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Legal Features of the Digitalisation of Agricultural Machinery Enterprises in Kazakhstan and Globally

Características legales de la digitalización de las empresas de maquinaria agrícola en Kazajstán y en el mundo

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Abstract

The relevance of research is caused by the development and active introduction of new technologies in the sphere of the processing industry and, in this connection, an increase of interest from the state and experts to questions of legal regulation of this process. The scientific article aims to reveal legal features of the turn of Kazakhstan factories producing various machinery and equipment of agrotechnical nature to digital and intellectual tools, through which the essence of production of agricultural mechanical factories of the Republic of Kazakhstan, the whole branch of agricultural engineering, can be radically changed. The article uses the method of empirical and comparative legal analysis of the national legislation of the Republic of Kazakhstan, international agreements in the relevant areas of mechanical engineering, works of Kazakhstan, and foreign authors on the subject. The results of the article are presented recommendations on the need to adopt several new Kazakhstan laws, new international agreements, and conventions on the problems of digitalisation and intellectualisation of agricultural engineering plants.

Keywords: digitalisation, agriculutural machinery, right to export, convention, digital tecnology.

Resumen

La relevancia de la investigación recae en el desarrollo y la introducción activa de nuevas tecnologías en el ámbito de la industria de procesamiento, y en un aumento del interés del Estado y los expertos a las cuestiones de regulación legal de este proceso. El artículo tiene como objetivo revelar las características legales del giro de las fábricas de Kazajstán que producen diversas maquinarias y equipos de naturaleza agrotécnica a herramientas digitales e intelectuales, mediante las cuales la esencia de la producción de fábricas mecánicas agrícolas de la República de Kazajstán abarca toda la rama de la ingeniería agrícola. Utilizamos el método de análisis jurídico empírico y comparado de la legislación nacional de la República de Kazajstán, acuerdos internacionales en las áreas relevantes de la ingeniería mecánica,

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obras de Kazajstán y autores extranjeros sobre el tema. Entre los resultados del artículo, se presentan recomendaciones sobre la necesidad de adoptar varias leyes nuevas nacionales, nuevos acuerdos internacionales y convenciones sobre los problemas de digitalización e intelectualización de las plantas de ingeniería agrícola en Kazajstán.

Palabras clave: digitalización, maquinaria agrícola, derecho de exportación, convención, tecnología digital.

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Introduction

Mechanical engineering is the backbone industry of a developed country's economy in the world and is an indicator of the technological level of the national industry. More than three thousand large and small machine-building enterprises operate on the territory of Kazakhstan, a significant part of which to varying degrees provide assistance to 9 large agricultural machine-building plants of the country. However, in conditions of growing competition among global producers of machinery and equipment for agricultural purposes, it is important for Kazakhstan machine-building enterprises to quickly introduce technological achievements of the Fourth Industrial Revolution into the process of production of their products. Of course, the practical implementation of the outlined plans for the digitalisation of agricultural engineering can and will raise legal issues. If it will be possible to identify these shortcomings of domestic legislation in time and adapt the norms of the relevant normative legal acts in advance to future technological progress, then it will be possible to create another internationally competitive sector of the economy in the form of agricultural machinery. Therefore, the authors set a goal to study the Kazakh and international experience of implementing digital technologies in production, conduct a comprehensive analysis of the domestic legislation, and identify its shortcomings, which may become a deterrent to the development of the considered direction of the agricultural engineering industry. Accordingly, the task will be to convey the proposed ideas, and thoughts to a wide range of readers, including specialists of the legislative body, and heads of domestic mechanical engineering enterprises.

The process of digitalisation and intellectualisation of various spheres of state and human society has become an increasing subject of study for many authors in recent years. The emergence of "smart" factories, plants, and even farms is becoming commonplace. However, on the scale of Kazakhstan's agricultural engineering, only a few authors pay attention to legal issues. But at the international level, these issues have not been sufficiently explored either. In this regard, the team of authors has studied in detail the national initiatives of advanced countries in this respect, their laws and regulations, individual works of authors, and the opinions of professionals in the industry in the course of the research.

