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THE ROLE OF SMES IN WATER SUPPLY AND SEWERAGE: A CASE OF KAZAKHSTAN*

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Abstract. The article examines the problems and features of the state of the life-supporting infrastructure, namely the water supply and wastewater disposal sector on the example of Kazakhstan. The role and prospects for the development of small and medium-sized businesses for the development of this sector are also determined. The results of the SWOT analysis of the development of the water supply and sanitation sector in Kazakhstan (taking into account the implementation of state investment programs) are presented, as well as the analysis of existing problems and a number of recommendations on the results of the study.

Keywords: Kazakhstan; water supply; sewerage; small and medium-sized enterprises (SMEs); state regulation of the economy; tariffs; life-supporting infrastructure

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JEL Classifications: H54, Q25, Q28, R10

1. Introduction

The Republic of Kazakhstan's water supply and sanitation sector has a fully formed consistent and functional legal framework – despite its fragmented nature and a number of specific shortcomings. Legislation on water resources and water supply is exhaustive. However, at the same time, it is fragmented and contained in a large number of legal documents.

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Over the past decade, major state investment programs have allowed Kazakhstan to improve significantly the quality of water supply and sanitation services. However, main problematic aspects remain relevant. Level of service in cities is very high: centralized water supply services cover almost the entire cities, and almost all enterprises in the sector provide water continuously and meet all the acceptable standards of suitability for drinking purposes. Despite these important achievements, the sector still requires both investment and improved participant competencies.

In particular, investments are needed to ensure full coverage of water supply and sanitation services for the rural population, develop wastewater treatment infrastructure and bring them in line not only with the legislation in force in Kazakhstan, but also adaptation to more environmentally demanding European standards (if necessary). And also the need to resolve remaining issues related to the quality of the supplied water.

By regional standards, water utilities show generally acceptable performance indicators. Nevertheless, these can be improved, especially in small towns. Often, small or medium enterprises suffer from insufficient productivity and production capabilities.

Legislative framework and institutional structure are generally well defined and functional, but insufficient operational regulation weakens the effectiveness of services. Areas of responsibility in the sector are allocated clearly, and the main functions (policy development, regulation, and service delivery) are divided, which is a key condition for effective sector management.

Socially motivated tariff policy makes the sector dependent on constant budget support and a small number of major consumers as sources of income. Tariffs for water supply and sanitation services reflect the importance of social protection of domestic consumers, which guarantees them access to services at an affordable price.

The main task of water management is to provide all branches and types of economic activity with water in the required quantity and quality. According to the nature of water resources use, Kazakhstan's economy sectors are divided into water consumers and water users. To be consumed later on, water is withdrawn from open sources (rivers, lakes and reservoirs) and underground sources (aquifers) and is used in industry, agriculture, for municipal needs, and for other sectors of the economy. Water is a part of manufactured products, and water resources are subject to pollution and evaporation for various reasons.

Long-term development in the provision of public goods and services can be thought of as a pendulum-like movement, in which trends toward public provision alternate with counter-movements toward increased privatization and the development of private initiatives, including small and medium-sized businesses. The trend toward public provision of life-supporting infrastructure services can be traced back to the nineteenth century, when urban services such as water and sewerage began to provide these services with high initial investment.

The trend toward the formation of natural monopolies in the water sector culminated in the theory of the convergence of economic systems in socialist planned economies and capitalist market economies for increasing state provision of services and economic control in market economies (see, for example, Tinbergen, 1959, 1961; Boettcher, 1970). At the same time, however, there was also strong criticism of the repulsion of private enterprise and state encroachment into more and more areas of the economy (Friedman, 1962; Hayek, 1960).

After World War II there was an expansion of the state supply of goods and services in market economies, supported by few economists (see above, also Shirley, Walsh, 2000; Shleifer, 1998). The idea of public (monopoly) provision of services has begun to lose ground due to growing criticism of the inefficiency of public corporations, especially in the last two decades of the 20th century. This also applies to areas that have always

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been provided by the public sector, namely life-supporting infrastructure and utilities, including the water and wastewater sector.

