-time) талдауға мүмкіндік туады.

- Басқарушылық шешім (Manager's Decision): Алгоритмнің соңғы кезеңінде менеджер дайын аналитикалық деректерге сүйене отырып, шығындарды оңтайландыру бойынша Data-driven (деректерге негізделген) шешім қабылдайды.

Осылайша, ұсынылған алгоритм бухгалтерлік есептің ақпараттық өрісін автоматтандырып, шешім қабылдаудың когнитивті жүктемесін азайтады».

Зерттеу барысында әзірленген модельді енгізудің тиімділігі 1-кестеде көрсетілген.

1-кесте. Дәстүрлі талдау мен цифрлық BI-аналитиканың салыстырмалы сипаттамасы

Көрсеткіш	Дәстүрлі есеп (Excel/1С)	Цифрлық BI-аналитика
Аналитика деңгейі	Статикалық (кезеңдік)	Көпөлшемді (нақты уақыт)
Деректер верификациясы	Қолмен тексеру	Автоматты (алгоритмдік)
Басқару функциясы	Тіркеуші (ретроспективті)	Превентивті (стратегиялық)

1-ші кестеде келтірілген салыстырмалы талдау нәтижелері көрсеткендей, цифрлық BI-аналитикаға көшу бухгалтерлік есептің аналитикалық функциясын түбегейлі трансформациялайды.

Біріншіден, деректерді верификациялаудың автоматты (алгоритмдік) режиміне ауысуы адам факторынан болатын қателіктерді жойып, ақпараттың сенімділігін (Reliability) қамтамасыз етеді.

Екіншіден, басқару функциясының ретроспективті (өткенді тіркеуші) сипаттан превентивті (болашақты болжаушы) сипатқа ауысуы «BI Group» холдингіне әкімшілік шығындарды стратегиялық жоспарлауға мүмкіндік береді. Бұл зерттеудің практикалық маңыздылығы — дәстүрлі есептеу әдістерінен нақты уақыт режиміндегі (Real-time) басқарушылық аналитикаға көшу арқылы кәсіпорынның ресурстық тиімділігін арттырудың ғылыми негізделген алгоритмін ұсынуында [3].

«BI Group» холдингінің мысалында кәсіпорындағы әкімшілік шығындарды талдаудың заманауи құралдарын зерттеу нәтижесінде келесідей ғылыми және практикалық тұжырымдар жасалды:

Теориялық тұрғыдан: Әкімшілік шығындарды басқарудың дәстүрлі ретроспективті әдістері қазіргі цифрлық экономика талаптарына жауап бере алмайтыны дәлелденді. Басқарушылық есептің аналитикалық функциясын трансформациялау үшін Business Intelligence (BI) технологияларын енгізу — кәсіпорынның стратегиялық тұрақтылығын қамтамасыз етудің басты шарты болып табылады.

Әдістемелік тұрғыдан: Холдингінің «BI Ecosystem» шеңберінде деректерді өңдеудің (ETL-процестер) және верификациялаудың бірыңғай алгоритмі негізделді. Бұл бухгалтерлік ақпараттың мөлдірлігін (transparency) қамтамасыз етіп, адам факторынан болатын қателіктерді барынша азайтуға мүмкіндік береді [4].

Практикалық тұрғыдан: Зерттеу аясында әзірленген үш деңгейлі аналитикалық архитектура (стратегиялық, тактикалық, операциялық) әкімшілік шығындарды нақты уақыт режимінде (real-time) бақылаудың тиімді құралы екенін көрсетті. Тәжірибелік деректерге сүйенсек, BI-құралдарын қолдану шешім қабылдау жылдамдығын арттырып, жанама шығындарды 8-12%-ға дейін оңтайландырудың ғылыми негізделген алғышарттарын жасайды.

Перспективалық бағыты: Ұсынылған модель тек құрылыс саласы ғана емес, Қазақстанның басқа да ірі диверсификацияланған компанияларында басқарушылық аналитиканы цифрландыру үшін эталондық үлгі (template) ретінде қолданыла алады [5].

Қорытындылай келе, әкімшілік шығындарды талдаудың заманауи цифрлық құралдарын әзірлеу және «BI Ecosystem» шеңберінде қолдану — бухгалтерлік есептің дәстүрлі статикалық қызметін стратегиялық шешім қабылдауды қолдау жүйесіне (Decision Support System) трансформациялайды. Зерттеу барысында негізделген аналитикалық архитектура кәсіпорынның басқару ресурстарын тиімді пайдалануға мүмкіндік беріп қана қоймай, цифрлық экономика жағдайында холдингінің ұзақ мерзімді қаржылық тұрақтылығын қамтамасыз ететін негізгі фактор болып табылады.

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## МЕТОДӢОИ ОМОРИ ВА МУНОСИБАТӢОИ СИСТЕМАВИ ДАР ОМУӢИШИ ОМОРИ

ДАВЛАТОВ МУӢАММАДИБРОӢИМ БЕКМУРОДАВИЧ

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**Аннотатсия:** *Методологияи оморӣ маҷмӯи усулҳо, қоидаҳо ва усулҳои тадқиқот мебошад. Истилоҳи "метод" ба усули тадқиқоти назариявӣ ё татбиқи амалӣ (масалан, усули фалсафӣ, усули нешрафта) ишора мекунад. Ҳангоми сухан дар бораи усули илмӣ умуман, мо умуман равишҳои омуӢиши ҳама гуна падидаҳо дар назар дорем.*

**Калидвожа:** *истеҳсолот, қувваи истеҳсолот, табиӣ, техники, нишондиҳанда, ҳароҷот, меҳнат, миқдор, инкишоф.*

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**Аннотация:** *Статистическая методология представляет собой совокупность приемов, правил и методов исследования. Под термином "метод" понимают способ теоретического исследования или практического осуществления чего-либо (например, философский метод, передовой метод). Когда речь идет о методе науки вообще, то имеют в виду наиболее общие способы подхода к изучению любых явлений.*

**Ключевые слова:** *производство, производительная сила, природный, технический, показатель, затраты, труд, количество, развитие.*

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Баъсно дар бораи фан ва методи омор қариб ки зиёда аз 100 сол рафта истодаанд. Онҳо диққати арбобони баръастаро на танҳо дар соҳаи омор балки дар дигар илмҳо низ ба худ ҷалб кардаанд, чунки ин масъала маънии умумии илмӣ ва ҷаҳонбинӣ дорад, ки он паълуҳои миқдории падидаҳои оммавии ҷамъиятро дар шартҳои аниқ мавқеъ ва вақт тадқиқ менамояд. Омор паълуӣ миқдории истеҳсолоти ҷамъиятро дар ягонагии қувваҳои истеҳсолӣ ва падидаҳои ҷаҳти фарҳангӣ ва сиёсии ҷамъият меомӯзад. Омор инчунин таъсири омилҳои табиӣ ва техниро ба тағйироти миқдории ҷаҳти ҷамъиятӣ ва таъсири истеҳсолоти ҷамъиятӣ ба шартҳои табиӣ ҷаҳти ҷамъиятӣ меомӯзад.

Ҳангоме, ки дар бораи методи илм сухан мегӯянд, усулҳои умумии муносибатро барои омухтани ӯро гуна падидаҳо дар назар доранд. Вақте, ки сухан дар бораи методи илми аниқ меравад, онгоҳ усулҳо ва методҳои коркардгардидаи махсус дар назар дошта мешавад, ки барои тадқиқи фанни он равона карда шудааст. Омор усул ва методҳои махсуси худро коркард намуда, инчунин системаи нишондиҳандаҳо ташаккул медиҳад, ки имкон фароҳам меорад, паълуҳои миқдории падидаҳо ва равандиҳои ҷаҳти ҷамъиятӣ дар ҷорҷӯбаи талаботҳои методи диалектикӣ омухта шаванд.

