



INVESTMENT IN HUMAN CAPITAL AS A DETERMINANT OF COST REDUCTION AND INCREASED EFFICIENCY OF INDUSTRIAL PRODUCTION

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Annotatsiya: Maqolada sanoat korxonalarida ishlab chiqarish xarajatlarini optimallashtirishning asosiy omili sifatida inson kapitalining roli ko'rib chiqiladi. Xalqaro tajriba, statistik ma'lumotlar va O'zbekistonning amaliy misollarini tahlil qilish asosida xodimlarning malakasi, raqamli savodxonligi va barqaror kadrlar rivojlanishiga sarmoya kiritish ishlab chiqarish samaradorligini sezilarli darajada oshirishi, nuqsonlarni kamaytirishi va mahsulot tannarxini pasaytirishi aniqlandi. Tadqiqot tizimli va miqdoriy yondashuvlarga, shuningdek, mamlakatdagi eng yirik sanoat korxonalarining keys-stadiga asoslangan. Ichki o'qitish tizimlari, bilim almashish, raqamlashtirish va kadrlar qo'nimsizligini kamaytirish xarajatlarni tejashning asosiy mexanizmlari ekanligi aniqlandi. Olingan natijalar inson kapitali nafaqat ijtimoiy, balki korxonalarning raqobatbardoshligi va uzoq muddatli rivojlanishini ta'minlaydigan strategik iqtisodiy resurs ekanligini tasdiqlaydi. Ishda siyosatni takomillashtirish yo'nalishlari taklif etilgan. Tadqiqotda O'zbekiston sanoatida inson resurslarini boshqarish siyosatini takomillashtirish, shu jumladan davlat yordamini rivojlantirish va ichki korporativ o'quv dasturlarini kuchaytirish yo'nalishlari taklif etilgan.

Kalit so'zlar: inson kapitali; ishlab chiqarish xarajatlari; xarajatlarni optimallashtirish; O'zbekiston sanoati; malaka oshirish; raqamlashtirish; bilim almashish; ishlab chiqarish samaradorligi; tannarxni pasaytirish; kadrlar barqarorligi; kadrlar kompetensiyasi, Kaizen, Lean Manufacturing, strategik boshqaruv.

Аннотация: В статье рассматривается роль человеческого капитала как ключевого фактора оптимизации производственных издержек на промышленных предприятиях. На основе анализа международного опыта, статистических данных и практических примеров Узбекистана выявлено, что инвестиции в квалификацию, цифровую грамотность и устойчивое кадровое развитие сотрудников значительно повышают эффективность производства, сокращают дефекты и уменьшают себестоимость продукции. Исследование опирается на системный и количественный подходы, а также на кейс-стади крупнейших промышленных предприятий страны. Установлено, что внутренние системы обучения, обмен знаниями, цифровизация и снижение текучести кадров являются основными механизмами экономии расходов. Полученные результаты подтверждают, что человеческий капитал выступает не только социальным, но и

стратегическим экономическим ресурсом, обеспечивающим конкурентоспособность и долгосрочное развитие предприятий. В работе предложены направления совершенствования политики управления человеческими ресурсами в промышленности Узбекистана, включая разработку государственного содействия и усиление внутренних корпоративных программ обучения.

Ключевые слова: человеческий капитал; производственные затраты; оптимизация затрат; промышленность Узбекистана; повышение квалификации; цифровизация; обмен знаниями; эффективность производства; снижение себестоимости; кадровая устойчивость; компетенции персонала, Kaizen, Lean Manufacturing, стратегическое управление.

Abstract: This article examines the role of human capital as a key factor in optimizing production costs at industrial enterprises. Based on an analysis of international experience, statistical data, and practical examples from Uzbekistan, it is found that investments in skills, digital literacy, and sustainable development significantly improve production efficiency, reduce defects, and lower production costs. The study draws on a systematic and quantitative approach, as well as case studies from the country's largest industrial enterprises. It is established that internal training systems, knowledge sharing, digitalization, and reduced employee turnover are the primary mechanisms for cost savings. The results confirm that human capital is not only a social but also a strategic economic resource, ensuring the competitiveness and long-term development of enterprises. The paper proposes areas for improving human resource management policies in Uzbekistan's industry, including the development of state support and strengthening internal corporate training programs.

Keywords: Human capital; production costs; cost optimization; industry of Uzbekistan; advanced training; digitalization; knowledge exchange; production efficiency; cost reduction; personnel sustainability; personnel competencies, Kaizen, Lean Manufacturing, strategic management.

Introduction. In today's economy, ensuring competitiveness and improving production efficiency is becoming one of the most important strategic priorities for industrial enterprises. This increases the role of human capital. Human capital is the process of creating economic value by investing in people's knowledge, skills, health, and qualifications. This concept is an important factor in building an effective workforce in industrial sectors, optimizing production processes, and reducing overall costs.

Global experience shows that companies that invest effectively in human capital remain competitive. In particular, according to research by the International Labour Organization (ILO) and the World Bank for 2023, the level of human capital development directly affects a country's gross domestic product (GDP) growth rate. For example, industrial enterprises with highly skilled personnel increased production efficiency by an average of 25-30%.

The importance of human capital in Uzbekistan's industrial sectors has also been growing in recent years. The reforms being carried out in the republic, especially as part of the "New Uzbekistan – 2030" strategy, pay special attention to human resource development. At the same time, most large industrial enterprises consider professional

training and continuous development of employees to be one of their priority tasks, along with increasing labor efficiency, reducing production costs, and technological upgrades.