From a global perspective, water-related problems are primarily related to water scarcity, quality, and distribution (e.g., RobecoSAM, 2015). The problems facing water and wastewater utilities are more narrowly focused:
- interrelated social issues, such as population growth, urbanization, migration, changing lifestyles, access to water (rural and urban), sanitation and hygiene, water supply, and improving environmental attitudes toward water resources;
- technological problems, namely technologies for improving water efficiency, water reuse and recycling;
- economic, which include socially oriented rather than financially recouped tariffs, aging infrastructure, attempts to denationalize the established monopoly enterprises (case of Kazakhstan), strengthening the role of SMEs in the water supply and sanitation sector;
- ecological: reduction of fresh water reserves, persistent drought, ground water depletion, agricultural productivity and climate change resilience, ecosystem pollution, waste management
- political problems (models of communal property, watershed and cooperation between states that own territorial rights to use e.g. rivers, vulnerability of water rights system).

These problems have been described repeatedly in the works of scholars (Luebkeman, 2015; Weerd Meester et al., 2017a; Water JPI, 2016, Dietz et al., 2014; Wehn de Montalvo and Alaerts, 2013; Ipektsidis et al., 2016; Moumen et al., 2019). Moreover, many developing countries lack a solid knowledge base and capacity at different levels (water professionals, organizations, enabling environment, and society) to address these issues and to maintain and improve the management of the water and wastewater sector through change and innovation.

Issues of economic development, taking into account regional specificities, the peculiarities of the formation of economic and political associations, related to the quality of life, the level of development of life-supporting infrastructure, the role of SMEs in the utility sector, issues of innovation, have been repeatedly considered in the works of economists and sociologists (Goley, 1988; Ferrucci, 1995; Garn, 1997; Gregg, 1989; Hong, 1993; Ishigure, 1991; Kiparsky et al, 2013; Krozer et al., 2010; Lobina, 2012; Martins,Williamson, 1994; Miller, 1990; Oka et al., 1996; Palfai et al., 1998; Partzsch, 2009; Peuckert et al., 2012; Robbins, 1998; Hartman et al, 2017; Sirkiä et al., 2017; Barripp et al., 2004; Bowmer, 2004; Thomas, Ford, 2005; Daniell et al, 2014; Wehn, Evers, 2015; Mvulirwenande et al., 2017; Ngo Thu, Wehn, 2016; Gharesifard, Wehn, 2016; Pascual et al., 2013; Boronenko, Lavrinenko, 2015; Shevyakova, Petrenko, 2019; Ślusarczyk et al., 2020; Maldonado Narváez, 2020; Tvaronaviciene, Burinskas, 2020).

The main problem of research in the field of increasing the role of small and medium-sized businesses in the water supply and sanitation sector is that they fix the already existing situation and look for ways to adapt to the changing conditions of the current reality. Researchers very often do not take into account that changes in the existing utility systems and life-supporting infrastructure in individual countries are primarily possible only after changing the regulatory framework and reducing the level of monopoly and state interference. The focus remains on the instrumental level, individual proposals and the search for barriers, but not ways to remove them.

The main issue of this study is to assess the state of the water and wastewater sector in Kazakhstan and the role of small, medium-sized businesses in it.

Objectives of the study:
- To provide a cost-effective and comprehensive analytical study of the water and wastewater sector in Kazakhstan and the role of SMEs in it;
- Evaluating the development of the competitive environment for SMEs in the water sector of Kazakhstan, opportunities for improving the capacity of engineering and manufacturing organizations through the growth of

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professional competencies of specialists;
- Evaluating the attractiveness of the water supply and sanitation sector in Kazakhstan and assessing the attractiveness of this sector;
- elaboration of proposals on building a system of training and staff development, schemes for organizing educational services and a set of tools to support small and medium-sized enterprises.