### Талаботҳои муъим чунинанд:

1. Ҳамаи падидаҳо ва равандиҳо дар алоқаи мутақобила ва шартнокии мутақобила бояд омухта шаванд. Аз ин рӯ, омор як дастаи калони воситаҳои методологӣ ва методиро барои ҷенкунии миқдории алоқаҳои сабабнок – тафтишаванда ва дигар алоқаҳои байни падидаҳо коркард намуд, масалан алоқаҳои байни ҳароҷоти меҳнат ва воситаҳо аз як тараф ва натиҷаҳои бадастомада аз тарафи дигар, аз як тараф байни нишондиҳандаҳои истеҳсолот дар соҳаҳои гуногуни хољагии халқ, байни истеҳсолнокии меҳнат ва омилҳои он ва ғайра.

2. Ҳамаи падидаҳо ва равандиҳо бояд дар ӯракат ва тағйирот, азнавсозӣ ва инкишофӣ бояд дида баромада шаванд. Омор барои ин методҳо ва нишондодҳои коркард карда баромадааст, ки онҳо имконият медиҳанд миқдоран тамоҷуло, суръати инкишофи падидаҳо ва равандиҳои ҷаҳти ҷамъиятиро, лапишнокии сатҳҳои онҳо ро ифода намоянд ва онҳо ро таснифот намоянд.

3. Муносибати диалектикӣ талаб менамояд, ки раванди гузариши тағйиротҳои миқдори ба тағйиротҳои асосии сифатнокӣ ба назар гирифта шавад. Ин талабот дар назди омор вазифаҳои мураккаб ва масъулиятнокро менамояд, чунки дар падидаҳои ҷаҳати ҷамъиятӣ ӯдудҳои гузариши тағйиротҳои миқдориро ба тағйиротҳои сифатнокӣ муайян намудан хеле душвор аст. Омор ин вазифаҳоро дар ҷар як ҳолати аниқ бо методҳои худ ҳал менамояд, масалан бо интихоби аломатҳои, ки имкон медиҳад, ки вази сифатнокӣ падидаҳоро аз дигар фарқ кунанд, бо муайянсозии ӯдудҳои миқдории байни гурӯҳҳои дар гурӯҳбандии оморӣ, бо омӯзиши тағйиротҳои сохторӣ, ки дар падидаҳо ба амал меоянд ва ғайра. Масалан, ҳангоми омӯзиши ҳаёти синфии деҳот коршиносони соҳаи омор ҳолаҳои деҳқониро аз рӯи аломати фуруш ва кирои кӯваи корӣ, аз рӯи ҳаҷми арендаи замин ва дигар аломатҳои муҳими ҳолагидорӣ гурӯҳбандӣ мекард. Раванди таҳлилҳои мамлакатаи ҳолагии кишлоқдориро ба мамлакатаи индустриалӣ омор бо динамикаи вази ҳосили маҳсулоти умумии саноат дар ҳаҷми умумии маҳсулоти ҳолагии кишлоқ ва саноат ва ғайра таснифот менамояд.

4. Муносибати диалектикӣ омӯзиши падидаҳоро дар партави муъорибаи зиддиятҳо – муносибаи байни қўна ва нав, муранда ва азнавтавлдшаванда, аз инкишоф бозмонда ва азнавинкишофёбанда талаб менамояд.

Ин талаботҳои диалектиро нисбат ба омор И.С. Пасхавер, А.Л. Яблочник аниқ намуда, чунин навиштаанд: «Маълумотҳои омор бояд чунин коркард гарданд, ки раванди вайроншавии ҳолагии қўнаи крепостной, натуралӣ ва раванди иваз намудани он ба заминдорӣ капиласитӣ аз рӯи ин маълумотҳо омӯхта мешавад» [5, с. 138]. Талаботҳои муосирро, ки ба омори ҷамъиятӣ инкишофёфта пешниҳод мешаванд, ба назар гирифта, он бояд ба ошкорсозӣ ва ҷамъбасти падидаҳои нав ва пешқадам дар ҳолагии кишлоқ мусоидат намояд, раванди аз миён бурдани шакли қўнаро нишон диҳад. Масалан, омор таърибаи пешқадамони истеҳсолотро, дараҷаи паёншавии методҳои нави кори онҳо, таъриқи техникаи нав, протсессҳои технологияи самарнокии баланд ва намудҳои маҳсулотро, методҳои ташкили илмӣ ва пардохти музди меҳнат, истеҳсолот, идора ва ғайраро меомӯзад.

Муқарраротҳои номбаргардидаи методи диалектикӣ, ки бо универсалии худ фарқ мекунанд, таъриқи худро дар методҳои маҳсус ҷар илм хусусан дар методҳои омор меёбанд. Охирин ба марҳалаҳои гуногуни таҳқиқоти оморӣ пайвастанд ва аз ин нуқтаи назар ба се гурӯҳи зерин тақсим карда мешаванд.

Методҳои мушоҳидаҳои оммавӣ барои ҳалли вазифаҳои марҳалаи якуми таҳқиқоти оморӣ коркард карда шудаанд –барои мушоҳидаи оморӣ. Онҳо барои ҷамъи илмӣ маълумотҳо дар бораи падидаҳои оммавӣ ва равандҳои ҷаҳати ҷамъиятӣ лозиманд. Мураккабии ташкил ва гузаронидани мушоҳидаҳои оммавӣ (барӯйхатгирӣ, таҳқиқотӣ, ҷамъи ҳисобот) ташкили илмӣ онро талаб менамояд.

Методҳои гурӯҳбандӣ ва маълумотҳои маводҳои барои коркарди натиҷаҳои мушоҳидаҳои оморӣ истифода мешаванд. Методҳои гурӯҳбандӣ имкон медиҳанд, ки маълумотҳои аз ҷониби омор омӯхташаванда ба гурӯҳҳои ва зергурӯҳҳои тақсим карда шаванд, масалан, ба гурӯҳҳои илтимоеи аҳоли, ба корхонаҳои калон ва хурд, пешқадам ва қафомонда ва ғайра. Ба методҳои маълумотҳои методҳои тафтиши маълумотҳои ҷамъоваришуда, системакунонии онҳо, коркард, ҳисобкунии маълумотҳои ҷамъбасти ва пешниҳоди онҳо дар шакли таҳлилаҳои оморӣ ворид мешаванд.

Методҳои муайянсозии нишондиҳандаҳои ҷамъбасткунанда, ҷамъбасти ва ситетикӣ нишондиҳандаҳо дар таълил барои ҳалли масъалаҳои давраи сеюми таҳқиқоти оморӣ истифода мешаванд, ки он қонуниятҳоро ошкор месозад ва меомӯзад ва параметрҳои гуногунро муайян месозад. Ба шумораи ин методҳо ва усулҳои методи бузургии миёна, ки бо ёрии онҳо сатҳҳои миқдории падидаҳо чен карда мешаванд; методи бузургии нисбӣ, ки таносубҳои нишондиҳандаҳои оморӣ ва сохтори падидаҳоро ифода менамоянд; методҳои таълили қаторҳои тақсимот, ки барои омӯзиши қонунҳои тақсимоти воқидӣ, маълумотҳои аз рӯи андозаи аломати омӯхташаванда; методҳои омӯзиши қаторҳои динамика, ки инкишофи падидаҳоро дар вақт таснифот менамоянд; методи индексӣ, ки барои таснифоти муқоисавии

сатъњои миёнаи падидањо ва муайянсозии таѓйироти падидаи мураккаб дар натиљаи таѓйири њар як падидањои онро муайянкунанда; методњои ченкунии миќдории алоќањо ва алоќањои мутаќобила байни падидањо дохил мешаванд.

