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Opportunities and prospects of public-private partnership for technological development of mining and metallurgical complex enterprises of Kazakhstan

Abstract

Object: To determine the directions for the development of PPP tools in the field of financing innovative projects aimed at improving the manufacturability of MMC enterprises.

Methods: Statistical data processing, system, logical, analogies and modeling methods.

Results: It is possible to summarize a number of problematic issues in the development of public-private partnership (PPPs): insufficient growth rates in the dynamics of the number of PPP projects, their imbalances by industry branch, lack of effective projects in the real sector of the economy, non-effective selection mechanism, which negatively affects budgetary efficiency, fragmentation and ambiguity of the regulatory framework of the PPP mechanism and a number of others.

Conclusions: To increase the level of digitalization of the Mining and Metallurgical Complex of Kazakhstan, the institutional model of PPP was demonstrated by creating a single operator for the development and promotion of technologies Industry 4.0. It is necessary to expand the functionality of Zerde National Infocommunication Holding, the Alatau Information Technology Park special economic zone, and the Astana Hub International Technopark of IT startups. The state partner solves the problems of developing digital technologies through the development of cooperation among domestic and foreign IT companies, an important criterion for this task is the high competitiveness and commercialization of projects, as well as unification for implementation in the activities of MMC enterprises. At the stage of distribution of digital solutions, more emphasis should be placed on supporting industry associations: the mining and metallurgical complex, the IT sector. Increasing the institutional responsibility of these structures will reduce the risks of state participation, as well as increase the level of trust on the part of private business.

Keywords: PPP, concession, public investment, innovations, technological development of the MMC, digital technologies, PPP models, IT sector.

Introduction

Negative effects and consequences of COVID-19 formed an understanding of the need to strengthen the partnership between the state and business. Attracting investments in domestic metallurgy is considered as the most important source for creating a domestic competitive technical base for metallurgical production. In the period of exacerbation of financial and economic problems in the world metallurgy, an active search is being made for solutions that would allow business to continue the development of long-term projects. The state is forced to concentrate its efforts on finding new effective approaches to support the national producer. One of the possible options for the innovative development of MMC enterprises is the involvement of PPP mechanisms. In developed countries, PPP mechanisms have been actively used over the past years to create innovations in the field of technologies Industry 4.0, artificial intelligence, robotics, in areas requiring significant and long-term investments.

We suppose that to increase the level of digitalization of the MMC of Kazakhstan, a multi-level PPP model should be developed by creating a single operator for the development and promotion of Industry 4.0 technolo-

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gies. At the first level, an institutional infrastructure for the digitalization of Industry 4.0 technologies will be created. One of the criteria for competitiveness should be cooperation among domestic and foreign IT companies.

At the stage of implementation and diffusion of Industry 4.0 technologies, special attention should be paid to the technological features of production. The criterion of competitiveness can be the unification of digital products.

Literature Review

The issues of functioning and development of public-private partnership instruments are being studied by a number of foreign scientists (Casady et al., 2018, Villani et al., 2017, Hodge et al., 2011, Badasyan, & Riemann, 2020).

The apparition of this tool was preceded by a change in the policy of managing state property in the UK. In 1992, the government developed a private financial initiative (Private Finance Initiative). According to the PFI concept, the private investor bears the main risks, which ensures more efficient use of public resources (Volkov, 2018). Later on such mechanisms were developed not only in infrastructure projects, but in all areas where private initiatives are more effective than state ones, but, at the same time, a certain public goal was achieved (Tkachenko et al., 2014).

G. Hodge and C. Greve note that PPP is a legally executed agreement between the participants, which is a state institution, on the one hand, and a private enterprise, on the other. As a result of this agreement, the resources of both parties are effectively used to create the final product or service of social importance. In addition to the common use of resources, each party to the contract is jointly and severally liable for risks and returns (Hodge et al., 2011).

The publications of the influential rating agency Standard and Poor's PPP describe an agreement of medium or long duration between an economic entity and the state, which is characterized not only by the joint use of common resources, the division of income, but also by collective responsibility for all obligations, risks arising in the process of joint - local activities. The research of the American professor P. Rosenau is based on the fact that PPP formed as a symbiosis of the market and the state, capable of mitigating the weaknesses of one and the other side, and enhancing the advantages of each side, allowing the most efficient use of available resources and obtaining a synergistic positive effect (Rosenau, 2000).