The main water consumer is the production sphere (real sector), which is a set of industries and activities resulting in a material product (a vendible). Material production sectors usually include industry, agriculture, transport, and communications.

Water management also affects the non-productive sector, a service sector, which includes activities that do not create a material product:
- Housing and communal services;
- Non-industrial types of consumer services for the population;
- Health, physical education and social security;
- Education;
- Finance, credit, insurance, pension provision;
- Culture and art;
- Science and scientific service;
- Management;
- Public associations, including professional associations.

Provision of water resources to all producers, both in agriculture and in the extractive and processing industries, requires appropriate water supply services, i.e. appropriately staffed enterprises.
Industrial water consumption is characterized by the following: Large volumes of water consumption and sanitation; a small percentage of non-returnable water consumption; a large dependence of the water consumption taken from the source on the production technology and water supply system; a variety of water use functions; uniformity of water consumption throughout the year; a large share in the pollution of water sources.

Complexity of water supply systems for industrial enterprises is determined not only by their multifactorial nature and their interdependence, but also by the features of return and repeated use of water in technological processes, a variety of schemes for wastewater disposal and regeneration, extraction of valuable components from treated water, and significant costs for the construction of water supply and sanitation systems. The structure of the entire water supply system depends on the source type: technological scheme, types and number of structures included, water supply stability, construction price and operating costs.

At the same time, the main thing that any water supply project should provide for industrial enterprises, cities and rural localities is drinking quality; required quantity; optimal capacity that does not harm the ecology of the reservoir; the shortest distance from the source to the consumer.

2. Diagnostics of the state of the water supply and sanitation sector in Kazakhstan

Table 1 shows the sections and chapters of the CCEA of the Tax Code of the Republic of Kazakhstan 03-2019 corresponding to the sector of the economy related to water management.

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Table 1. CCEA sections and chapters

Section	Chapter	Group	Class	Class name	Subclass	Subclass name
A	01	01.6	01.61	Activities supporting crop production	01.61.2	Operation of irrigation systems
E	36	36.0	36.00	Water collection, treatment and distribution	36.00.0	Water collection, treatment and distribution
	37	37.0	37.00	Wastewater collection and treatment	37.00.0	Wastewater collection and treatment
F	41	41.0	41.10	Development of construction projects	41.10.0	Development of construction projects
	42	42.2	42.21	Construction of pipelines	42.21.2	Construction of pipelines for water supply and sewerage systems
		42.9	42.91	Construction of water facilities	42.91.0	Construction of water structures
G	46	46.6	46.66	46 Wholesale trade, excluding automobile and motorcycle business	46.66.0	Wholesale of other machinery, equipment, parts and accessories
M	71		71.12	Engineering surveys and provision of technical advice in this area	71.12.1	Engineering and technical design activities, excluding nuclear industry and nuclear power facilities
	72	72.1	72.19	Other natural and technical sciences related scientific research and experimental developments	72.19.9	Other natural and technical sciences related research and development
	74	74.9	74.90	Other professional, scientific, and technical activities not included in other groupings	74.90.2	Conformity assessment accreditation
					74.90.3	Activities of departmental services dealing with innovative technologies (medical, educational, consulting, etc.)
					74.90.9	Other professional, scientific, and technical activities not included in other groupings
P	85	85.3	85.32	Technical and vocational secondary education	85.32.1	Vocational and technical education
		85.4	85.42	Higher and postgraduate education	85.42.1	Higher education
					85.42.2	Postgraduate education
		85.5	85.59	Other types of education not included in other groupings	85.59.2	Types of education provided by national companies and their subsidiaries
			85.60	Support activities in education	85.60.1	Support activities in education provided by the national companies and their subsidiaries
					85.59.9	Other educational activities not included in other groupings
S	94	94.1	94.11	Activities of commercial, business and professional public organizations	94.11.0	Commercial and entrepreneurial public organization activities
					94.12.0	Professional public organizations activities
					94.20.0	Trade union activities