Омор дар људої аз паълуњои сифатнокии падида бемаънї ва бемазмун аст, ва ба ин њатто Г.Гегель ањамияти махсус дода буд. «Дар омор –навишта буд ӯ –раќамњое, ки бо онњо машѓул аст, танњо бо натиљањои сифатнокиаш шавќангез аст. Љусутуљуї холи раќами бе нуќтаи назари роњбарикунанда предмети љустуљуїњои бефоида мебошанд, ки наметавонанд шавќмандии назариявї ва амалиро ќонењ гардонанд» [1, с. 231].

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## ФУНКЦИЯ ВА РОЛИ АНДОЗБАНДИ ДАР СИСТЕМАИ ИҚТИСОДИИ ЧАМЪИЯТ

ФАЙЗУЛЛОЕВ БАХТОВАР БАХТИЁРОВИЧ

омӯзгори Донишгоњи давлатии Бохтар ба номи Носири Хусрав, Ёумбурии  
Тоҷикистон.

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**Аннотатсия.** *Чамъовариҳои андоз вазифаи қадимӣ ва яке аз шартҳои асосии мавҷудияти давлат ва рушди ҷомеа дар роҳи шукуфоии иқтисодӣ ва иҷтимоӣ мебошад. Дар тӯли таърихи ҷомеа, ҳеҷ як давлат бе андоз фаъолият карда натавонист, зеро барои иҷрои вазифаҳои худ ба миқдори муайяни пул ниёз дорад, ки онро танҳо тавассути андоз чамъоварӣ кардан мумкин аст. Давлат ин пардохтҳоро аз шахравандони худ, ҳам шахсони воқеӣ ва ҳам шахсони ҳуқуқӣ, чамъ мекунад.*

**Калидвожаҳо:** Андоз, молия, пардохтҳо, буҷет, давлат, санксия, имтиёз, боҷ, фондҳо, иқтисод.

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**Аннотация.** *Взимание налогов – древнейшая функция и одно из основных условий существования государства, развития общества на пути к экономическому и социальному процветанию. В истории развития общества ещё ни одно государство не смогло обойтись без налогов, поскольку для выполнения своих функций ему требуется определенная сумма денежных средств, которые могут быть собраны только посредством налоговых сборов, эти сборы государство собирает со своих граждан в виде физических и юридических лиц.*

**Ключевые слова:** Налог, финансы, платежи, бюджет, государство, санкция, привилегия, обязанность, фонды, экономика.

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Аз нигоҳи таърихӣ бармеояд, ки андозҳо чун системаҳои хирочӣ дар тӯли асрҳо арзи вучуд доштаанд. Чи тавре ки ба мо маълум аст, системаи хирочитонӣ зодаи зарурати қонеъ гардонидани дархостҳои чамъиятӣ мебошад. Ин хусусияти андоз функцияи фискалиро (вазифаи хазинадориро) иҷро мекунад. Функцияи фискалӣ дар давраи тӯлонӣ маънидоди кофии моҳият ва мақоми андоз буд. Протсессҳои андозбандиро давлат иҷро мекард ва ба шаклҳои давлатдорӣ вобаста буд. Дар шаклҳои давлатдорӣ тоталитарӣ ва аз ҷиҳати иқтисодӣ суғараққарда чун қоида функцияи фискалии андоз бартарӣ дошт.

Гарониҳои бори андоз ва қомилан ба манфиатҳои хазина мутеъ будани андозбандӣ ба вазъияте мерасонад, ки андозсупорандагон на фақат ўҳдадорҳои андозиро иҷро намекунанд, балки ба ҷустуҷӯи роҳҳои қонунӣ ва ғайриқонунӣ саркашӣ намудан аз андозсупорӣ машғул мегарданд.

Бо мурури ташаккул ва инкишофи муносибатҳои молияи пулӣ, мустақилияти иқтисодии субъектҳои хоҷагидорӣ дар муомилоти молияи озод, дархостҳои ташаккули ҳавасмандгардонӣ ё боздоштани тақрористеҳсол, таъсир расонидан ба қобилияти пардохткунӣ аҳоли, кӯмак расонидан ба сармоягузори ташаккул меёбанд. Зарурати танзимдиҳии давлатии протсессҳои азнавтақсимкунӣ чамъиятӣ, густариши меъёри давлатӣ ба иқтисодиёт ҳанӯз дар замонҳои меркантилистҳо (охири қарни XV ва ибтидои қарни XVI) асоснок карда шуда буд, ки таълимоти онҳо ба инкишоф ва раванқи сармоядорӣ савдой асос гузошта буд.

Давраи гузаштан аз мутлақият (абсолютизм) ба шаклҳои давлатдорӣ намояндагӣ (интихоботӣ) ба инкишофи таълимоти танзимдиҳии хоҷагии молиявӣ тавассути низоми намояндагони давлатӣ тақони нав расонд. Бо вучуди он ки дар "сабоҳи капитализми ибтидои назарияти муҳоҳилат нақардани давлат ба иқтисодиёт ҳуқумфармо буд, инкишофи минбаъдаи назарияи андозбандии фискалӣ тадричан дархостҳои хоҷагидорӣ молиявӣ иҷтимоӣ - иқтисодиро ба назари эътибор мегард.

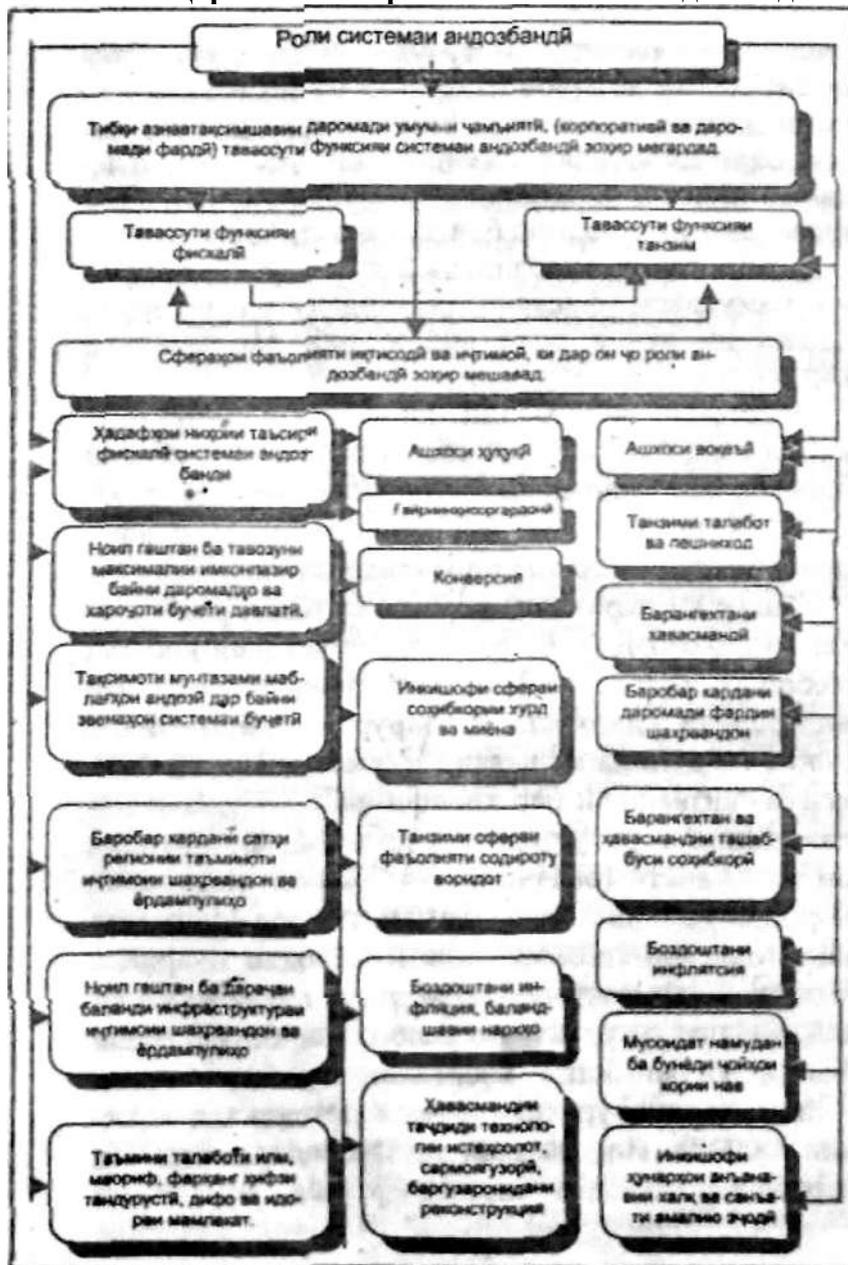
Бо ҳамин тарик, андозшиносӣ ду функсияро муайян намудааст: фискалӣ (хазиनावӣ) ва танзимӣ.

