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THE POTENTIALS AND CHALLENGES OF ARTIFICIAL INTELLIGENCE IN KAZAKHSTAN'S MODERN TRANSFORMATION

The rapid advancement of digital technologies globally is reshaping societal structures and influencing new trends that deviate from traditional developmental paths. As artificial intelligence (AI) emerges as a pivotal innovation within this technological revolution, its integration across various domains has highlighted both new opportunities and pressing challenges. Initially confined to technical disciplines, AI now prompts public discourse on potential societal impacts, particularly in the humanities where ethical transformations raise concerns. The Fourth Industrial Revolution, particularly AI, is transforming modern life, especially the labor market. AI is automating routine tasks, enhancing efficiency but also displacing jobs. While AI is expected to create new opportunities, its rapid integration raises ethical and legal concerns, including data privacy, ownership, and algorithmic bias. As high-skilled jobs grow, educational institutions must prepare individuals with adaptive skills. Emphasizing "AI literacy" and lifelong learning is crucial for equipping people to thrive in an AI-driven world, ensuring social resilience and a balanced transition. This article examines the scientific discourse surrounding these issues, analyzing the core ethical dilemmas in a transformed society – a discourse that holds particular relevance for the swiftly evolving technological landscape of Kazakhstan.

Key words: society, transformation, artificial intelligence, Kazakhstan, new opportunities and challenges, ethical dilemmas.

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Қазіргі Қазақстан трансформациясындағы жасанды интеллект мүмкіндіктері мен тәуекелдері

Әлем бойынша цифрлы технологиялардың қарқынды дамуы қоғам болмысын трансформациялап, оның дәстүрлі даму жолына қатысты жаңа трендтерге ықпалын тигізуде. Технологиялық революцияның жасанды интеллект сынды соңғы жаңашылдығы қоғамның түрлі салаларына енгізіле келе, көптеген жаңа мүмкіндіктер мен жаңа мәселелерді өзектендіріп отыр. Бастапқы кезде техника саласының жетістігі қазіргі кезде көпшілік қауымды толғандыруда негіз бар. Гуманитарлық сала зиялылары да бұл мәселелерге этиканың негізгі қағидалары трансформациясы тұрғысынан алаңдаушылық білдіреді. Ұсынылып отырған мақалада көтерілген мәселелер аясындағы ғылыми дискурстар зерделеніп, трансформацияланған қоғамдағы негізгі этикалық дилеммалар талданған. Бұл дискурстар мен мәселелер технологиялық тұрғыда қарқынды даму үстіндегі қазақстандық қоғам үшін маңызды болып табылады.

Түйін сөздер: қоғам, трансформация, жасанды интеллект, Қазақстан, жаңа мүмкіндіктер мен мәселелер, этикалық дилеммалар.

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Возможности и риски искусственного интеллекта в трансформации современного Казахстана

Стремительное развитие цифровых технологий во всем мире задает новые тренды развития, трансформируя общество в его сложившемся понимании. Последние достижения технологической революции в контексте внедрения искусственного интеллекта в разные сферы обществен-

ной деятельности создают уникальные возможности, вместе с тем, обуславливая новые риски и проблемы. Являющиеся изначально достижением точных наук, нововведения в технической сфере, сегодня небезосновательно волнуют как общество в целом, так и вызывая обеспокоенность гуманитариев с точки зрения трансформации этических принципов. В данной статье анализируются соответствующие дискурсы, проводится анализ ключевых этических дилемм в трансформирующемся обществе. Данные дискурсы и проблемы актуальны для казахстанского общества, активно развивающемся в технологическом русле.

Ключевые слова: общество, трансформация, искусственный интеллект, Казахстан, новые возможности и проблемы, этические дилеммы.

Introduction

The concept of a fair society has been appealing across eras, particularly during periods of complex transformations and crises when the importance of justice intensifies. Throughout history, numerous initiatives aimed at establishing societies based on values of equality, fraternity, and freedom have been partially successful. Nevertheless, these attempts often resulted in the opposite – dominance and oppression rather than justice. For example, the 20th-century projects for building a “new society” have left lasting scars that remain relevant today. In Kazakhstan, the Soviet ideology-driven pursuit of a fair society brought a series of adversities, from class struggles and repression to political and economic crises. These struggles, rooted in the country’s history, remain integral to its collective memory.