Source: composed by the authors

The water supply and sewerage sector (as a basic component of the water economy in Kazakhstan) consists of enterprises and organizations included, according to the registered data of the General Classifier of Economic Activities OKED NK RK 03-2019, in section E “Water supply; collection, processing and disposal of waste, activities to eliminate pollution. " This section includes activities related to the organization of collection,

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treatment and disposal of various types of waste, such as solid or liquid industrial or domestic waste, as well as the collection and disposal of waste from contaminated sites. Products from a waste treatment or wastewater treatment process can either be disposed of or serve as raw materials for other manufacturing processes. Water supply activities are also classified under this section. Sections: 36 Collection, treatment and distribution of water; 37 Collection and treatment of waste water and 38 Collection, treatment and disposal of waste; utilization (recovery) of materials. Section 38 does not directly deal with water supply and sanitation.

Data on employment in sector E are shown in Table 2 and despite the fact that it averages 1% of employment in Kazakhstan, water supply and sanitation is the most important part of life-supporting infrastructure.

Table 2. Employment in Section E industries. Water supply; sewerage system, waste collection and distribution control (CCEA 36, 37, 38)

Indicators	Units of measure	2014	2015	2016	2017	2018
Employment in Section E Industries	Thousand people	86,5	81,9	80,2	74,2	80,4
In % of total employment	Per cent	1,0	1,0	0,9	0,9	0,9
For reference: Employed population, total	Thousand people	8510,1	8433,3	8553,4	8585,2	8695,0

Source: composed by the authors

In 2018, water supply companies in Kazakhstan supplied 2359.8 million m³ of water into the network, and more than a quarter of the water volume was passed through treatment facilities. In 2019, water supply companies supplied 2339.9 million m³ of water into the network, with a quarter of this volume passed through treatment facilities.

In 2018, 41.2% of all water supplied into the network was spent on the enterprises' own needs at the expense of electric power and manufacturing industry enterprises. Leakage water losses amounted to 217.8 million m³. In 2019, 40.1% of all water supplied into the network was spent on the enterprises ' own needs at the expense of electric power and manufacturing industry enterprises. Leakage water losses amounted to 241 million m³.
The volume of water released to consumers in 2018 amounted to 1168.3 million m³ of water, of which 44.2% to the population. The volume of water released to consumers in 2019 amounted to 1160.9 million m³ of water, of which 46.2% to the population, which can be seen in Figure 1.

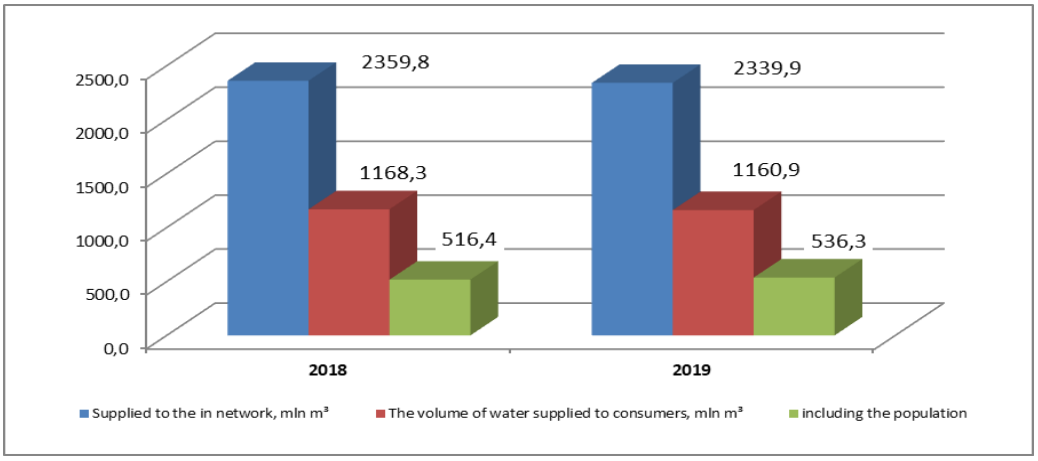

Fig. 1. Key indicators of the water supply sector in Kazakhstan

Source: composed by the authors

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The total length of water pipelines in 2018 was 26.3 thousand km; of which 40.7 thousand km of street water supply networks; 11.9 thousand km of submain and yard networks. The total length of water pipelines in 2019 was 27.2 thousand km; of which 44.1 thousand km of street water supply networks; 12.6 thousand km of submain and yard networks.