The topic proposed for analysis by technical specialists, lawyers, economists, both theorists, and practitioners, especially in developed countries, continues to be a hot topic, but it is no longer a completely new one. This can be seen in the works of foreign scholars on the subject: Barr *et al.* (2021), Gattamelata *et al.* (2021), Green *et al.* (2021),

Harry and Long (2018), and many other scientists. This topic is both relevant and new to scientists in almost all countries, especially in developing countries. This is noted by Russian scientists: Gulyaev (2020), Bachilo (2018), and Berdyshev and Tseplyaev (2018). The Kazakh authors engaged in the study of the proposed topic include Zharkov *et al.* (2021), Ivanov *et al.* (2017), Lopota and Spassky (2021), and Khabrieva (2018).

Based on the literature review, it should be said that in many developing countries, including Kazakhstan, digitalisation is in its initial stage. While the number of innovative industrial (machine-building) enterprises in a number of developed Western countries is as high as 60 percent, in Russia it is 11 percent, and in Kazakhstan even less. In addition, the problems of digitalisation of mechanical engineering have not been sufficiently investigated from a legal perspective, even in developed countries. Therefore, this article aims to draw the attention of managers and specialists in the agricultural machine-building industry of Kazakhstan to the need to accelerate the development of industrial enterprises through digital technologies and organisational and legal methods.

Literature review

Among the foreign studies that have studied this subject, several scientists should be noted: Barr *et al.* (2021), professors in the Department of Agricultural and Biosystems Engineering at Iowa State University, in the United States of America, who investigated the possibility of increasing the efficiency of crop processing by using selective processing strategies in grain elevators; Gattamelata *et al.* (2021), who proposed a partial assistance system for tractor and agricultural machinery drivers in order to improve their safety; Green *et al.* (2021), who explored new ways to measure delay during real-time wireless video transmission for remote monitoring of autonomous agricultural machinery; Harry and Long (2018), who wrote the book entitled *Introduction to Agricultural Engineering Technology: a Problem-Solving Approach*, and Hassine (2022), World Trade Organization (1958), and Koreng and Kremker (2021). Lagnelöv *et al.* (2021) have investigated the life cycle of electric tractors; Li *et al.* (2021), whose articles propose a visual navigation algorithm for agricultural robots based on deep image understanding; Mayani and Golakiva (2020) proposed sustainable farming techniques using high-tech agricultural engineering. Also, Mirbod *et al.* (2021), and others (Pundir *et al.*, 2022; Shafiei *et al.*, 2022; Wei *et al.*, 2021; Smeets, 2021; Bachilo, 2018; Berdyshev and Tseplyaev, 2018; Britskaya, 2021; Republic of Kazakhstan, 2021b; Garbuk, 2021).

In the Russian field of scientific research, this topic is also considered, in particular, the following works: Gulyaev (2020), who wrote the book *Agricultural Machines. Agricultural Equipment*, and Bachilo (2018), believes that the challenges of the new stage of information society development concern the justification of the figure as a form of information representation and the importance of its introduction into the conceptual apparatus of information law. Also, Berdyshev and Tseplyaev (2018), in their book *Theory and Calculation of Technological Parameters of Agricultural Machines* explicitly investigate the parameters of produced agricultural machinery.

In the course of studying and analysing Kazakh scientific works on this subject, the following authors should be mentioned: Zharkov *et al.* (2021) are engaged in research on technical means of drip-spray irrigation, and others (Ivanov *et al.*, 2017; Ivanova, 2021; Republic of Kazakhstan, 2021; Lopota and Spassky, 2021; Khabrieva, 2018; EnergyProm, 2020; Entrepreneurial Code..., 2015; Tebiz Group, 2022a), and "Analysis of the Grain Harvester Market in Kazakhstan" (Tebiz Group, 2022b), which provide figures and data on production indicators of loading of Kazakhstan's plants for the industrial assembly of agricultural machinery, and the forecasts for the future.