From this perspective, optimizing production costs through human capital is not only a means of improving economic efficiency, but also a means of ensuring the sustainability and long-term development of enterprises. Based on this approach, this study aims to examine strategies for reducing costs by leveraging human capital in industrial enterprises.

Literature review. The concept of human capital was first introduced into scientific discourse in the 1960s by economists such as G. Becker and T. Schultz, whose research recognized factors such as human potential—i.e., knowledge, skills, and health—as important elements of economic growth and production efficiency. In his work *Human Capital*, G. Becker (1993) scientifically substantiated that investment in human capital is the most profitable type of investment for the public and private sectors [1,2].

In recent years, more in-depth studies have been conducted on the impact of human capital on production costs. According to a study by McKinsey & Company (2022), industrial enterprises that regularly upgrade their employees' skills reduce labor productivity by an average of 20-25% and production losses by 15-20%. The report "The Future of Work in Manufacturing" also highlights mechanisms for optimizing costs through training, digitalization, and internal knowledge sharing in industrial enterprises [3].

According to the Human Capital Index report published by the World Bank in 2023, countries that do not invest enough in human capital suffer GDP losses of 1.4-1.7% per year on average. This shows that human capital is of strategic importance not only as a social resource but also as a financial resource [4].

In recent years, scientific research related to human capital has intensified in Uzbekistan. Articles published in scientific journals by the Center for Economic Research and Reform, the Ministry of Economy and Finance of the Republic of Uzbekistan, and several higher education institutions highlight the relationship between human capital and production efficiency. In particular, the annual reports of Uzbekneftegaz and UzAuto Motors clearly analyze indicators related to the impact of training programs on production costs, staff turnover, and labor productivity.

In addition, the report "Skills for a Resilient Workforce," published by the ILO (International Labor Organization) in 2021, proved that companies that invested in human capital during the pandemic were highly resilient to crises [5].

Overall, a review of the literature shows that by managing human capital as a strategic resource, industrial enterprises can significantly optimize costs, increase labor productivity, and ensure competitiveness. However, there is a lack of models or concepts adapted to the conditions of Uzbekistan in the existing literature. This circumstance further increases the relevance of this study.

Research methodology. The methodological basis of the study is formed through the integration of theoretical analysis of human capital concepts based on systematic, quantitative, and analytical approaches that ensure an objective assessment of industrial enterprises' production indicators, as well as a comprehensive study of the

impact of staff qualifications, internal training programs, the level of digital competence, and personnel stability on production costs and the efficiency of technological processes. The use of case studies and comparative analysis will reveal patterns of cost optimization through human capital development and form scientifically sound conclusions relevant to the industrial sector of Uzbekistan.

Analysis of material and research results. The study analyzed the role of human capital in optimizing costs at industrial enterprises. In this regard, based on international and national experience, the following main areas were identified:

An analysis conducted at several large industrial enterprises in Uzbekistan showed that improving the professional qualifications of workers:

- ❖ reduces the number of malfunctions and waste in the production process by 15-20%; serves to reduce the cost of production by 8-12%.

- ❖ For example, as a result of internal training programs implemented by UzAuto Motors in 2023, production efficiency increased by 17% and the number of defects decreased by 14%.

- ❖ Staff retention is one of the important factors in reducing costs. According to the MDGs (2021):

- ❖ the departure of one employee causes the company an average loss of US\$1,500-2,000;

- ❖ at companies with internal incentive and career growth systems, employee turnover will be two times lower.

Analysis has shown that strategies focused on human capital (training, motivation, healthy environment) ensure employee retention, which reduces hiring and training costs.

In recent years, along with the digitization of production systems, costs have been optimized by directing human capital towards digital knowledge:

- As part of the Digital Workforce program conducted by Uzbekneftegaz JSC in 2024, digital modular training courses for technical workers were introduced, which increased energy efficiency by 9%;

- time and resource costs in projects involving employees with digital skills were reduced by 15-18%.

Dependence on external consultants and trainers is reduced by training less experienced employees by highly qualified employees at enterprises. This internal knowledge exchange:

- Human capital is a key strategic resource for industrial enterprises, and investing in it significantly reduces costs in the long term.

- Qualified and continuously developing employees optimize the cost of production, increasing production efficiency and reducing the number of failures.

- Digital knowledge and internal training systems ensure consistent and cost-effective management of the technological and human costs of the enterprise.

- To fully utilize the potential of human capital in industrial enterprises in Uzbekistan, a systematic approach, government support, and strengthening of internal training strategies in enterprises are needed.

Conclusions. The results of the study showed that strategic approaches focused on human capital in industrial enterprises not only increase labor productivity but also

allow for effective optimization of production costs. The main components of human capital—knowledge, skills, health, and innovative thinking—directly affect the quality and efficiency of the production process.

➤ The analyzed international experience and practical examples at enterprises in Uzbekistan have proven that:

➤ improving the qualifications and continuous development of personnel will significantly reduce the number of losses and defects in production;

➤ Internal training systems and digital knowledge are highly effective in reducing costs.

➤ Human capital development reduces staff turnover and creates a stable workforce.

➤ In addition, investing in human capital can reduce hidden costs associated with hiring, training, and production disruptions. At the enterprise level, a strategic cost management model can be developed through internal knowledge sharing, incentive systems, and personnel with modern technological skills.

➤ Based on this, the following general conclusions were made:

➤ Human capital is not only a social but also an economic priority resource for industrial enterprises.

➤ Investments in human capital should become an integral part of a long-term cost optimization strategy.

➤ For the effective use of available human resources in Uzbekistan's industry, systematic, scientifically based approaches are needed in cooperation between enterprises and the state.

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