The main advantage of using PPP is effective mutually beneficial cooperation between the state and economic entities in those sectors where the dominance of only private capital is impossible and the presence of the state is necessary here because of the social component, but the state cannot fully meet its obligations due to limited budget resources. Particularly relevant are projects in socially oriented areas, such as healthcare, education, energy, road infrastructure, housing and communal services, etc. A number of works are dedicated to these areas (Taubayev et al., 2018). These works establish a number of functions that a private investor can perform:

– Finance – financing or co-financing of the project;
– Design – project design, including infrastructure design and assistance model;
– Construction – construction or reconstruction of facilities included in the project;
– Maintenance – maintenance of hard infrastructure (facilities as well as equipment, if applicable);
– Operation – supply of related equipment, IT and management/delivery of services;
– Deliver – provision and management of certain clinical and clinical support services (Ho, 2006, Calabro et al., 2019, Samii et al., 2002).

Obtaining a multiple long-term effect from bilateral cooperation with mutual investment of resources is possible subject to compliance with all the principles and goals of PPP, which include open hearings and discussions of directions for investing and using PPP resources, the effectiveness and efficiency of partnerships, plans for long-term implementation, use of new, updated facilities, services, as well as the creation and implementation of projects in the following areas: management support, leasing, concession (this type is especially relevant for the Kazakh business community in the framework of cooperation in the field of PPP), "Design-Build-Operate-and Transfer" (DBOT; "Design development - construction - management – transfer"), "Build-and Transfer" (BT; "Build-transfer"), "Build-Operate-and Transfer" (BOT; "Build-management-transfer") (Riley et al., 2018,).

A much less developed issue is the possibility of using PPP tools for the innovative development of the real sector of the economy. In some scientific works, the limited use of PPP is justified by the increased risk of the timeliness of the return of investments directed to the implementation of various innovative projects (Efimov, 2016).

Methods

Determining the directions for the development of PPP tools in the field of financing innovative projects aimed at improving the manufacturability of MMC enterprises includes a set of methods, from which we selected a number of methods:

– methods of statistical data processing allowed to determine the current state of development of the PPP field in Kazakhstan;

– the system method, the logical method identified the current problems of innovative development of mining and metallurgical enterprises through public-private partnership;

– the method of analogies and modeling allowed developing an algorithm and a hierarchical model for managing and supporting PPP projects for the innovative development of the MMC.

Results

In the Republic of Kazakhstan, PPP mechanisms are at the beginning of their development. First of all, two main stages in the development of PPP mechanisms should be distinguished:

1) 2005–2013. With the adoption of the Law of the Republic of Kazakhstan "On Concession" in 2006, which defines the norms, principles and rules for the transfer of state property, the first three projects were implemented related to the development of transport and energy infrastructure (construction of the passenger terminal of the Aktau international airport, reconstruction of the railway road "Station Shar-Ust-Kamenogorsk", construction of a power transmission line "Northern Kazakhstan - Aktobe region"). At this stage, there were no more concession agreements. In 2008, JSC "Kazakhstan Center for Public-Private Partnership" was established under the Ministry of National Economy of the Republic of Kazakhstan;

2) 2014-to present time. In 2014, the Consultative Center for Public-Private Partnerships was established, later there were several reorganizations of the Center for Support of Public-Private Partnership Projects LLP, Kazakhstan Project Preparation Fund LLP, the main founder is Baiterek NMH JSC. This institutional framework was designed to accompany PPP projects at the national level. In 2015, the Law of the Republic of Kazakhstan "On public-private partnership" was adopted, which began to determine the forms of cooperation between the public partner and the private partner in the framework of PPP.

Further development of the relevant legal framework led to a number of recent amendments to the PPP Law, which have resulted in:

– Simplification of PPP planning by reducing the planning stages of PPP projects;

– Provision by the state partner of a long-term guarantee of sale/consumption;

– Development of standard documentation aimed at saving time for all parties involved;

– Launching a unified database of PPP projects.

According to the JSC "Kazakhstan Center for Public-Private Partnership" for the 16-year period from 2006 to 2022, the total number of projects amounted to 1366 units (Figure 1). From the above dynamics, it can be seen that the main development of PPP projects in Kazakhstan began only in 2017. At the same time, in the last year, there is again a sharp decrease, for six months of 2022, only 3 projects have been developed.