Materials and methods

While researching the topic, the authors referred to various sources of information, including national strategies for the development of digital technologies in various countries, laws and regulations governing agricultural engineering, and the authoritative opinions of experts in the field. Global experience in the introduction of high technology in the engineering sector was studied. Articles from the bulletins and compilations of machine-building unions and associations were reviewed. All the above and other data from official and open sources became materials for the research of this article. The method of comparative legal analysis has been extensively applied in this paper. This allowed the authors to compare and contrast the legal frameworks of different countries and the development strategies of competing agricultural machinery companies and thus attempt to identify the weaknesses of the domestic legal framework in the field of high-tech agricultural machinery. The method of scientific foresight has helped to predict possible scenarios for the development of agricultural engineering in Kazakhstan and to develop plausible solutions to emerging legal disputes concerning the introduction of high technology in this promising sector of the economy. The following steps were used to develop the topic of the paper:

1. One of the most hotly debated topics in recent years was brought up for discussion.

2. Having analysed and studied a considerable amount of scientific and practical material, the authors unanimously came to the conclusion that the topic of digitalisation, intellectualisation of agricultural engineering in Kazakhstan and the world, despite the great interest of foreign and domestic scientists, does not yet have coverage of all the issues under study. Problems of digitalisation of agricultural engineering in foreign countries have been studied insufficiently: separate works consider this topic from technological and technical points of view. A significant result of the study is that the authors have concluded that the legal aspects of the topic of the article have not been studied practically in either foreign or Kazakh legal science.

3. The authors proposed a legal vision of the development of digitalised agricultural engineering and the possible ways of its legal regulation was one of the logical results of all the research work of the authors' team in this direction. In this regard, the article proposes and substantiates new Kazakh laws on a number of aspects of the digitalisation of agricultural engineering in Kazakhstan.

4. In the course of writing the article, it was found, that the international legal experience of the digital transformation of industry and agricultural machinery is concentrated only in some acts of the regional European Union. There are no conventions or agreements in universal international law on the subject of digitalisation of agricultural machinery. On this basis, another result of the study was the proposal and justification in the article of a number of universal international legal instruments on cooperation between states on the design of robots, artificial intelligence technology, and cybersecurity in the economy and industry.

Results

The legal basis for the industrial assembly of agricultural machinery and its components is Article 244-1 "Agreement on industrial assembly" Entrepreneurial Code of the Republic of Kazakhstan (2015), Article 64 Law of the Republic of Kazakhstan No. 86-VII "On Industrial Policy" (Republic of Kazakhstan, 2021a) which define the objectives of stimulating the development of agricultural machinery production, the specifics of location, the authorised body in the field of state support of an industrial activity, and the need for this state body and the agricultural and engineering enterprise to conclude a civil-law contract—an agreement on industrial assembly and its components. Today, the world leaders in the production of agricultural machinery are the USA and a number of European countries. Their regulatory framework is predominantly at the level of bylaws. Studying the issue of the need to introduce digitalisation, intellectualisation of agricultural engineering in Kazakhstan, the functioning of JSC (joint-stock company) Agromashholding KZ and Kostanay tractor plant will be considered, the national and regional content of regulatory documents on the issue under study will be analysed. JSC Agromashholding KZ invested 1.7 billion tenge in the production of Kirovets tractors in Kostanai in 2021: in the first phase it is planned to assemble 200 tractors, and in 2022 to reach the design capacity of 500 tractors (Britskaya, 2021). In April 2019, Agromashholding KZ JSC and Petersburg Tractor Plant JSC (a subsidiary of Kirov Plant PJSC (public joint-stock company)) signed a legal document—an agreement on the industrial assembly of Kirovets tractors in Kostanai (Republic of Kazakhstan). Production of Kirovets tractors is organised at Agromashholding KZ's production facilities in Kostanai. Petersburg Tractor Plant JSC will supply machine sets and carry out technology transfer. It is hoped that Petersburg Tractor Plant will transfer not only machine-building technologies but also digital technologies related to tractor construction to the Kazakhstan enterprise.