Achieving sovereignty did not instantly resolve all these issues, and recent years have seen political, economic, and social tensions escalate within the country. This rising potential for social discontent is evident both in expert analyses and in observable trends. While there are official commitments to establishing a just society, many pressing issues remain unaddressed.

It is imperative that public discourse recognizes that creating a fair society cannot be achieved through political authority alone. The integration of all constructive forces within society is essential: “In our current stage of development, the unification of all healthy social forces is necessary” [Seydumanov, 2022: 9]. This process requires the participation of civil institutions and individual citizens alongside government entities, and this necessitates the reorganization of ideological orientations and value systems.

Worldwide, societies and nations are undergoing similar transitions marked by significant change. In addition to internal political, social, and economic issues, rapid advances in digital technology are producing both unprecedented opportunities and risks. These developments call for an interdisciplinary approach to examining issues such as human values,

social inequality, security, and dependence. Such research should be conducted within frameworks of international cooperation, as digital technology is effectively erasing national borders, facilitating global interactions.

The Fourth Industrial Revolution is impacting on various aspects of modern life, particularly the labor market. In many countries, AI is already taking on standardized and routine tasks, enhancing efficiency but also displacing numerous job roles. However, according to some of the world’s leading consulting firms, AI is likely to create a substantial number of new jobs and bring overall positive economic benefits, although companies differ in their estimates of how many jobs will be replaced versus created.

Today, AI and other advanced technologies are expanding the range of high-skilled jobs that demand unique creative and analytical skills along with human interaction. In other words, many existing occupations may disappear, necessitating workers to develop new skills – either upskill or reskill – to take on new professions arising from AI advancements. It is strategically crucial for educational institutions to anticipate and prepare for these shifts to equip current workers with the necessary technical and social-professional competencies. This preparation will help groom future generations, facilitating a smoother transition to an AI – dominated world and ensuring social sustainability.

As AI products evolve, a range of ethical and legal issues become increasingly pertinent. The widespread adoption of AI technologies entails numerous risks and challenges, particularly related to data ownership (e.g., the use of data for commercial purposes), consent (e.g., whether students, due to their age, can genuinely provide informed consent), and privacy (e.g., the application of intrusive emotion-recognition systems). Another risk involves algorithmic bias, which may infringe upon fundamental human rights. Additionally, there is concern over the accumulation of AI data and experience within a small number of international technological and military superpowers.

Who owns this data, who has access to it, what are the confidentiality and non-disclosure challenges, and how should data be analyzed, interpreted, and transmitted? All users of modern digital technologies are susceptible to the misuse or compromise of their personal data, especially given that comprehensive data protection laws exist in less than 30% of countries worldwide (except in Europe).

Another significant concern is the potential for intentional or unintentional biases embedded within AI algorithms (i.e., how data is analyzed). Indeed, algorithms are playing an increasingly critical role in society, automating a broad range of tasks – from decisions affecting employment to determining prison sentences. At the same time, there is a growing awareness that algorithms are not as neutral as often portrayed; for instance, they can automate biases with varying degrees of adverse effects on individuals.

An equally important aspect is the issue of access to digital technologies. The situation is further complicated by the fact that this digital divide exists across multiple dimensions, such as between developed and developing countries, across different socio-economic groups within countries, between technology owners and users, as well as between those whose work is enhanced by AI and those whose professions may become obsolete.

However, none of this progress will happen automatically. Without decisive action, we may enter a world where existing inequalities are exacerbated, and uncertainty grows. In fact, if the global community intends for AI not to worsen existing inequalities, it will become increasingly important for every citizen to gain a clear understanding of AI – what it is, how it functions, and how it might impact their lives.

This concept is sometimes referred to as “AI literacy”. Professionals who can effectively teach AI use will play a crucial role. Educational services will shift towards supporting lifelong learning so that individuals can enhance their agency, employability, and capacity to contribute to societal development. In other words, educational approaches worldwide must adopt systemic measures to prepare all citizens for harmonious living and working in the AI era.