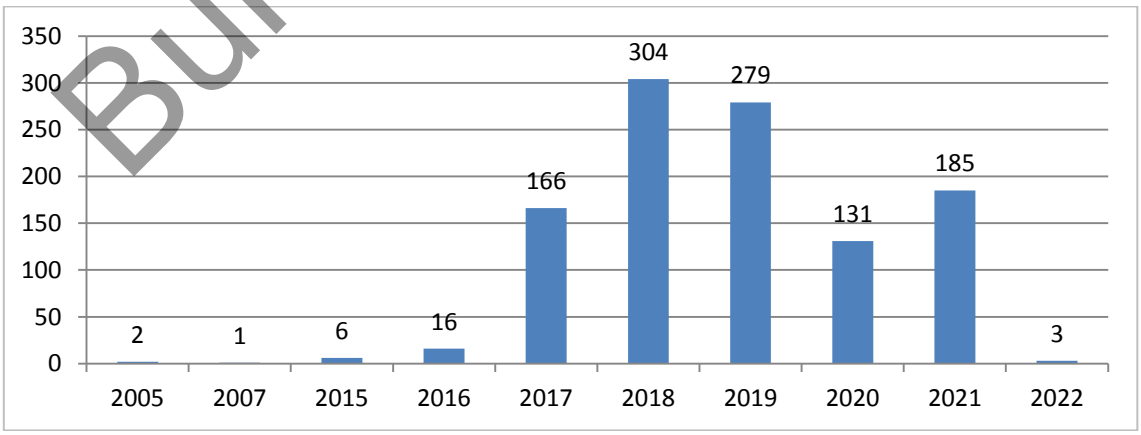

Figure 1. Number of PPP projects in the Republic of Kazakhstan

Note – Compiled by authors based on data from (Kazakhstan Public-Private Partnership Center, 2022)

As can be seen from Figure 2, 814 PPP projects (60%) are under implementation. Of these, 590 projects (72.5%) have been put into operation, 55 projects (6.8%) are at the stage of financial closure, 90 projects (11.1%) are at the stage of construction and obtaining permits.

139 projects (10.2%) are at the planning stage, 81 projects (5.9%) are at the stage of concluding contracts, contracts for 72 projects (5.3%) have been terminated, for 49 projects (3.6%) no competition took place, only for 211 projects the contract is considered to be implemented.

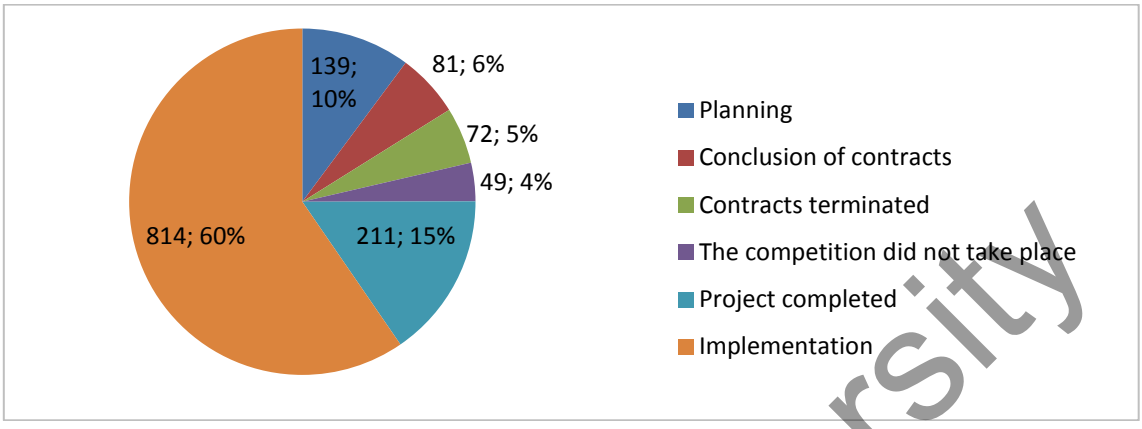

Figure 2. Structure of PPP projects by stages of implementation

Note – Compiled by authors based on data from (Kazakhstan Public-Private Partnership Center, 2022)

In addition, it should be noted that local executive bodies act as state partners. Most of the projects - 97% - are implemented at the local level (Figure 3).