In 2018, there were 573 sewer structures and 301 separate sewer networks operating on the territory of the Republic. In 2019, there were 599 sewer structures and 272 separate sewer networks operating on the territory of the Republic.

The length of the main sewers in 2018 was 4.6 thousand km. The street sewer network was 6.3 thousand km. The length of the main sewers in 2019 was 4.8 thousand km. The street sewer network was 6.6 thousand km. The installed capacity of treatment facilities in 2018 was 3828.4 thousand m³/day. 580.7 million m³ of wastewater was passed through the treatment facilities, so the share of treated wastewater in the total wastewater flow was 86.8%. In particular, 532.9 million m³ were purified by full-scale biological treatment, of which 5.7 million m³ with posttreatment, 472.6 million m³ with standard treatment, and 43.5 million m³ was insufficiently treated. The capacity of mechanical treatment facilities in 2019 was 1414.1 thousand m³/day, and 2731.4 thousand m³/day for biological treatment facilities (full cycle). 579.2 million m³ of wastewater was passed through the treatment facilities, so the share of treated wastewater in the total wastewater flow was 84.5%. In particular, 495.5 million m³ were purified by full-scale biological treatment, of which 124.7 million m³ with posttreatment, and 497.0 million m³ was discharged into natural water bodies.

Key challenges and barriers to creating an effective system of economic incentives for the water resources management sector include the following:

1. Unreasonably low (socially oriented) tariffs for end-users of water resources make the sector dependent on state subsidies (see Table 3).

Table 3. Average prices and tariffs for water use in Kazakhstan, end of period

No.	Indicators	Unit of measure	2012	2013	2014	2015	2016	2017	2018
Average prices and tariffs for paid services for the population									
1	Hot water	Tenge/m³	172	173	178	199	218	234	240
2	Cold water	Tenge/m³	35	45	48	57	65	71	73
3	Wastewater disposal	Tenge/m³	23	30	31	37	43	46	48
Purchase prices for certain types of products of production-technical purpose of the industrial enterprises									
4	Steam and hot water (heat energy)	Tenge/ Gcal	2958	3707	4127	4446	5284	5435	6410
5	Average annual exchange rate of the Euro (according to the National Bank of Kazakhstan) https://nationalbank.kz/ru/news/oficialnye-kursy	Tenge/ Euro	191,67	202,09	238,1	245,8	378,63	368,32	406,66
Average prices and tariffs for paid services for the population									
1.1	Hot water	Euro/m³	0,90	0,86	0,75	0,81	0,58	0,64	0,59
2.1	Cold water	Euro/m³	0,18	0,22	0,20	0,23	0,17	0,19	0,18
3.1	Wastewater disposal	Euro/m³	0,12	0,15	0,13	0,15	0,11	0,12	0,12
Purchase prices for certain types of products of production-technical purpose of the industrial enterprises									
4.1	Steam and hot water (heat energy)	Euro/Gcal	15,43	18,34	17,33	18,09	13,96	14,76	15,76

Source: composed by the authors

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2. Payment system does not encourage the development of an effective water management system.

3. Limited access to investment, including borrowed funds of water supply and sanitation service providers.
Despite state's significant efforts to implement measures to transfer the costs of maintaining water facilities to self-financing at the expense of water users, currently the issues of recoupment of operating costs of water services, considering preventive maintenance, operating costs, capital repairs and renovations, remain open leaving many water services, especially those in rural areas, hanging on the verge of bankruptcy.