Agromashholding KZ JSC together with its partners from the People's Republic of China, Lovol company, opened a tractor production facility in Kostanai in 2019 for up to 3.000 tractors per year. On the basis of the signed act of international private law—the Industrial Assembly Agreement—the Kazakh and Chinese parties have agreed to increase the level of Kazakhstani localisation every year. This means that already in the first year of production in Kostanay, cabins will be manufactured and agricultural products will be welded and painted. In agricultural engineering of the Republic of Kazakhstan, production from January to April 2021 increased on average by 3 times in physical terms: production of tractors increased by 3.3 times, reapers by 3.2 times,

and harvesters by 1.9 times. Kazakhstan has established production of a number of end products of agricultural machinery: tractors, combine harvesters and forage harvesters, seeding machines, cultivators, and balers. For the most part, this is the assembly production of the leading manufacturers of the Eurasian Economic Union (EAEU) member states. In 2020, Kazakhstan produced 2.585 tractors and 962 combines. The Akmola region produced 1.048 tractors (Belorus and RSM), the Kostanai plants (Lovol and Kirovets) produced 585 units, and Belorus (East Kazakhstan Region) produced 561 tractors. In total, there are about thirty enterprises producing agricultural machinery and spare parts in Kazakhstan. The main enterprises include Agromashholding KZ, SemAZ LLP (Limited Liability Partnership), Kostanay Tractor Plant, and other enterprises.

Based on data from the Association of Kazakhstan Automobile Industry, in the first half of 2021 agricultural engineering companies in Kazakhstan produced 2.935 units of agricultural machinery, including 414 combines and 2.521 tractors of various brands. The flagship of agricultural machinery Agromashholding KZ produced 466 units of agricultural machinery over 6 months of 2021, including 135 ESSIL combines, 331 Lovol tractors, and 150 Altyn Dan seeders. In every industrial plant, including agricultural machinery plants, a vision (strategy) must be formulated with the help of the manager and his digital transformation department, and a detailed digitalisation plan must be developed based on this vision for all workshops, sections, production, auxiliary, storage, and other areas, in general, throughout the entire enterprise. The company must respond quickly to all digital and legal changes, adapting digital tools to the specific technical and regulatory changes and needs in the process of the combined operation of numerically controlled machines, equipment, robots (Wei *et al.*, 2021), and conveyor within the workshop and between workshops. A digital strategy, when integrated into the overall corporate strategy of an enterprise, must be unique to each enterprise, each plant. The state, for its part, should provide organisational and financial support for digitalisation to all enterprises, including industrial and agricultural factories. In other words, digital technologies must be introduced to speed up the production process. Digitalisation is the search, collection, storage, processing, and transmission of data, in the form of digits, data, and information, which exist in electronic format. Digitalisation and the law are mutually dependent on each other. It is possible that under the influence of digital technology, according to academician Khabrieva (2018), the formation of a "new legal system" is possible, in which a set of legal norms in the form of digital law of agricultural engineering will occupy its niche.

One of the first measures of digitalisation of any agricultural machinery in the Republic of Kazakhstan should be the introduction of electronic document flow to replace paper document flow (Ivanova, 2021). It is the latter kind of document flow that is labour-intensive: the electronic system dramatically improves and speeds up the process of document circulation. The digitalisation of agricultural machinery companies in the country involves the introduction of the Internet of Things. Why it is said that the Internet of Things in this production is necessary and useful? In order to answer this question, it should be said, that the factory, relying on the data obtained through the Internet of Things, can actually make the necessary strategic decisions (Hassine, 2022). Thanks to this Internet of Things, the factory, like many other enterprises, was able to overcome the Corona crisis with minimal losses. However, the Internet of Things itself needs our help

during its implementation in the production process of the agricultural and technical engineering plant. This segment of digitalisation needs industrial standards adapted to the production of tractors, combines, and agricultural equipment, of which there are few: in the meantime, there should be at least a few hundred. This segment also needs algorithms for the legal regulation of the production process. In other words, to ensure the implementation of digitalisation, it is required to adopt the following new Kazakh laws: "On Digitalisation of Agricultural Engineering," "On the Order and Conditions of Implementation of Digital Tools in Industrial Enterprises," including agricultural machinery of the republic, "On Training of Specialised IT Personnel for Mechanical Engineering," including agricultural machinery.