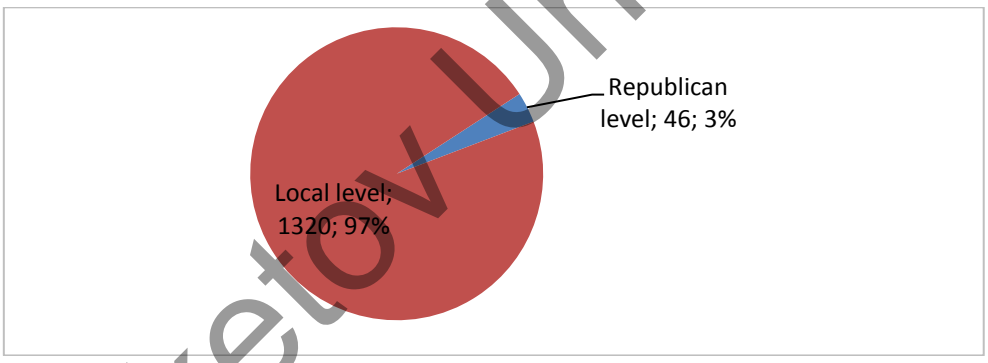

Figure 3. Structure of PPP projects by level

Note – Compiled by authors based on data from (Kazakhstan Public-Private Partnership Center, 2022)

For the entire period of implementation of PPP mechanisms at the republican level, 46 projects were considered, of which 21 projects are at the planning stage. In the field of digital technology development, the following should be noted:

– Determination of the organization that maintains the information system for tracking the movement of vehicles specializing in the removal of waste, according to satellite navigation systems;

– Implementation, maintenance, and development of an information system for centralized collection and storage of electronic information resources in the field of housing relations and housing and communal services;

– Implementation and adaptation of an information system for paperless document management in the field of air cargo transportation (e-Freight);

– Creation and implementation of an automated system for collecting data on air passengers;

– Creation, implementation, and maintenance of the automated information system of the electronic journal “Kundelik”;

– Providing broadband access to rural settlements of the Republic of Kazakhstan using the technology of fiber-optic communication lines;

– Creation, implementation and operation of a hardware-software complex (hereinafter referred to as HSC), designed to automate the return of part of the money spent for all segments of the population in the form of a fiscal bonus (cashback) from the state and a commercial bonus (cashback) from manufacturers/importers of goods from the amount purchases reflected in fiscal receipts, regardless of the method of payment;

– Implementation and adaptation of a digital profile based on biometric identification;

– Implementation and operation of a computer program to ensure the functioning of the rate accounting center;

– Creation of a unified automated system for registering mobile devices using IMEI codes;

– National Spatial Data Infrastructure of the Republic of Kazakhstan (NSDI);

– Development and implementation of a universal payment system for instant payments;

– Implementation and operation of the electronic queue system at the cross-border points of the Republic of Kazakhstan;

– Implementation of the Horizontal Monitoring Platform;

– Creation and implementation of an analytical trading platform;

– A platform for the protection of consumer rights through the involvement of citizens, business representatives, pre-trial authorities and the state to improve the market situation and the quality of life of consumers.

It is impossible to assess the effectiveness of PPP projects, since the projects are at the planning and implementation stages, however, the first steps in the development of digital technologies through public-private partnerships have already been made.

If we consider the sectoral structure of PPP projects in more detail, we can conclude that the use of public-private partnership mechanisms is socially oriented.

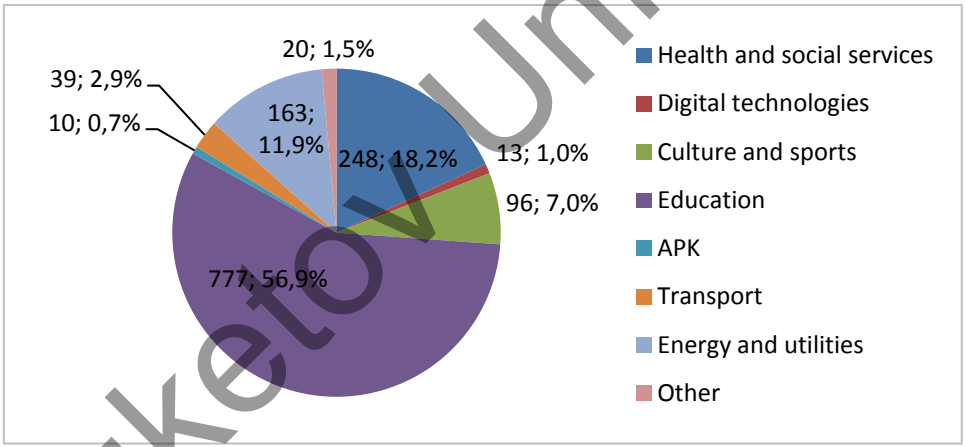

Figure 4. Sectoral structure of PPP projects

Note – Compiled by authors based on data from (Kazakhstan Public-Private Partnership Center, 2022)