In historical turning points, smaller, developing nations have sometimes assumed global leadership roles. Examples include Japan, South Korea, Singapore, and Taiwan, which analysts have termed the “Asian Tigers” [Gilmanova, 2019: 6]. Undoubtedly, Kazakhstan has the potential to develop its unique opportunities in the current global race for digitalization and AI. While the technological revolution presents vast developmental prospects for Kazakh-

stan, there is a pressing need to establish clear rules and enforce stringent regulations governing the integration of digital technologies, particularly AI, into society. Developed and developing nations alike are increasingly aware of the importance of cooperation in this regard, although these new technologies might also foster novel forms of conflict and competition. A lack of timely reflection on these developments could exacerbate existing conflicts and potentially endanger humanity's future.

At present, the interaction between humans and AI remains flexible and subject to regulation. Lessons from overlooked experiences in previous phases of scientific and technical progress must inform today's approach. For Kazakhstan, harnessing new technologies is essential not only for addressing internal socio-economic issues but also for gaining a foothold on the global stage.

AI stands out as a unique facet of the digital revolution, directly influencing the economy and society while also demanding significant progress in science and innovation. With digitalization and AI integration increasingly propelling global progress, society faces an ethical dilemma: Will AI ultimately serve human interests, or will humans fall victim to it? This discourse is not only relevant but essential.

This study aims to analyze the scientific debates on the societal impact of new technologies, including AI, and assess the potential transformations in society's value systems. In pursuit of this objective, the study classifies different perspectives and examines central issues.

Methods and methodology

This article conducts a thorough review of discourses by domestic and foreign researchers on the impact of AI, a product of recent digital technology, on societal transformation and value systems. Documents on AI guidelines developed by international organizations were subjected to hermeneutic analysis. Classification, comparative, and analytical methods were employed in this study, with specific examples of societal transformation applied to projections concerning Kazakhstan's developmental prospects.

Results and Discussion

Discussions on the future of humanity have always captivated society. Today, this topic has attracted the heightened attention of intellectuals. The rapid development of scientific discoveries and technologies is significantly impacting all areas of

social life. The contemporary rise of technology is evident in the integration of AI products into various sectors. The potential positive and negative effects of these transformations are of great concern to society. While new technologies fascinate many, there are also narratives that portray AI as a looming threat.

It is premature to assert that AI will conquer human society or that humans are losing ground to it. The key concern is that individuals do not become agents within technical systems. If a cybernetic society were to emerge, the window for corrective action may close.

Intellectuals are making efforts to delve into the underlying causes and possible consequences of these developments. By categorizing scientific criticisms of AI and its societal impact, we can identify several perspectives.

One positive view is that AI will continue to play a beneficial role in societal advancement, simplifying life and reducing the need for humans to engage in repetitive tasks, thus allowing more time for intellectual and personal growth [Doherty, Wilson, 2019]. According to these optimistic perspectives, well-informed, educated, and capable individuals will form a robust society, actively contributing to its development.

Conversely, some experts argue that modern digital technologies are exacerbating social inequality [Khachuyan, Yusuf, 2022]. They warn that, through AI, authorities could impose total surveillance, restricting freedoms and infringing upon rights. These experts are concerned that AI algorithms, operating based on templates, may fail to consider the unique social and cultural norms of diverse communities.

One critique, attributed to L. Mumford (2022), emphasizes the “person-organization” model in technocratic societies. Mumford contends that in a world dominated by technology, humans’ risk is becoming mere cogs within a “Megamachine” they have created. This perspective warns that, if humans become mere components of a global system, they could lose their intrinsic human values, with technology gaining precedence and reducing individuals to mere tools of production.

Another line of discourse suggests that technology is inherently neutral, and its impact on society depends on human intentions [Dzyaloshinsky, 2019: 20]. In this view, fears about technology are unwarranted, and the onus is on individuals to harness these tools positively.

Some perspectives suggest that AI is capable of manipulating human consciousness, potentially in-

fluencing individuals’ choices – a notion supported by certain studies [Thaler, 2008]. Experiments have shown that AI can track individuals’ past choices and use that information to sway future decisions.