Тибки ин ақида роли андозбандӣ дар амалияи иқтисодии ҷамъиятӣ ҷорӣ гардидааст. Системаи андозбандӣ, ки тибқи қонунгузорӣ қабул гардидааст ин фишанги азнавтақсимкунии даромадҳои андоздиҳандагони потенциали мебошад. Ба ин системаи амалкунанда оиди истифодашавии функсияҳои андоз шаҳодат медиҳад.

Тавре ки дар нақшаи 1 акс ёфтааст, роли системаи андозбандӣ ба омилҳои объективӣ вобаста мебошад. Тавассути функсияи фискалии системаи андозбандӣ дархостҳои зарурии умумимиллӣ қонеъ гардонидани мешаванд. Аммо тавассути функсияи танзимдиҳӣ бар хилофи ҷабри фискалӣ механизми махсус густариш дода мешавад, ки тибқи он мувозинати (баланси) манфиатҳои иқтисодии корпоративӣ, шахсӣ ва ҷамъиятӣ таъмин мегардад. Мақсади танзими андозӣ фароҳам овардани ҷикатҳои сармоягузорӣ, болоравии натоиҷи молиявӣ ва алалхусус кӯмак расонидан ба афзоиши фонди умумимиллии воситаҳои пулӣ мебошад.

Хуллас ҳарду функсияи андозӣ потенциали дохилии андозбандиро амалан татбиқ мегардонад.

**Нақшаи 1. Ҷараёни таъсирбахши системаи андозбандӣ.**



Ба андозбандӣ ҳамчун соҳаи муносибатҳои молиявӣ - буҷетӣ азнавтақсимкунӣ, танзимдиҳии таъсирбахш ба ҳавасмандгардонии иқтисодӣ хос мебошад. Бо вучуди ҳамин моҳияти ҳавасмандгардонӣ ба функсияи фискалӣ ҳам хос мебошад, зеро маблағҳои буҷетие, ки асосан бо методҳои андозӣ дохил мегарданд, инчунин барои инкишофи сфераи ғайриистеҳсолӣ, таъминоти дархостҳои илм, ҳифзи тандурустӣ, фарҳанг ва дигар соҳаҳои ҷамъиятии истеъмоли ҳамагонӣ сафарбар мешаванд.

Истифодаи оқилона ва мақсадноки маблағҳои буҷетӣ боиси ҳавасмандии пешрафти ҷомеа мегарданд. Аммо ин тариқи ҳавасмандгардонӣ ба таври ғайримустақим амал мекунад, таъсири мустақим намерасонад ва баъзан таъсири он баъд аз солҳои зиёде зоҳир мегардад.

Маблағҳои молиявӣ барои инкишофи тамоми соҳаҳои фаъолияти ғайриистеҳсолӣ ва ҷамъиятӣ дар истеҳсолот ба вучуд оварда мешаванд, бинобар он, истеҳсолот объекти асосии ҳавасмандӣ мебошад. Аз ин ҷо бармеояд, ки ба андоз функсияҳои ҳавасмандгардонии мустақим хос намебошад.

Маънии истилоҳи "ҳавасмандгардонӣ" (стимул) ташвиқ кардан (барангехтан) ба коре (рафторе, амале) мебошад. Барангехтан ба ин ва ё он рафтор (амал) танҳо тавассути мукофот ва ҷазодиҳӣ имкон мегардад. Дар андозбандӣ кор фармудни мукофот (ҳавасмандгардонӣ), санксия ё ҷазо амалиёти танзимдиҳӣ мебошад. Зеро ки ҳардуи инҳо тақозои вазъи ин ва ё он соҳаи фаъолияти молиявӣ-ҳочагӣ буда, даҳолати муайяни обективиро талаб мекунад.

Функсияи танзимии андозӣ дар амалияи воқеъӣ ба ду шакл зоҳир мегардад: имтиёзот ва санксия (ҷазо). Санксияҳои андозӣ тавассути таъсири функсияҳои назоратии молия зоҳир мегарданд. Бинобар ин, танзими андозӣ ҳосияти назоратро ҳам дарбар мегирад. Дар амалияи воқеъӣ сфераи назорати андозӣ бо санадҳои махсуси қонунгузорӣ салоҳият дода мешавад. Меъёрҳои ҳукукии махсус барои субъектҳои назорати андозӣ, ҳуқуқ ва вазифаҳои онҳо амал мекунанд.

Оиди функсия ва вазифаҳои умури андоз, аудиторҳо, полиси андоз, департаментҳои ҳукумати ва қонунгузорӣ ва комиссияҳо қонунҳои махсус қабул карда мешаванд.

Имтиёзот ва санксияҳои андозӣ, ки вобаста ба вазъи конкретӣ андешида мешаванд, дар қонунҳои андоз муқаррар карда шудаанд. Ба кор бурдани онҳо аз рӯи ҳар як андози алоҳида муайян карда мешавад. Низомии умумии санксияҳо мутобиқи қонуншиканӣҳои андоз дар боби 10 моддаҳои 73-89 "Кодекси андози Ҷумҳурии Тоҷикистон" муқаррар гардидааст.

Дар баробари ин оиди мазмуни қонуншиканӣҳои андоз ва санксияҳои ба ҷавобгарӣ кашидан нисбати қонуншиканӣ, инчунин вариантҳои имтиёзот бо қонунҳои андозӣ оид ба ҳар намуди андоз муайян карда мешаванд. Маҷмӯи амалиёти функционалии системаи андозбандӣ аз механизми андозбандӣ иборат буда, элементҳои (ҷузъҳои) зеринро дарбар мегирад: ба нақшагирӣ, танзимдиҳӣ ва назорат. Ин чун функсияи умумии тамоми системаи андозбандӣ эътироф шудааст.