Level of tariffs for industrial consumers varies up to 350 tenge/m³ (including investment costs) and, therefore, is not comparable to the level of tariffs applied in other countries. Tariff level used does not cover the full cost of water supply (capital and operating costs). In addition to covering the cost of water supply, industrial consumers are usually forced to subsidize utility customers. Current tariffs for industrial enterprises are related only to the level of water consumption, which practically does not create incentives for the use of return water consumption and recycling.

Tariffs for utility customers are quite low and usually do not fully cover operating costs.
As a result of low tariffs, most consumers assume water is "shareware" and do not try to use it sparingly. This leads to low efficiency in the use of water resources by end users and unproductive consumption of water by agricultural consumers and the population. For the industrial sector, current water tariffs provide little economic incentive to invest in water-saving technologies.

Tariffs for sewage services also provide insufficient incentives to reduce pollution and treat wastewater. Industrial wastewater tariffs do not depend on both quality and degree of wastewater treatment. Despite the existence of detailed methodologies in Kazakhstan, their application is hampered by the lack of continuous and widespread monitoring of water quality and the ability to impose effective penalties for violations. Agricultural sector of Kazakhstan does not apply wastewater tariffs, so there are no incentives to maintain drainage systems.

The results of the SWOT analysis of Kazakhstan's water supply and sanitation sector development (taking into account the implementation of state investment programs) are presented in Table 4.

Table 4. SWOT analysis of Kazakhstan's water supply and sanitation sector development

1. Strengths	2. Weaknesses
For the whole country	
1.1 Urban population growth trends (i.e., an increase in the number of service users). 1.2. High share of large cities of Almaty and Nur-Sultan in the country's GDP and a growing demand for water supply (pilot projects for training and creation of specialized Training centers are possible). 1.3. Dynamic development of the service sector in major cities (Nur-Sultan and Almaty), including those provided by SMEs (education, health, culture and leisure) and, consequently, an increase in the need for water supply and sanitation. 1.4. Creation of a favorable environment for the development of a modern (innovative) and "green" economy in large cities and, consequently, increase in the need for highly qualified experts. 1.5. Transport connectivity of the capital with the regions.	2.1. A gap in the urbanization level of developed countries. 2.2. Low competitiveness of major cities at the global and regional (Eurasian) markets. 2.3. Regional disparities in the quality of life, especially between urban and rural localities. 2.4. Low level of diversification of economy of mono and small cities, and rural settlements.

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Exclusively in the water supply and sanitation sector	
1.6. A continuous state support for the development and modernization of the housing and utilities system (possibility of financing the projects). 1.7. Already existing relatively high degree of coverage of the urban population with centralized water supply and sanitation. 1.8. Work has continued on using the potential of underground water to provide the population with access to drinking water (this is especially relevant for rural localities), therefore, the emergence of new SMEs for the operation and maintenance of water intake structures and, as a result, an increase in the need for qualified personnel.	***2.5. Critical shortage and aging of existing qualified personnel (with higher education, technical and special education) in the water supply and sanitation sector.*** ***2.6. Underdevelopment and absence of practice orientation in the system for training of personnel with modern skills and competencies for the water supply and sanitation sector.*** 2.7. Low level of population awareness on processes taking place in the water supply and sanitation sector, tariff formation, advantages of new technologies, systems of economy and consumption accounting. 2.8. Mismatch of engineering and social infrastructure, high wear of water supply, sewerage, heat and electricity networks, local inner-city roads, especially those in small and single-industry towns and rural localities. 2.9. Lack of alternative sources of financing for the modernization of engineering infrastructure in cities (other than the state budget). 2.10. Low level of implementation of new technologies in the housing and communal dervices system.
3. Opportunities	**4. Threats**
For the whole country	
3.1. Development of mobile labor market in large cities. 3.2. Formation and expansion of sales markets in agglomerations and large cities, including those for water supply and sanitation services. 3.3. Implementation of strategies for the development of major cities until 2050. 3.4. Improvement of the quality of life through technological (innovative) development of large cities, mono, and small cities, rural settlements in the implementation of a state investment programs.	4.1. An ongoing pandemic and tightening of sanitary-epidemiological regime. 4.2. Investment unattractiveness of small and single-industry towns and rural settlements remote from large cities. 4.3. Mass unemployment due to the shutdown of city-forming enterprises in small and single-industry towns, as well as rural areas, and, consequently, the lack of funds to pay for water supply and sanitation services.
Exclusively in the water supply and sanitation sector	
3.5. Introduction of PPP mechanisms to increase the investment attractiveness of the water supply and sanitation sector. 3.6. Introduction of new technologies and digitalization in the water supply and sanitation sector to increase the service life of engineering infrastructure, reduce losses, and automate production processes. 3.7. Development of the education system for the training of qualified personnel with necessary skills and competencies at all levels of training (pilot projects for training and creation of specialized Training centers are possible).	4.4. Excessive strain on urban infrastructure. 4.5. Lack of a system of educational institution (universities, colleges, etc.) orders of specialists from operating organizations in training areas. 4.6. Lack of centers for professional development and competence development, both at the operating enterprises themselves, and in general in Kazakhstan. 4.7. Reduction of state support for the modernization of engineering infrastructure due to budget constraints. 4.8. Weakening of the national currency, which will lead to an increase in prices for imported construction materials and equipment.