57% of all projects were implemented in the educational sector, in most cases, it is the provision of catering services in children's or school institutions. The second most important sector in terms of the prevalence of PPP projects is healthcare - 248 projects (18%), here projects are mainly implemented to expand the network of hospitals, medical-obstetric stations, medical outpatient clinics, etc. 163 projects (12%) PPPs are implemented in the housing and communal services and energy, projects are aimed at improving engineering and technical networks (lighting, heating, landscaping, etc.). 96 projects (7%) are implemented in the field of culture and sports, mainly the construction and operation of sports facilities. These areas account for 94% of all PPP projects.

Discussions

In general, it should be noted that the regulation of PPP in Kazakhstan reflects accepted international standards. PPP has the following exceptional features:

– Relationships between public and private partners are established by concluding an agreement on PPP;

– The PPP project is designed for the medium or long term, from three to 30 years, depending on the specifics of the project;

– Joint participation of the public and the private partner in the implementation of the PPP project;

– Consolidation of resources of public and private partners for the implementation of the PPP project;

– Risks are shared among the parties depending on which party is in the best position to manage risk at a lower cost.

At the legislative level, there are four main goals of PPP:

1) to maintain sustainable socio-economic development of the country, the formation of prerequisites for increasing the effectiveness of partnerships between private capital and the state structure;

2) increasing the investment attractiveness of sectors of the economy, especially social and infrastructure facilities of the country, through the joint effective use of resources of private business and the state;

3) development of a client-oriented approach in the provision of services and production of goods to the population, improving the quality and availability;

4) increase the overall innovation activity in the country, including the promotion of high-tech and knowledge-intensive industrial development.

According to the current legislation, PPP is applied in an institutional format by creating a joint venture, as well as in a contact format by concluding a PPP agreement (concession, trust management agreement, leasing, service contract, R&D agreement, life cycle contract). Of the total number of PPP contracts, service contracts are the most widespread - 36% (494 projects), its specificity is the modernization and maintenance of a certain type of equipment. 26% of all PPP projects (355 units) have standard PPP agreements, 16% of PPP projects (209 units) are implemented through trust management agreements. PPP directions in relation to the development of R&D, life cycle contracts, equipment leasing are unpopular.

Judging by the sectoral structure of PPP projects, it can be concluded that public-private partnerships in the real sector of the economy are not developed, the goal of PPP to assist in the innovative development of the economy of Kazakhstan has not been achieved.

In addition, the analysis of the practice of applying PPP mechanisms revealed the following problems: The selection mechanism is not clearly applied, not all projects are budget-efficient, which leads to an increase in government obligations. Some PPP projects are implemented only at the expense of the local budget, the state has only obligations without private investment. This is reflected in the ratio of attracting private and public investments, if in world practice the normal level of the ratio is 3 to 1, in Kazakhstan it is 1.5 tenge of private investment to 1 tenge of state.

An analysis of the development of the metallurgical industry in Kazakhstan showed that the expansion of the freedom of action of economic entities is one of the most important, but not the only factors in the functioning of the mechanism of effective market interaction. Today, the state does not have effective mechanisms for the innovation and technological development of the MMC. The main reason for this situation is the moral obsolescence of production capacities and the change in the structure of demand for metal products, which requires innovative modernization of technologies. Metallurgists need large-scale investments to implement new projects.

When developing a new PPP model in an enterprise, the following criteria should be taken into account:

– obtaining by the enterprise the greatest profit on invested capital at minimum investment costs;

– achievement of economic, scientific, technical, and social effect from the activities under consideration - for each investment object, specific methods of evaluating efficiency are used, and then those projects are selected so that, all other things being equal, provide the enterprise with the maximum investment efficiency;

– ensuring the liquidity of investments;

– compliance with the state priorities for the development of the economy as a whole;

– rational use of funds for the implementation of environmental projects;

– minimization of investment risks associated with the implementation of specific projects.