Таъсирбахшии системаи андозбандӣ ба роли андозҳо вобаста мебошад. Таъсири ин ё мусбӣ ё манфӣ шуда метавонад. Ин нақш хусусан дар доираи андозҳои алоҳида зоҳир мегардад. Нақши андоз онгоҳ мусбӣ шуда метавонад, ки потенциали (иқтидори) андозбандӣ дар амалияи воқеъӣ ба таври максималӣ (дараҷаи баланд) татбиқ гардад ва тибқи он байни функсияҳои андоз ба қадре мувозинат ба даст оварда шавад. Дар амалияи воқеъӣ ин чун андозситонии муносиб зоҳир мегардад ва ба шарте ки манфиатҳои андозсупорандагон коҳиш наёбанд. Шарҳи роли (мақоми) андозҳо масъалаи муҳими таҳқиқоти илмӣ – амалӣ мебошад.

Мақоми андозбандӣ дар аксари соҳаҳои иқтисодӣ зоҳир мегардад, ки он дар нақши 1 акс ёфтааст. Дар ин нақш гуногуншаклӣ ва сермаъногии амалиёти андозҳо тасвир ёфтааст. Бинобар ин, таъмин намудани таъсири андозбандии мусбӣ ба соҳаҳои молиявӣ - ҳочагӣ ва дигар фаъолиятҳои ҷамъиятии судманд масъалаи душвор ва ниҳоят ихтилофнок мебошад.

Муҳолифот аз он иборат аст, ки мақсади давлат ба ҳадди максималӣ ситонидани андозҳо буда, аммо мақсади андозсупоранда - ба ҳадди минималӣ расонидани ҳаҷми андоз мебошад.

Ҳалли масъалаи ниҳоят муҳим - муносиб гардонидани андозбандӣ ба омилҳои объективӣ ва субъективӣ вобаста аст.

Андозбандӣ дар зери фишор ва таъсири якҷояи иқтисодӣ ва сиёсат ташаккул меёбад. Андозбандӣ дар ҳаёти иқтисодии воқеӣ сатҳи (дараҷаи) рушду камолоти иқтисодӣ ва сиёсии ҷамъиятро инъикос мекунад.

Ҳангоми андозбандӣ манфиатҳои давлат ва андоздиханда ба ҳамдигар бар меҳӯранд (ба ҳамдигар зид мебароянд). Онҳо ба мақоми андозбандӣ - ҳар кадом аз нигоҳи худ баҳо медиҳанд. Бинобар ин, дар системаи андозбандӣ барои ҳар ду тарафи муносибатҳои ҳуқуқии андозбандӣ мақоми баробарӣ ҷой надорад. Алалхусус дар шароитҳои бӯҳрони иқтисодӣ ва сиёсӣ ихтилофоти манфиатҳои давлат ва андозсупорандагон шиддатнок мегарданд. Дар ин мавридҳо намоёндагони ҳокимияти иҷроӣ ва қонунгузорию зарур аст, ки аз вазъи танзимшавии андоз воқиф бошанд ва дар айни замон ҳам ба системаи андозбандӣ ва ҳам ба тамоми соҳаҳои муносибатҳои истисноӣ ислоҳоти дахлдор ворид гардонанд.

Аснои шарҳу баҳодихӣ ба мақому роли андозҳо дар ташаккули даромадҳои буҷет таносуботи байни маблағҳои воридгардида ба буҷет ва маблағҳои гурӯҳҳои якҷанд намудҳои андозҳо ва инчунин маблағи андозҳои ҷудоғона аз як ҷониб ва аз ҷониби дигар маблағи умумии даромадҳои буҷетӣ муқоиса ва ошкор карда мешаванд. Вазни қиёсии ин ва ё он гурӯҳи андозҳо, намуди андоз, мақоми хеле баланд доштаи онҳо дар ташаккули даромадҳои буҷет шаҳодат медиҳад. Ин шакли таҳлил ба таври муқоисаи динамикӣ иҷро карда мешавад ва натиҷаи он имкон медиҳад, ки аҳамияти андозбандӣ дар қори устувор гардонидани сиёсати буҷетӣ муайян карда шавад ва мақоми андозҳо дар ҳалли масъалаҳои иҷтимоӣ ошкор гардад.

Ҳангоми муқоиса намудани таносуботи байни маблағҳои андозҳои ҷудоғона, гурӯҳҳои андозҳо ва маблағи умумии маблағҳои ба буҷет воридгардида маълум мешавад, ки ба кадом гурӯҳи андозӣ ё намуди андоз мақоми фискалии даромадҳои буҷетӣ хос аст.

Мақомоти фискалии андозбандиро инчунин маълумотҳои оиди ҳиссаи ситонидашудаи даромадҳои корхонаҳо ва даромадҳои шахрвандон нишон медиҳанд. Ин шакли таҳлил аз гаронии бори андоз шаҳодат медиҳад. Аснои таҳлили мақоми фискалии андозҳо маълумоти дахлдор муқоиса карда мешавад.

Роли фискалии андозҳоро инчунин маълумотҳои оиди маблағи санқсияҳои молиявии ба буҷет воридшуда, маблағҳои давлат барои мақомоти умури андоз ба харҷдода, инчунин маълумотҳои оиди фарқи байни маблағи умумии андозҳои буҷетӣ тасдиқгардида ва бузургии онҳоро дар ҳисоботҳои оиди иҷроӣ буҷет нишон медиҳанд. Чун қоида, ҷабри аз ҳад зиёди фискалӣ сабаби иҷро нагардидани супоришҳои нақшавии пардохти андозҳо мегардад.

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## АЗ ТАЪРИХ ВА ПАЙДОИШИ ИЛМИ ОМОР

ДАВЛАТОВ МУЊАММАДИБРОЊИМ БЕКМУРОДАВИЧ

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***Аннотатсия:** Дар ҷомеаи муосир, омор дар идоракунии иқтисодӣ нақши муҳим мебозад. Новобаста аз сатҳ ва марҳилаи рушди иқтисодӣ ё хусусияти низоми сиёсӣ, омор дар тӯли асрҳо ҳамчун воситаи зарурӣ ва муассири идоракунии давлатӣ ва ҳамзамон ҳамчун илме, ки ҷанбаи миқдорӣ падидаҳои оммавиरो меомӯзад, хизмат кардааст.*

***Калидвожа:** истеҳсолот, қувваи истеҳсолот, табиӣ, техники, нишондиҳанда, хароҷот, меҳнат, миқдор, инкишоф.*

***Аннотация:** В современном обществе важную роль в механизме управления экономикой выполняет статистика. Независимо от уровня и стадии экономического развития, характера политической системы, статистика на протяжении сотен лет своего существования всегда выступала как необходимый и эффективный инструмент государственного управления и одновременно как наука, исследующая количественную сторону массовых явлений.*

***Ключевые слова:** производство, производительная сила, природный, технический, показатель, затраты, труд, количество, развитие.*

Омор яке аз соҳаҳои асостарини илмҳои иқтисодӣ ба ҳисоб меравад, илми омор методологияи таълими илтимоию – иқтисодии омориро қор қарда баромадаст, ӯнамаи ин услубият усулҳои бо ӯнам алоқамандро дар бар мегирад. ӯнамаи ин усулҳо дар таълими ӯндисаҳои илтимоию-иқтисодӣ мақоми хос ва аъамияти худро дорад.

Ҷузориш ба иқтисоди бозоргонӣ барои ҷузaronидани илми омор ба низоми ӯнисоботи миллӣ (наҷ. счёта) водор намуд, ки ин аз рӯйи стандартҳои байналхалқӣ буда, эътибори оморро ба зинаи баланд бардошт. Аз ин рӯ, омӯзиши аъамияти усулҳои оморӣ дар таълими ӯндисаҳо ва просессҳои ӯнаёти ӯамбиятӣ рӯзмара гардидаанд.

Истифодаи усулҳои оморӣ дар давраи иқтисоди бозоргонӣ барои таълими ӯндисаҳои илтимоию-иқтисодӣ хеле рӯзмара мебошад, усулҳои таълими динамики аъамияти хеле қалон дорад.