Source: composed by the authors

In Kazakhstan, the expected trends of increasing water consumption and decreasing water availability threaten to increase the regional deficit, which six of the eight water basins in Kazakhstan may face by 2025. According to available estimates, by 2040, Kazakhstan may face a significant shortage of water resources for 50% of the need.

Speaking of reducing the threat of water scarcity in recent years, we have noted only one positive trend in the management of water resources in Kazakhstan, namely, a transition to the basin principle of water resources management, which corresponds to the best international practices. We can also note an increased financing of water management and hydro-reclamation infrastructure through the implementation of state programs, which helps to reduce water losses and improve infrastructure safety.

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However, despite improvements in water resources management, a significant number of issues in the water supply and sanitation sector remain unresolved:

1. Most efforts to prevent shortages focus on infrastructure development rather than reducing water demand.
2. Low efficiency of use (productivity) of water resources in Kazakhstan.
3. The existing tariff structure, especially in agriculture and for the population, does not encourage efficient use of water resources and does not allow investors to cover owner operating and capital costs.
4. Efforts to promote efficient use of water resources are insufficient in all sectors, but most of all in agriculture, where losses are up to 66%.
5. There is a lack of investment in infrastructure, both in the construction of new facilities to provide access to water and in the maintenance of existing infrastructure.
6. Access to water resources remains an issue: 84.4% of the population of Kazakhstan has access to quality drinking water in rural areas (94.5% in urban areas), and 68.7% is the coverage by wastewater treatment in cities (much lower in rural areas), while in most developed countries these indicators are close to 100%. Source: Decree of the Government of the Republic of Kazakhstan dated December 31, 2019 No. 1054 "On approval of the state program of housing and communal development "Nurly Zher" for 2020—2025".
7. More than 40% of main and distribution channels are in poor condition.
8. A significant part of the irrigation and drainage infrastructure is in a derelict state.
9. Some key water management mechanisms are not well developed or are missing, and there is also a lack of a strategic approach to water sector management.
10. A poor coordination of water resources management between various ministries and agencies.
11. Water sector lacks experts and managers skilled enough to project the balance of water resources, optimize capital investments, and improve the efficiency of water consumption.
12. The trend of growth in recent years of material damage from harmful effects due to high flows, floods, changes in the banks of water bodies, flooding of territories with groundwater, waterlogging and salinization of land, water erosion.
13. Limited allocation of funds for the repair of hydraulic structures, which leads to the aging of the main water resources.
14. There is no order for the delivery of experts from operating companies and water sector infrastructure enterprises.