In scientific discussions, the theory of “nudging” is often applied to the analysis of human decision-making possibilities. Nudging refers to the subtle guidance of an individual’s behavior and decision-making by shaping text and cues that influence without direct directives, giving an illusion of freedom while steering towards predetermined choices [Thaler, 2008].

Such discourses can be classified further or grouped together, yet it is clear that today’s world is undergoing fundamental shifts in ethics, communication, and substance, encountering new challenges and risks. Among these pressing issues, one of the most significant is how society interprets and adapts to the new technological revolution. This process undoubtedly influences the broader transformation of humanity [Schwab, 2017: 1].

The role of AI in contemporary society and the public’s acceptance or rejection of it largely depend on how market representatives frame AI through public communication channels. In social psychology, this process is known as conceptual framing or “choice architecture” [Abramova, 2020:15]. Every phenomenon presented to society is given within a particular context, influencing both local and global narratives about technology and innovation.

Historically, AI development has been linked to efforts to model and mechanize human cognitive abilities. The term “artificial intelligence” was first introduced by researcher John McCarthy during a seminar at Dartmouth College in 1956, where it was used to describe efforts to understand and simulate the structure of computer programs [Artificial intelligence technologies in education, 2022: 9]. Today, AI is a prominent field influencing all aspects of society, from politics and economics to education and science. As global digitalization advances, the boundaries between nations blur, expanding opportunities for collaboration.

In many countries, AI applications are increasingly integrated into daily life, ranging from virtual assistants on smartphones to chatbots providing various support services, entertainment recommendations, crime prevention measures, facial recognition, and medical diagnosis. In fact, AI is regularly used in sectors like banking, construction, and transportation, etc. Additionally, innovations associated with Industry 4.0 – such as autonomous vehicles, 3D printing, bio- and nanotechnology, robotics, and quantum computing – are all underpinned by AI.

With the rise of the internet, the relationship between humans and AI is entering a new phase within virtual communities. Researchers propose calling this emerging sphere the “infosphere,” where a new model of informational reality is evolving [Ioseliani, Tskhadadze, 2019]. Within this structure, the worldview and informational model of existence are transforming. Elements such as techno sphere, global integration processes, new informational spaces, and AI are radically changing daily life. As a result, comprehensive computer literacy must be prioritized, encompassing both technical and psychological adaptation.

Some researchers advocate for the use of the term “augmented intelligence” rather than AI when discussing human-technological interactions [Artificial intelligence technologies in education, 2022:16]. This term acknowledges that human involvement is still central to data collection and algorithm development. For example, while computers outperform humans in certain tasks, such as playing chess, the combination of human and computer strategies yields better results than either alone. In fact, amateur chess players equipped with AI have defeated both standalone computers and grandmasters in some tournaments [Brynjolfsson, McAfee, 2014]. This perspective suggests that AI should be viewed not as an independent entity but as a means of enhancing human potential.

The transition to augmented intelligence should focus on creating technologies that expand cognitive capabilities and enhance the efficiency of human-AI collaboration. Such an approach could enable the development of reasonable combinations of artificial and collective intelligence to address global challenges [Mulgan, 2018: 631]. As machine learning technologies evolve, interactions between human developers and AI systems become increasingly complex. Consequently, new risks inevitably arise, adding urgency to the study of societal transformation.

Today, ethical relationships are undergoing a transformation. In the past, ethical concerns revolved around human-to-human interactions, but now AI increasingly assumes a role as an ethical subject, not merely as an object. Some researchers question whether humans should abandon ethical anthropocentrism when interacting with AI [Ioseliani, Tskhadadze, 2019]. However, it is not so much a matter of rejecting anthropocentrism as it is a need to reevaluate and adjust to new processes.

AI and robotics have significant potential for enhancing human life, especially in extreme environments where robotic systems may perform tasks

in hazardous conditions unsuitable for humans, such as high or low temperatures, oxygen-deficient areas, and even subterranean construction.