Considering the complexity of the problems being solved in the metallurgical industry, their wide range, close connection with the globalization of the economy, the stimulation of new metallurgical industries should be based primarily on digital management methods, provide conditions for the economic interest of metallurgical enterprises for the development of 4-5 stages.

For the effective introduction of digital technologies in the real sector of the economy, it is necessary to develop an institutional public-private partnership, this will allow to implement the principle of a single operator. JSC National Infocommunication Holding Zerde, the Ministry of Information and Social Development of the Republic of Kazakhstan can become the state partner of this PPP model (Figure 5).

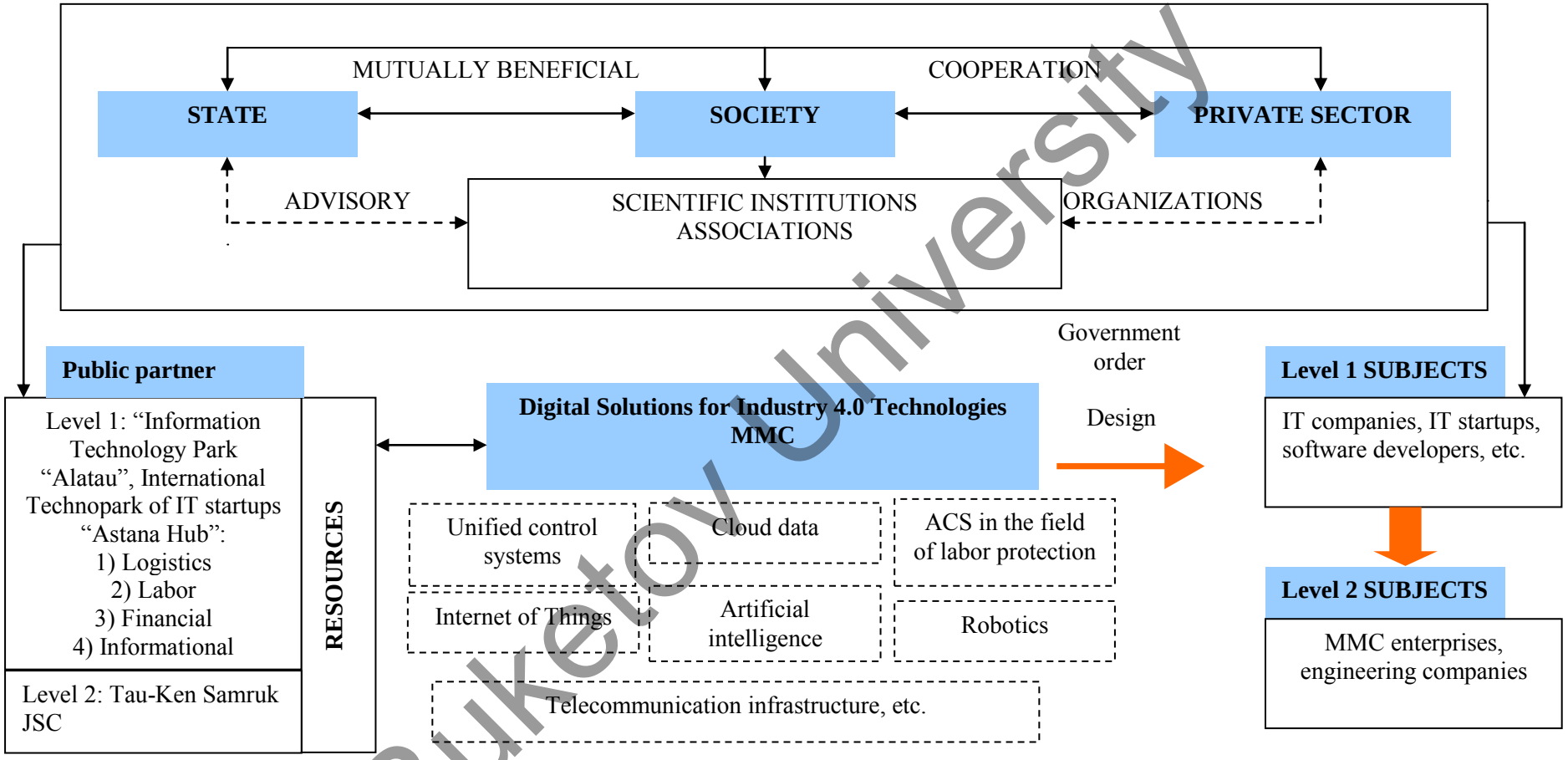

Figure 5. Two-level model of the PPP mechanism in the mining and metallurgical complex