Асоси усули динамики принципи диаэтрики тараққийёт мебошад. ӯ нишон медиҳад, ки ӯнамаи ӯндисаҳо ва протсесҳо (ӯараёнҳо) дар табиат ва ӯамбияти инсонӣ ӯнамеша дар ӯаракат ва тараққийёт мебошад.

Воқеият ва аъамияти омӯхтани усули динамики боз дар он аст, ки бо ёрии он мо метавонем нақат тағйиротҳои қонуниятҳои ӯндисаҳои ӯамбиятию илтимои-иқтисодиро дар даври омӯхташаванда дарқ намоем, инчунин муъимтараш онҳоро пешбинӣ намоем, ки ин лаъзаи муъими таълими оморӣ мебошад.

Ба омӯзиши ӯар як илм шурӯъ намуда, пеш аз ӯама бояд маълум намуд, ки он чиро ва чӣ гуна таъкиқ менамояд, яъне фанни он чӣ мебошад ва аз чӣ гуна метод ва ё методҳои он истифода мебарад. ӯавоби аниқ ва дуруст ба ин саволҳо аъамияти муъим дорад ва барои ӯалли бисёре аз масъалаҳои шакли илм ва хусусан барои тайёрии қарҳои қаландихтисос дар мактаби олі аъамияти қалидӣ дорад.

Фан ва методи ӯар як илмо муайян намуда, падидаҳои онро метавон ӯаматарофа ва амиқ омӯхт, моъият ва қонунҳои онро ошқор намуд, ин қонунҳоро аз худ намуда ва онҳоро дар фаъолияти амалӣ метавон истифода бурд. Аз ин рӯ, ба омӯзиши омор оғоз намуда, бояд донист, ки он на танҳо фаъолияти амалии одамон мебошад, ки бо ӯамбоварии маълумотҳои

миқдорї ва коркарди он машѓуланд ва ё ки он қатори беохири ададњо мебошад, ки дар таблитсањо лямњоварї шуда дар маълумотномањои оморї чоп мешавад.

К.Маркс дар бораи як маълумотномаи оморї, ки соли 1859 дар Англия ба чоп расида буд ва назар ба нашрияњои омории муосир камтар эътибор дошта буда, навишта буд: «чї қадаре, ки ин раќамњои дар сутунчањо овардашуда назарногир бошанд њам, лекин дар асл онњо барои таърихи рушди умумии миллат назар ба китобњои калонњалм, ки пур аз чопњои бењуда њастанд, маводи пурќимматтар медињанд»[1].

Масъала дар бораи фанни омор хеле мураккаб аст. Он якчанд маротиба муњокима гардидааст, чунки омор бо даври васли падидањо ва равандњо саруқор дорад, ки онњо фанни дигар илмњо мебошанд, хусусан илмњои лямњиятшиносї. Инчунин, дар бисёр илмњо методњои омории таќќикот васеъ истифода мешаванд.

Калимаи «Омор» аз калимаи латинии «Status» гирифта шуда, мањноаш вазъ, вазъи падидањо мебошад. Аз ин реша калимањои «Stato» (давлат) «Statista» (оморчї –донандаи давлат), «Statistica» (статистика –љавоби муайяни донишњо, маълумотњо, дар бораи давлат) ба миён омадааст[3, с.125]. Истилоњи «омор» садсолањоро аз сар гузаронидааст, њарчанд ки мундариљаи он якчанд маротиба таѓйир ёфтааст.

Омор њамчун фаъолияти амалї таърихи чандсоларо дорад. Пайдоиши он ба давраи ташаккулёбии лямњияти синфї ва давлатї рост меояд. Талаботњои њарбї ва хољагидорї дар давраи хеле қадими таърихи инсоният зарурияти бањисобгирии ањолии мардонро, ки аслиња бардошта метавонистанд ва минбаъд бањисобгирии шумораи умумии ањолї, њайат, фаъолияти онњоро ба миён оварданд. Дар алоќа бо ин дар давраи қадим ва асрњои миёна корњои калони оморї –бањисобгирии ањолї, замин, моликият –пеш аз њама барои ситонидани хироль –гузаронида мешуд. Чунин корњо дар Хитой, Вавилон, Рим ва дар Юнони қадим гузаронида мешуд.

Дар асрњои миёна феодалњои алоњида хусусан калисо, бањисобгирии аморатњои худро мегузарониданд. Бо рушди лѳмеа талабот ба маълумоти оморї меафзояд, давраи падидањое, ки бояд ба њисоб гирифта шаванд, васеъ мегардиданд. Рушди шаърњои савдо, низ талаботро ба омор меафзояд.

Дар асри XVI маълумњои оморї пайдо мешаванд, ки вазъи лѓуѓрофї, сиёсї ва иќтисодии давлатњои гуногунро таснифот менамоянд.

Дар асри XVII зери таъсири талаботњо ба донишњои гуногун дар бораи давлат самти тасвири дар омор пайдор шуд, ки онро давлатдорї меномиданд ва дар он вазифа ва методи омор аз тасвири дастовардњои давлатї иборат буд: ташкили сиёсї ва маъмурии давлат ва шартњои табиї, њудудњо, иќлим, ањолї, иќтисод ва дигар объектњое, ки вазъи давлатро тасниф менамоянд. Аз маълумњои то имрўз расида дида мешавад, ки аз рўйи мањдудияти таснифотњои ададї асосан таснифотњои дањонї зиёд буданд.

Ба он нигоњ накарда, ки давлатдорї њамчун самт дар соњаи омор дар асри XVIII њукумфармої мекард, њатто дар баъзе мамлакатњо то асри XIX ба монанди Русия, аз рўйи таснифоти тасвири доштанањо то сатњи илм боло нарафтааст. Беасос давлатдорї номи «бачагии илми омор» -ро нагирифтааст. Чунки он ба сатњи илм, хусусан назарияњои иќтисодии њамон давра мувофиќат мекард, ва дар он қонуниятњои лямњонї объективї аз нуќтаи назари на илм балки дин дида баромада мешуданд.

Пайдоиши омор њамчун илм ба он давра дохил мешавад, ки капитализм дар раванди барқарорсозии худ муњити хубро барои рушди илм муњайё мекард. Омор њамчун илм дар якљоягї бо иќтисоди сиёсї ва назарияи иќтисодї як қатор соњањои хољагии қишлоќ ва демография дар асарњои У.Петтї (1623 -1687) ба вуљуд омадааст. К.Маркс дар бораи ў навишта буд, ки «ў падаи иќтисоди сиёсї ва як қатор ихтироъкорї омор низ њаст» [6, с. 34] ва ў дар бораи асосњои падидањо сухан мегўяд. Камин тавр, агар предмети системаи меркантилї, ки дар Англия пеш аз иќтисоди классики сиёсат вуљуд дошт, ташхиси пардохтњои рўякии равандњои муруљаи ва метод –инњикоси пардохтњои мушоњидашаванда бошад, фанни иќтисодї классики сиёсат, чї хеле ки К.Маркс навиштааст «вобастагии дохилии

муносибатҳои буржуазии истеъсолот мебошад»]. Барои таснифоти онҳо У.Петти маълумоти омориро зиёд ҷалб мекард, на танҳо барои инъикоси одди, балки барои таълили моҳияти падидаҳои ҷаҳти ҷамъияти, барои ошкорсозии қонуниятҳои ба онҳо хос.

Байни намоёндогони мақоти «Арифметикаи сиёси» нақши бузургро дар пайдо гардидани омор ҷамҷун илм, ки қонуниятҳои ҷаҳти ҷамъиятиро меомӯзад, асарҳои Д.Граунт (1620 -1674) дошт, ки ӯ ҷамҷамони У.Петти буд.