Due to the Internet of Things, video surveillance systems can be upgraded to monitor the technological process in the plant's workshops, to control the actions of personnel in production, vehicle entry/exit, to prevent unauthorised persons from entering restricted areas, to detect smoke and fires at the initial stage in one or another area of the plant, and to take measures to curb critical events. The Internet of Things allows the implementation of a system of automated data collection from several thousand electricity meters and water supply sensors, and also an environmental monitoring system in the form of a set of air quality posts in the plant's workshops in order to prevent pollutant levels in the production areas of the plant by automating the control of fan installations. The plant's lawyers shall communicate to the IT (information technology) specialists all the subtleties of the country's environmental legislation. In general, all production and related indicators can be monitored remotely via a single portal in real-time. Consequently, a digital platform is introduced in the form of a platform business model, in the given case, the platform model for agricultural engineering, on the basis of which an electronic document management system, a meeting management system, a unified reporting system, an industrial safety management system for the plant and its personnel, and a counterparty interaction module can and should be created.

A digital workstation is developed, used, and updated with the necessary current information for each worker and employee in the combined plant, for example. An extended user card is filled in electronically along with his/her photo card; the relevant legal documents in the form of job descriptions are also linked to the employee's workplace; all key performance indicators achieved by the employee (worker) are indicated; the employee's personal performance is tracked on a current basis; all emergency notifications and alerts are also entered here; all manifestations of the employee's performance discipline are recorded. In other words, the digital workplace of a factory worker becomes an electronic and automatic application of the Entrepreneurial Code of the Republic of Kazakhstan (Entrepreneurial Code..., 2015), and other normative and legal acts in relation to each employee. In Soviet times, along with traditional meetings, the format of conference calls by radio was often used. This type of meeting should be routine: now, instead of radio communication, there will be computer communication via Skype for Business, Microsoft Teams, and Zoom platforms. Now, contacts at a meeting, session, or conference between the tractor factory and its branches, dealerships, and ministries are not only audible (by ear), but also visual (by sight): the presence effect is as close to reality as possible.

Whereas the digital signature was previously used mainly in relations with external contractors, the logic of digitalisation and the remote working mode of many employees now extends the legal provision for digital signatures in documents regulating the internal relations of the plant management and its employees under labour and administrative law (labour processes and employee penalties). Digitalisation extends to the day-to-day activities of an agricultural machinery worker. They are issued with a single plastic smart card with a microchip which allows them to enter the factory to work: they are automatically identified at the entrance, time-stamped, and authorised to enter. It gives the employee access to his or her personal account at any information kiosk of the factory. The production process in the factory's workshops is also being digitalised. This is manifested in the automated execution of work orders and permits with electronic logbooks, simplified access to a single database of necessary documents, automated provision of analytics, elimination of risks to a minimum degree when an employee is allowed to work at high risk, provision of prompt access to necessary information on ongoing and completed work, which could contribute to the clearer execution of the prescribed work order. The legal clarity of the electronic work order issued to the employee is ensured by giving it a digital signature, which contains a mathematically elaborated unique digital code. The general digitalisation of the plant dovetails with the practical application of the Entrepreneurial Code of the Republic of Kazakhstan (Entrepreneurial Code..., 2015).

The entire digitalised system of agricultural machinery plants requires its cyber security. In other words, web application protection, anti-virus protection, protection, and traffic control of digitalised systems will need to be installed. The attention of the management of Kazakhstan's digitised agricultural engineering plants should be drawn to the fact that their financial and economic interests in cyberthreats and cybercrimes committed against them are under the protection of the Kazakhstani state. At the same time, the Kazakh legislators are appealed with a proposal to amend and supplement the above articles as they are somewhat outdated and do not contain the terms "cyber threats," "cybercrimes," and "cybersecurity." In this connection, in order to strengthen cyber security in all spheres of the economy of the Republic of Kazakhstan, including agricultural engineering, and all other public spheres of the country, it is considered advisable to develop and adopt new Kazakh laws, in particular, "On Taking Urgent Measures to Combat Cybercrime," "On Mutual Exchange of Information by Businesses and the State on Cyber Threats and Committed cybercrimes." It should also be kept in mind, that cyber security is ensured by removing technical barriers in artificial intelligence technology systems (Pundir *et al.*, 2022; Garbuk, 2021). In order to make the fight against cybercrime more effective, it would be advisable to develop and adopt a universal international convention on *Joining Efforts of States to Ensure Cybersecurity in the Economy*, including in industry and engineering. It would be desirable to establish international organisations to combat hacking in all regions of the world.