Note – Compiled by authors

At this level, the main contract of the PPP mechanism should be R&D contracts aimed at the development of digital technologies, the creation of samples, the state order, and the order for design. The special economic zone "Park of information technologies "Alatau" and the international technopark of IT start-ups "Astana Hub" can serve as an innovative infrastructure and platform for the implementation of digital technologies and solutions. IT companies, venture companies, business agents can become private partners. The main state goal of applying the SDP is the innovative development of the MMC through the introduction of Industry 4.0 technologies. The goal of innovative entrepreneurship is to maximize profits through the commercialization of research results.

Information management and control systems have been introduced at all MMC enterprises in Kazakhstan, domestic IT companies should develop digital solutions for the compatibility of existing systems and the developed Industry 4.0 technologies, aimed primarily at improving the efficiency of control and monitoring operations, financial, economic and marketing aspects of activity. Particular attention should be paid to improving labor safety in the mining industry through digital technologies.

At the stage of implementation and diffusion of Industry 4.0 technologies, the Ministry of National Economy of the Republic of Kazakhstan, the National Mining Company Tau-Ken Samruk can become a state partner. The most suitable forms of PPP are DBOT ("Design-Build-Operate-Transfer"; "Design of digital applications - construction - management – transfer"), BT ("Build-Transfer"; "Build-transfer"), BOT ("Build-Operate-Transfer"; "Build-Control-Transfer").

World experience has identified the main factors for a successful public-private partnership:

1) joint financing of projects for the digitalization of the mining and metallurgical complex with a mandatory predominant share of the private partner;

2) gradual expansion of the functionality of the national innovation infrastructure based on the diffusion of improving innovations of individual MMC enterprises;

3) increasing the level of trust in venture projects. Creation of a mechanism for guaranteeing venture investment, creating preferences and benefits for venture companies;

4) diversification of state support to reduce the risks of state partners;

5) development of non-financial instruments of state support for innovative projects (training of personnel, advisory services for support, services for the protection of intellectual property, etc.) (Leigland et al., 2018, Frolov, 2021, Liang et al., 2018).

Conclusions

At present, the role of the state should be strengthened as a guarantor of maintaining a favorable and predictable regulatory regime for the economic activity of the MMC; one of the possible directions is the development of PPP mechanisms. It is necessary to ensure the openness and predictability of the state investment policy, to stimulate the attraction of capital from the non-state sector to solve the priority tasks of the development of metallurgy.

The following directions are proposed to improve the efficiency of the application of the PPP mechanism in relation to innovative digitalization projects and the development of Industry 4.0 technologies:

1. Unification of the provisions of the Laws of the Republic of Kazakhstan "On Concession" and "On Public-Private Partnership". These laws, in fact, are aimed at regulating provisions in one area - PPP, however, there are discrepancies in certain articles and provisions relating to concession agreements.

2. Development of the principles of cooperation in the system of initiation and development of digital applications and technologies. The concept of "coopetition" comes from the merger of the two words collaboration and competition. This phenomenon is first described in the competitive struggle of digital magnates: Apple, Microsoft, Intel. It is in the case of the development of digital technologies that require a certain unification that a certain environment is created, implying simultaneous cooperation and competition.

3. Expansion of the network of business intermediaries, business partners in the information and communication area, consolidation of their efforts in the development of unified digital solutions for mining and metallurgical enterprises.

4. Development of a mechanism for state support of MMC and ICT associations, instead of individual mining and metallurgical enterprises of small and medium-sized businesses, which will allow a comprehensive approach to the problems of digitalization of the industry and the development of Industry 4.0 technologies.

5. Creation of an institutional environment for a single digital platform for MMC enterprises in relation to Big-Data, cloud storage in the field of operational control, marketing, international trade, and other activities of the MMC, which will ensure the correct and efficient functioning of public-private partnership mechanisms.

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А.Қ. Қабдыбай, Н.Д. Кенжебеков, Е.Б. Жайлауов, Д.И. Сыздыкова, Д.Н. Улыбышев

Қазақстанның ТМК кәсіпорындарының технологиялық дамуы үшін мемлекеттік-жекеменшік әріптестіктің мүмкіндіктері

Аңдатпа

Мақсаты: ТМК кәсіпорындарының өндірістік қабілеттілігін арттыруға бағытталған инновациялық жобаларды қаржыландыру саласында МЖӘ құралдарын дамыту бағыттарын анықтау.