Д.Граунт аввалин маротиба қонуниятҳои махсусро муқаррар намуд, ки ба падидаҳо ва равандиҳои оммави таалуқ доранд ва дар асоси метрикаҳои таблитсаҳои фавтнокиро коркард намуд. Ба он нигоҳ накарда, ки дар он вақт қонуни рақамҳои калон вуҷуд надошт, Граунт ва Петти якумин шуда, дарк намуданд, ки қонуниятҳои онҳо ошкор намуда танҳо дар асоси мушоҳидаҳои оммави ба даст меоянд. Д.Граунт таълил намуд, ки аз рӯи миқдори таваллуд ва фавтноки мушкил аст, ки шумораи аҳолии шаҳро муайян намуд. Ӯ навишта буд, ки «Ҷарчанд, ки ман фикр намекунам, ки бюллетена як ҷафтаина барои асоснокии ин ҳулоса кифоя аст, лекин ман пешбини менамоем, ки як чанд бюллетенҳои солона –ин яке аз роҳхати осон ва беҳтари муқаррарсозии шумораи аҳоли мебошад»[5, с.9 ].

Бо тадқиқоти худ Петти ва Граунт ба илми омор ибтидо гузоштанд. Аз он давра зиёда аз 300 сол гузашт. Дар ин садсолаҳо омор дар инкишофи худ марҳалаҳои гуногунро гузашта аз рӯи гуфтаи мутахассисон «ба яке аз аслиҳои пуриқтидори дарки илми»[2, с.121] табдил ёфтааст. Оморо, пеш аз ҷама, олимони барҷастаи соҳаи омор инкишоф додаанд. Ба қатори ин олимони, ки дар асарҳои онҳо назарияи омор инкишоф дода шудааст дохил мешаванд. Д.П.Журавский (1810 -1856), П.П.Семенов, Тён –Шанский (1827 -1914), Ю.Э.Ленсон (1835 -1893), А.И.Чупров (1842 -1908), А.А.Кауфман (1864 -1919), А.А.Чупров (1874 -1926) ва дигарон.

Дар рушди назарияи тоинқилобии омор нақши бузургро омери умумидавлати бозид, ки ба камбудии нигоҳ накарда қоршиносон онро хеле баланд баҳогузори намуданд.

Марҳалаи дигар дар рушди омор бо асарҳои К.Маркс ва Ф.Энгелс алоқаманд аст. Ҷатто дар асарҳои онҳо дар солҳои 40 -60-ум, ки пеш аз «Капитал» навишта шудаанд, маводи оморӣ хеле васеъ истифода бурда шудааст. Дар асарҳои К.Маркс ва Ф.Энгелс муқаррароти ибтидоии омри нав ҷой доранд. Асосҳои материализми диалектики ва таърихи ва иқтисоди нави сиёси барои марҳалаи нав дар инкишофи омор замина гузоштанд. Онҳо имкон доданд, ки бисёре аз масъалаҳои муҳими илми омор ҷалли худро ёбанд.

Инкишофи минбаъдаи омор дар давраи тоинқилоб ва баъдиинқилоб бо асарҳои ва фаъолияти В.И.Ленин алоқаманд аст. Муқаррароти, принсипҳои ва методҳои омор, ки дар асарҳои ӯ асоснок гардидаанд, зери роҳбарии бевоситаи ӯ ва иштироки пайдошави, барқароршавии якумин давлати сотсиалисти дар ҷаҳон ба амал омадааст.

Инкишофи минбаъдаи омор дар асарҳои олимони Шӯравӣ –академики С.Г.Стумилин (1877 -1974), В.С.Немчинов (1894-1964), аъзо –корреспондентони А.И. Смит –Фалькнер (1878 -1968), В.Н.Старковский (1905 -1975) ва дигарон дида мешавад.

Аз маълумоти қутоҳи таърихи бармеояд, ки:

а) омор дар асри XVII ҷамҷун илми ҷамъияти, ки падидаҳо ва равандиҳои ҷаҳти ҷамъиятиро меомӯзад, пайдо шудааст;

б) дар байни дигар илми омор ҷамҷун илме, ки паълуҳои миқдории падидаҳо ва равандиҳои оммавиро меомӯзад, барқарори дорад;

в) аллақай дар якумин тадқиқоти оморӣ –иқтисоди ва оморӣ –демографи қонуниятҳои муҳими ҷаҳти ҷамъияти ошкор гардиданд, ки онҳо дар равандиҳои оммави падидор мегарданд. Худи маҷуми қонунияти оморӣ, ки нақши муҳимро дар илми муосир мебошад, дар тадқиқоти оморӣ асри XVIII ба вуҷуд омадааст;

г) омор то наври якумин теоремаи математикӣ дар бораи қонуни адади калон (тебремо –Бернули) аз ин қонун барои омӯзиши падидаҳои оммави истифода кардааст.

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## РАЗРАБОТКА СТРАТЕГИИ ПО СОВЕРШЕНСТВОВАНИЮ ИНВЕСТИЦИОННОЙ ПРИВЛЕКАТЕЛЬНОСТИ СЕЛЬСКОГО ХОЗЯЙСТВА

**САЙДАХМАДОВА ШАРИФГУЛ САМАДОВНА**

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**Аннотация:** В последние годы, несмотря на некоторые признаки оживления экономики сельского хозяйства, положение в инвестиционной сфере остается сложным. Не определены приоритетные сферы эффективного инвестирования, не разработана стратегия привлечения инвестиций в различные отрасли аграрного сектора. В нынешних условиях для привлечения инвестиций необходимо создать определенные условия. Поэтому возможности привлечения инвестиций в сельское хозяйство во многом зависят от того, какие условия созданы для деятельности инвесторов, влияющих на результаты инвестиционного процесса, на сколько благоприятен его инвестиционный климат.

**Ключевые слова:** Экономика, производственные фонды, финансирования, аграрные предприятия, сельское хозяйство.

**Key words:** Economy, production assets, financing, agricultural enterprises, agriculture.

Практика показывает, что многие иностранные инвесторы в Таджикистане находят интересные проекты, осуществление которых является весьма привлекательным и прибыльным. Однако все еще имеет место настороженность, опасение инвесторов потерять свои инвестиции. Вместе с тем, нам представляется, что эти опасения обусловлены и рядом субъективных причин, в том числе недостаточным знанием законов Республики Таджикистан, гарантирующих защиту интересов иностранных инвесторов. Каждое государство должно прилагать усилия для привлечения в страну инвестиций. С этой целью проводится определенная инвестиционная политика и формируется соответствующий инвестиционный климат, на который влияют наличие или отсутствие политической и экономической стабильности в стране, ее географическое положение, налоговые льготы, предоставленные инвесторам возможность свободного вывоза капитала, наличие квалифицированных кадров, соответствующих сырьевых ресурсов, развитость транспортных сетей и другие факторы. Однако, прежде всего, в стране должна существовать определенная правовая основа для инвестиционной деятельности, т.е. должны быть приняты законодательные акты и другие нормативные документы, способствующие привлечению инвестиций.

Данная работа обосновывается выводом о том, что Республика Таджикистан путем привлечения крупных иностранных инвестиций в экономику может добиться устойчивого экономического роста. В стране необходимо создать условия, которые могли бы способствовать привлечению иностранных инвестиций. Необходимо обеспечить политическую стабильность и безопасность, господства закона, проводить хорошо продуманную макроэкономическую политику, ориентированную на обеспечение стабильных цен, твердой налоговой дисциплины и устойчивого равновесия платежного баланса.