Discussion

How can an intelligent enterprise, a plant, or a factory be characterised? According to the advanced experience of Western countries, the main characteristics of a smart and intelligent factory, in the given case—agricultural engineering factory in Kazakhstan, include prompt response to the fast-growing pace of changes in industrial production processes, volume of data; the ability of the factory to meet individual and ever-growing needs and requirements of customers and clients; the ability to use resources efficiently, thereby ensuring profitability of the factory and increasing shareholder value of the given enterprise. Digital technologies are at the heart of the smart enterprise. The following digital technologies can be leveraged in the digitalised operations of a Kazakh combined plant: Big Data, artificial intelligence, augmented reality technologies, robotics and sensory components, and wireless communication technologies. Western smart industrial factories and plants, including agricultural engineering concerns, are embracing additive and laser technologies, creating sensors and detectors in the form of smart products with pre-programmed properties. In the long term, the paradigm of serverless digital computing can be applied to industry, in this kind of enterprise (Shafiei *et al.*, 2022). It makes sense to develop a Regulation on a "smart" factory, where digital rights and responsibilities of each manager, engineer, lawyer, other office workers, foreman, ordinary worker, safety rules, and types of responsibility for their actions and for the actions of robots assigned to them should be written in detail. Each employee, according to the Regulation, must pass an examination for a clear knowledge of his or her digital and general professional competence.

The point of Virtual Reality and Augmented Reality technology is as follows. Having exhausted all the technical possibilities in their factory to fix a malfunction of, for example, a grinding machine, the management of the agricultural machinery turns to the engineers of the machine-building company for assistance. Using Microsoft HoloLens, the machine tool builder draws up step-by-step instructions on how to rectify the cause of the fault, taking into consideration the specifics of the breakdown. The factory technician, following the instructions, fixes the fault. And all this happens despite the decent distance between the plant and the factory. Koreng and Kremker, researchers of this digitalisation segment report, detail that today "there are no specifications or guidelines for developing a user interface for an augmented reality system in an industrial context" (Koreng and Kremker, 2021). In this regard, it is necessary to consider the possible development and adoption of appropriate normative and technical rules based on the norms of Kazakhstan legislation on technical regulation and standards, through the application of which the potential of augmented and virtual reality technology can be increased.

What will the smart video information processing system look like in the near term, for example, at a Kazakh tractor plant? The system will survey an average factory of two dozen facilities, including four workshops. For this purpose, a high-speed data transmission network will be designed inside the plant, which must have a bandwidth of at least 9 Gbit/sec (gigabit per second—the basic unit of measurement for the enormous volume of information transfer in 1 second), with a total length of about 14 thousand meters. Video cameras will be installed along the entire perimeter of the plant

as a cumulative video surveillance system approximately 9.000 meters long. A facial recognition system will be installed at all four pedestrian checkpoints (checkpoints). A number plate recognition system for trucks and cars will be designed at three vehicle checkpoints. A number plate recognition system for railway cars at two railway checkpoints will also be designed. A system will be designed to monitor production processes in four workshops, warehouses, and other production areas (approximately 90 video cameras). All data will be consolidated into one single portal, where all incoming video information will be processed by a machine, which will enable the management to make rational management and legal decisions in real-time.