Әдісі: Зерттеуді жүргізу кезінде статистикалық мәліметтерді өңдеу әдістері, жүйелік әдіс, логикалық әдіс, аналогия және модельдеу әдісі қолданылды.

Нәтижелері: МЖӘ дамытудың бірқатар проблемалық мәселелерін қорытындылауға болады: МЖӘ жобалары санының динамикасының өсу қарқынының жеткіліксіздігі, олардың салалық теңгерімсіздігі, экономиканың нақты секторында тиімді жобалардың болмауы, іріктеу механизмінің жеткіліксіз тиімділігі, бюджеттік тиімділікке, МЖӘ тетігінің нормативтік-құқықтық базасының бытыраңқылығы мен анық еместігіне және бірқатар басқаларына теріс әсер етеді.

Қорытындылар: Қазақстанның тау-кен металлургиялық кешенін цифрландыру деңгейін арттыру үшін Индустрия 4.0 технологияларын дамыту және ілгерілету бойынша бірыңғай операторды құру арқылы МЖӘ институционалдық моделі негізделді. «Зерде» ұлттық инфокоммуникациялық холдингі» АҚ, «Алатау» ақпараттық технологиялар паркі» АЭА, «Astana Hub» IT-стартаптар халықаралық технопаркінің функционалдығын кеңейту қажет. Мемлекеттік серіктес цифрлық технологияларды дамыту мәселелерін отандық және шетелдік IT-компаниялар арасындағы ынтымақтастықты дамыту арқылы шешеді. Бұл тапсырманың маңызды критерийі әзірлемелердің жоғары бәсекеге қабілеттілігі мен коммерциялануы, сондай-ақ ТМК кәсіпорындарының қызметіне енгізу үшін біріздендіру болып табылады. Цифрлық шешімдерді тарату кезеңінде салалық бірлестіктерді: тау-кен металлургия кешенін, IT секторын қолдауға көбірек назар аудару керек. Бұл құрылымдардың институционалдық жауапкершілігін арттыру мемлекеттің қатысу тәуекелдерін азайтады, сондай-ақ жеке бизнес тарапынан сенім деңгейін арттырады.

Кілт сөздер: мемлекеттік-жекеменшік әріптестік, концессия, мемлекеттік инвестициялар, инновациялар, ТМК технологиялық дамуы, цифрлық технологиялар, МЖӘ үлгілері, IT секторы.

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Возможности и перспективы государственно-частного партнерства для технологического развития предприятий ГМК Казахстана

Аннотация:

Цель: Заключается в определении направлений развития инструментов ГЧП в области финансирования инновационных проектов, направленных на повышение технологичности предприятий ГМК.

Метод: При проведении исследования использованы методы статистической обработки данных, системный метод, логический метод, метод аналогий и моделирования.

Результаты: Можно обобщить ряд проблемных вопросов развития ГЧП: недостаточные темпы роста в динамике количества проектов ГЧП, их отраслевые диспропорции, отсутствие действенных проектов в реальном секторе экономики, недостаточно эффективный механизм отбора, что негативно отражается на бюджетной эффективности, фрагментарность и неоднозначность нормативно-правовой базы механизма ГЧП и ряд других.

Выводы: Для повышения уровня цифровизации ГМК Казахстана обоснована институциональная модель ГЧП путем создания единого оператора разработки и продвижения технологий Индустрии 4.0. Следует расширить функциональные возможности АО «Национальный инфокоммуникационный холдинг "Зерде"», СЭЗ «Парк информационных технологий "Алатау"», международного технопарка IT-стартапов «Astana Hub». Государственный партнер решает задачи разработки цифровых технологий за счет развития кооперации среди отечественных и иностранных IT-компаний. Важным критерием данной задачи является высокая конкурентоспособность и коммерциализуемость разработок, а также унификация для внедрения в деятельность предприятий ГМК. На этапе распространения цифровых решений больший упор следует сделать на поддержку отраслевых ассоциаций: ГМК, IT-сектора. Повышение институциональной ответственности данных структур позволит снизить риски государственного участия, а также повысить уровень доверия со стороны частного бизнеса.

Ключевые слова: ГЧП, концессия, государственные инвестиции, инновации, технологическое развитие ГМК, цифровые технологии, модели ГЧП, IT-сектор.

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