Исходным этапом процесса разработки стратегии повышения инвестиционной привлекательности сельского хозяйства Республики Таджикистан является анализ стратегических факторов среды, в которой функционирует сельское хозяйство. Широко используемая и наиболее известная методика SWOT-анализа нами была применена при разработке этой стратегии в сельском хозяйстве (табл.1.).

По нашему мнению, одним из важнейших факторов, влияющих на инвестиционную привлекательность сельского хозяйства республики, является государственная поддержка. В настоящее время существует нормативно-правовая база, регулирующая инвестиционную

деятельность. Анализ основных параметров нормативного правового регулирования инвестиционной деятельности показал, что в Республике Таджикистан законодательно не закреплены в соответствующем законе приоритетные направления инвестиций.

**Таблица 1.**

**SWOT-анализ повышения инвестиционной привлекательности сельского хозяйства Республики Таджикистан**

<b>Сильные стороны (S)</b>	<b>Слабые стороны (W)</b>
<ol style="list-style-type: none"> <li>1. Более высокие льготы иностранным инвесторам на весь срок окупаемости инвестиционного проекта.</li> <li>2. Выгодное экономико-географическое и геополитическое положение, и высокий туристический потенциал.</li> <li>3. Сформированная нормативно-правовая база для привлечения иностранных инвестиций отраслям национальной экономики.</li> <li>4. Богатое историческое прошлое и развитый культурный потенциал.</li> <li>5. Наличие водно-природных ресурсов.</li> <li>6. Благоприятная экологическая ситуация.</li> </ol>	<ol style="list-style-type: none"> <li>1. Низкий уровень доходов сельского населения и низкая квалификация трудовых кадров.</li> <li>2. Низкий производственный потенциал.</li> <li>3. Низкий уровень развития инфраструктурных отраслей и плохое техническое состояние имеющейся производственной инфраструктуры.</li> <li>4. Низкие государственные вложения в аграрную науку.</li> <li>5. Низкий уровень эффективности функционирования рыночных институтов, включая банковские учреждения, реальное отсутствие фондового рынка.</li> <li>6. Практически полное отсутствие вторичного рынка ценных бумаг.</li> </ol>
<b>Возможности (O)</b>	<b>Угрозы (T)</b>
<ol style="list-style-type: none"> <li>1. Развитие отраслей переработки сельскохозяйственной продукции.</li> <li>2. Активная пропаганда инвестиционной привлекательности основных и высокодоходных отраслей сельского хозяйства.</li> <li>3. Принятие закона «Об инвестиции» с учетом отраслевых характеристик сельского хозяйства, экономико-социального положения и географического расположения.</li> <li>4. Создание специального государственного органа, отвечающего за привлечением инвестиций в сельское хозяйство с четкой программой для оздоровления инвестиционного климата и эффективного управления инвестиционным процессом в аграрном секторе республики</li> <li>5. Разработка и экспертиза инвестиционных проектов направляемых в сельское хозяйство за счет государственного бюджета.</li> </ol>	<ol style="list-style-type: none"> <li>1. Основные вложения иностранных инвесторов приходятся на энергетику, промышленность, связь и услуги.</li> <li>2. Недостаток достоверных информации о сельскохозяйственных предприятиях и их инвестиционных проектах для принятия инвестиционного решения</li> <li>3. Неверно выбранные приоритеты инвестиционной политики государства могут негативно отразиться на развитии сельского хозяйства.</li> <li>4. Дальнейшая недооценка инвесторами отраслей сельского хозяйства с учетом производственно-технических, социальных и финансово-экономических рисков может привести к потере инвесторов и еще большему ухудшению инвестиционной привлекательности сельского хозяйства.</li> <li>5. Чрезмерно накопленные долги хлопководческой отрасли могут отрицательно влиять на инвестиционный климат в сельском хозяйстве.</li> </ol>

К таким приоритетам можно отнести развития перспективных отраслей сельского хозяйства, переработка сельскохозяйственной продукции товаропроизводителей, инновационная деятельность в сельском хозяйстве и другие.

До настоящего времени остается недостаточным объем инвестиции в развитии отраслей сельского хозяйства. В 2024 году общий объем инвестиции, включая кредиты банков, привлеченные в аграрный сектор республики, составляет 128,5 млн долларов. Исследованиями выяснилось, что уровень вложения инвестиций в сельское хозяйство не соответствует уровню использования. Поэтому эффективное использование инвестиций имеет непосредственное влияние на реальное повышение инвестиционной активности отраслей сельского хозяйства.

В условиях рынка необходимость привлечения инвестиций в сельское хозяйство является одной из важнейших задач на ближайшие годы, без решения которой невозможно оздоровление аграрного сектора республики. В настоящее время в сельском хозяйстве страны сохраняется ряд системных проблем. Они являются сдерживающими факторами в дальнейшее развитие отрасли и привели к снижению инвестиционной активности и создают неблагоприятный инвестиционный климат в сельском хозяйстве.

В последние годы коммерческие банки республики заинтересованы финансировать аграрный сектор. Прежде всего, это связано с ростом привлекательности некоторых отраслей сельского хозяйства и усилением системы государственной кредитной поддержки аграрного производства. Однако, долгосрочные кредиты не получили широкого распространения в сельском хозяйстве. Поэтому для восполнения этого пробела коммерческим банкам необходимо внести изменения в свою политику и увеличить объемы выдачи долгосрочного кредита сельскому хозяйству.

В условиях Таджикистана, когда отрасль хлопководство является убыточной, перспективным и приоритетным направлением может стать вложение капитала в развитие садоводства и виноградарства, которые в нашей республике имеют важное народнохозяйственное значение. Вместе с тем, практическая значимость развития этих отраслей открывают возможности роста аграрной экономики и экспортного потенциала страны. Для увеличения производства продукции этих культур и насыщения рынка качественной отечественной продукцией, необходимо оказать поддержку развитию горно-долинного садоводства через механизм предоставления бюджетных средств и за счет средств отечественных и иностранных инвесторов. Необходимо стимулировать развитие плодоводства и виноградарства путем создания и модернизации имеющихся мощностей перерабатывающего комплекса, развития рынка, сбыта продукции с активным применением налоговых и ценовых рычагов.

Для дальнейшего развития сельского хозяйства и повышения качества и урожайности сельскохозяйственных культур, а также для поднятия экономики этой отрасли предлагаем принять следующие меры:

- необходимо применять на практике научные достижения и передовой опыт, которые являются одним из основных факторов повышения эффективности отраслей сельского хозяйства;

- необходимо принять первоочередные меры по совершенствованию материально-технической базы сельского хозяйства путем обновления парка машин и оборудования за счет лизинговых поставок. Целесообразно в регионах республики создать такое снабженческое предприятие, которое могло бы обеспечить достаточным количеством материально-техническими ресурсами (минеральные удобрения, ядохимикаты, топливо, смазочные материалы, сельскохозяйственные техники и запасные части), а также качественными высокоурожайными и научно испытанными элитными семенами по реальной рыночной цене;

- Министерство сельского хозяйства Республики Таджикистан, Таджикская Академия сельскохозяйственных наук и Таджикский аграрный университет в ходе реализации

грантовых программ международных финансовых организаций на местах должны организовать тренинги по изучению современных методов и передовой технологии производства, обработки и реализации сельскохозяйственных культур;

- соответствующим министерствам и ведомствам необходимо разработать инвестиционные проекты по развитию сельского хозяйства и программы по улучшению оросительных и мелиоративных сетей в сельской местности;

- необходимо разработать государственные целевые программы развития отдельных отраслей сельского хозяйства, отражающие политику Правительства Республики Таджикистан.

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