Could industrial robots participate in the work of a combine harvester plant, say, the same Agromashholding KZ, which could eventually displace the skilled and, especially, unskilled workers of that plant? It will not be possible, because the introduction of intelligent industrial robots, and robotic complexes is possible only in those industrial and agricultural plants where there is no live staff. This is due to legal requirements in the regulations (orders) of the relevant ministries, in particular, in the Instruction on the organisation and implementation of industrial control at a hazardous production facility dated June 24, 2021, which only regulates the relations of live personnel, live workers, and do not contain even a hint about the introduction of a robot in industrial production. Investigator, the robot with its features should be placed in the Kazakhstan legal framework. Collaborative robots (working alongside people, known as cobots for short), voice-activated robots that can signal production alarms with a humanlike voice, could be part of the production process in Kazakhstan's agricultural machinery plants. A computer application in this category of robots can recognise human speech, understand the meaning of words, and reproduce human speech, as the digital navigator in many cars already does, assisting the driver in finding the right address in the city.

A digital tool in the form of a central database—an accounting system for a metal milling machine operating on the factory shop floor—solves the problems of creating transparent reporting of machine consumption, reducing the cost of the metal being used, and establishing a barrier to the theft of metal and products made from it. These digital elements will be installed on all machine tools, welding, and painting equipment in the plant. Most importantly, the high quality of the manufactured machine or mechanism will be assured. The Criminal Code of the Republic may provide for an article from the responsibility of the adjuster, foreman, responsible for ensuring the lawful consumption of material by the robot. In the twentieth century, in factories and companies of industrial Western and Eastern countries, the quality of machines and mechanisms produced, including agricultural machinery, was assessed and validated by a specialist. In digitalised Kazakhstan agricultural machinery this function will be performed by the digital technology of computer vision, which will provide a benchmark check of the quality of each assembled unit of a tractor, combine, and it will be done in impeccable automatic mode. The digital technology specialists should coordinate their actions on the implementation of computer vision technology in the control process with the plant lawyers, who are obliged to draw adjusters' attention to the peculiarities of the control mechanism at the enterprise.

It makes sense to develop robotics in Kazakhstan, which can be equipped with agricultural machinery factories. It is necessary to pay attention to the Entrepreneurial Code of the Republic of Kazakhstan (2015). Paragraph 34 of Article 1 of this Law has been amended with respect to robotisation: in particular, an intelligent robot is defined as "an automated device performing a certain action or inaction with respect to a perceived and recognised external environment." But this is clearly not enough. Therefore, a proposal is made that the Kazakhstani legislator adopt a separate, detailed new law "On Measures to Develop Robotics," in which a range of articles or a separate section dedicated to agricultural and industrial robotics could be envisaged. In addition, it would be useful to use the full potential of bilateral and regional international treaties and agreements on scientific and technical cooperation, in which the Republic of Kazakhstan officially participates. In these international legal acts, Kazakhstan could introduce norms on cooperation on the design of industrial and other robots and subsequently could implement these norms. The individual "robotics legislation" must not only be developed but a "domestic programme for its technical development" and a clear legal framework for robotics is needed (Lopota and Spassky, 2021).

It would be advisable to develop and adopt a regional convention "On cooperation of EAEU member states in the development of artificial intelligence and robotics systems" to build on this provision. On the basis of this convention, a research institute for artificial intelligence and robotics could be established, as has been done in Singapore. If the factories could be quickly digitalised in the form of their own robots and artificial intelligence devices, Kazakhstan could catch up with leading countries in agricultural engineering in the combine and tractor manufacturing sectors. The intellectualisation of the agricultural machinery plant manifests itself in the form of a virtual consulting robot that can perform the following tasks: advise employees on recurring organisational and production issues, formulate and request necessary information, provide employees in the relevant area or workshop of the plant with the necessary regulations and step-by-step regulatory documents, assist in working with the software products of the plant, to use the management of the plant and its subdivisions in decision and communication to the staff of the plant common tasks of the management, to conduct a business conversation with buyers, customers, and stakeholders on the given topic. The digitalised production algorithms of the agricultural engineering plants of the Republic of Kazakhstan are an automated application of the norms of the above Law of the Republic of Kazakhstan No. 86-VII "On Industrial Policy" (Republic of Kazakhstan, 2021a). In turn, it is necessary to introduce appropriate norms on digitalisation of production.