Nevertheless, while automation offers clear benefits, it also introduces new risks, primarily related to accountability. Some experts caution that reliance on AI could lead to a gradual shift in responsibility onto machines, despite the inherent potential for system failures. Such failures could result in AI making unfavorable or even harmful decisions for humans [Khachikyan, Yusufov, 2022].

These concerns have motivated recent professional-level discussions, including the 2017 Asilomar Conference in the United States, which addressed foundational principles for AI use and called for universally accepted standards. The primary objective was to ensure that AI development remains focused on improving human life [Asilomar AI Principles, 2017].

In 2019, UNESCO and the Chinese government organized an international conference, “Planning Education in the AI Era: A New Frontier in Technological Advancement,” attended by ministers from over 50 countries, 100 representatives from UN member states, and officials from various research institutions, civil organizations, and the private sector. The conference culminated in the “Beijing Consensus on AI and Education” document, which compiled global perspectives on AI and formulated shared principles [Beijing Consensus on Artificial Intelligence and Education, 2019].

According to studies, by 2030, approximately 30% of public services worldwide will be automated, potentially affecting up to 375 million jobs [Artificial intelligence technologies in education 2022:16]. Not only blue-collar workers but also “white-collar” professionals may face displacement. In fields where logic and basic algebra dominate, AI could perform tasks independently. However, professions requiring deep thinking and complex skills will continue to demand human involvement [Artificial intelligence technologies in education, 2022: 17].

IBM’s 2023 report, “Augmented Work in an AI-Driven Automated World,” suggests that AI will reach unprecedented levels of influence on employment and job security [17]. The report emphasizes that while AI will not replace humans directly, those proficient in AI skills will replace those who either cannot or will not adapt to working with AI [Augmented work for an automated, AI-driven world, 2024].

The “Moravec Paradox” (1988) in science highlights this phenomenon: although machines excel

at processing data, they lack the intrinsic ability to self-reflect, reason, or engage in human processes of decision-making and judgment. This is why the field will continue to value human roles, especially in critical thinking, creativity, and collaborative partnerships over rote, memory-based tasks.

Although AI has the potential to address various social and economic issues, its deployment also introduces new challenges and risks. While there is concern over AI surpassing human capabilities, the most pressing ethical and social issues arise from how AI is used. These challenges include data privacy, decision-making accountability, and algorithmic bias, all of which must be systematically examined.

Conclusion

Technological developments have often been leveraged for political ends; for instance, 20th-century advances in atomic physics contributed to nuclear weaponry. Nations investing in today's digital technology must learn from history to mitigate both positive and negative impacts. Without clear principles to govern development, the trajectory of societal progress remains uncertain. As the global community advances AI, there is a pressing need to foster comprehensive understanding among all citizens, particularly regarding AI's potential and risks. This knowledge can be cultivated through what we might term "AI literacy," where educators play a pivotal role in fostering lifelong learning habits.

In short, the quest to advance AI must include ethical considerations and a proactive approach to harmonizing societal transformation within this new technological landscape. Questions regarding data privacy and algorithmic biases remain central topics within ongoing discourses.

Kazakhstan's transformation, aligned with global developments, is anticipated to bring qualita-

tive changes to society. However, ensuring that this transformation proceeds responsibly requires legal, regulatory, and scientific oversight. In summarizing the primary issues, we propose the following focal points:

What criteria should guide the collection and application of personal data across different age groups?

To what extent can individuals resist the collection and application of their personal data?

Who bears ethical responsibility for decisions based on AI-derived judgments?

How are ethical responsibilities defined for private-sector AI developers?

How will changes in human emotions and interests affect AI ethics and data interpretation?

Which educational approaches are ethically acceptable for training individuals to work with AI?

Thus, new high technologies, AI, and globalization trends are shaping a new human reality. Pragmatic, utilitarian, professional, and responsible values will play an essential role in this emerging order.

Halting technological revolutions is no longer feasible. Innovations in information science, Technosphere, and AI are inherently neutral; their impact depends on human choices. With AI, individuals can now send and receive information instantly, transforming fields such as education, societal values, and worldviews. Ultimately, these transformations are guiding society toward a new level of development.

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