One manifestation of the negative qualities of the national legislation has been the complication of certain procedures related to the electronic processing of documents when purchasing agricultural machinery with the help of state subsidies, which complicates the already difficult process of selling Kazakh machinery. This is about the Qoldau.kz digital platform. This platform was created to facilitate the purchase of services and goods in the agricultural industry, including the purchase of agricultural machinery. In reality, however, this portal has not been well received by farmers. Deputies of the lower chamber of the Parliament of the Republic have long proposed combining the platforms Qoldau.kz, the Information and Analytical System, and the Subsidy Information System. Through exports, agricultural machinery (tractors and combines) produced

in Kazakhstan is supplied to Kyrgyzstan, Uzbekistan, Azerbaijan, and Turkmenistan. Export-trade legal relations regarding the agricultural machinery of Kazakhstan with the above states on different legal basis: on the basis of World Trade Organization (WTO) rules, EAEU, and on the basis of bilateral interstate trade treaties and agreements. Kazakhstan exports them to Uzbekistan, Azerbaijan, and Turkmenistan on the basis of bilateral trade agreements. Kazakhstan supplies agricultural technical machinery to Kyrgyzstan based on the Treaty on the Eurasian Economic Union (ConstantPlus, 2014), if necessary, on the basis of WTO law, since both of these states are official members of this international organisation. Now it is necessary to expand the range of countries to which agricultural machinery produced in Kazakhstan can be exported. This circle can be expanded by reducing the cost of produced improved agricultural machinery (traditional and electric traction), unmanned tractors, and harvesters, increasing their number, and conducting exhibition and advertising work.

The rapid pace of digitalisation of world trade is forcing the global community to pay more attention to it. Above all, such discussions are taking place within the framework of the World Trade Organisation. In 2021, for example, the WTO Chairs Programme, which aims to support and promote trade-related academic activities of universities and research institutes in developing and least-developed countries, issued a research paper on the challenges and opportunities of digital trade in today's world, which also raised legal issues (Smeets, 2021). In the research paper, many authors pointed out that the legal framework to combat cybercrime in many countries is insufficient. In addition, the authors highlighted the problem of lack of legal framework for full e-commerce in most developing countries, citing the lack of digital signature laws and the problem of divergent tax rates in the legislation of different countries (Smeets, 2021; Zharkov *et al*., 2021).

Conclusions

Based on the analysis and study of scientific and practical materials, have been established that the topic of digitalisation and intellectualisation of agricultural machinery in Kazakhstan and the world is not covered enough. The problems of digitalisation and intellectualisation of agricultural machinery were considered by foreign scientists mainly from technological and technical points of view. In particular, the international legal experience of the digital transformation of industry and agricultural engineering is concentrated only in separate acts of the regional European Union. Have been noted that universal international law has no conventions or agreements on the digitisation of agricultural machinery. Thus, there is a need to study the legal aspects of the researched topic, to develop and justify several universal international legal documents regarding the cooperation of states on the design of robots, artificial intelligence technologies, and cyber security in the economy and industry.

In this research paper, the authors propose to improve the existing Kazakhstan laws, make proposals, and analyse new Kazakhstan laws, regulations, and new international conventions to ensure a radical turn towards digitalisation and intellectualisation of agricultural engineering enterprises in the Republic of Kazakhstan based on the advanced

foreign professional experience. The article provides a list of a number of proposed titles of new Kazakhstan laws, and new conventions on digitalisation and intellectualisation of agricultural engineering, from which a few significant acts should be outlined, in particular, "On Digitalisation of Agricultural Engineering," "On Measures to Develop Robotics," "On Taking Urgent Measures to Combat Cybercrime," "On Cooperation of States to Address the Problems of Digitalisation of Industrial Production" (including agricultural machinery engineering).

The yardstick of quality-produced goods and agricultural machinery is their rapid domestic sales and export outside the country. Therefore, it is very important to ensure that tractors, combines, and all types of attachments and trailed equipment are reliable, of high quality, comfortable, aesthetically pleasing, and, therefore, more competitive in the world market through digitalisation, intellectualisation, and automation of production every year.

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