Strategy for the development of the water supply and sanitation sector should consider current priorities:
- Value of human capital,
- Expert competence,
- Qualification development system,
- Reliable water volumes and quality review,
- World level of technological development,
- Achievements in the methodology of long-term planning and projection,
- Effective plans of action for the environment protection.

The lack of strategic approach leads to a reduction in the level and quality of water, water infrastructure wear, water pollution, degradation of aquatic and related catchment area terrestrial ecosystems; threatens regions of the country (half of regions) already restricted in water supplies to increase water scarcity even more.

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3. Assessment of the role of SMEs in the water supply and sanitation sector in Kazakhstan

Small and medium-sized businesses (SMEs) are the backbone of the economic development of any state, and Kazakhstan is no exception. It is the level of development of SMEs that largely determines the solution of employment problems, filling the domestic market with domestic goods and creating a competitive environment.

Small and medium enterprises in the Republic of Kazakhstan include legal entities, individual entrepreneurs and peasant or farm agricultures whose activities are regulated by the Business Code of the Republic of Kazakhstan. Small business entities are individual entrepreneurs without incorporation of legal entity and legal entities engaged in entrepreneurship with an average annual number of employees not exceeding one hundred people and an average annual income not exceeding three hundred thousand times the monthly calculation index established by the law on the Republican budget and effective as of January 1st of the corresponding financial year.

Medium businesses are individual entrepreneurs and legal entities engaged in business, which are not small or large businesses.

Individual entrepreneurship is an independent, initiative activity of citizens of the Republic of Kazakhstan, oralmans, aimed at obtaining a net income, and based on the property of individuals themselves and carried out on behalf of individuals, at their risk and under their property responsibility.

As of January 1, 2020, number of operating small and medium enterprises (hereinafter referred to as SMEs) amounted to 1330.2 thousand units. The number of employees in SMEs as of January 1, 2020 was 3448.7 thousand people. The output of products (goods and services) by SMEs in 2019 amounted to 32387 billion tenge.

Tables below show the number of small enterprises in Section E.

Table 5. Number of registered subjects of small entrepreneurship (units)

Indicators	Total	Including	
		Small businesses	Individual entrepreneurs
Total as of April 1st, 2020	**1 579 894**	**387 247**	**970 625**
Industry	65 324	30 214	35 110
Water supply; waste collection, treatment and disposal, pollution remediation	3 490	2 179	1 311
Percentage of registered SMEs as of April 1st, 2020	**0.22%**	**0.56%**	**0.14%**
Total as of January 1st, 2020	**1 601 081**	**383 240**	**996 550**
Industry	65 447	29 906	35 541
Water supply; sewerage, waste collection and distribution control	3 445	2 169	1 276
Percentage of registered SMEs as of January 1st, 2020	**0.22%**	**0.57%**	**0.13%**
Total as of January 1st, 2019	**1 574 789**	**369 823**	**999 731**
Industry	61 172	29 140	32 032
Water supply; sewerage, waste collection and distribution control	3 163	2 057	1 106
Percentage of registered SMEs as of January 1st, 2019	**0.2%**	**0.56%**	**0.11%**
Total as of January 1, 2018	**1 537 633**	**349 025**	**993 621**
Industry	59 063	28 373	30 690
Water supply; sewerage, waste collection and distribution control	2 950	1 958	992
Percentage of registered SMEs as of January 1st, 2018	**0.19%**	**0.56%**	**0.1%**

Source: composed by the authors

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Table 6. Number of active small enterprises (units)

Indicators	Total	Including	
		Small business entities	Individual entrepreneurs
Total as of April 1st, 2020	**1 316 037**	**264 931**	**836 830**
Industry	51 162	20 734	30 428
Water supply; waste collection, treatment and disposal, pollution remediation	2 704	1 549	1 155
Percentage of registered SMEs as of April 1st, 2020	**0.21%**	**0.58%**	**0.14%**
Total as of January 1st, 2020	**1 327 742**	**258 365**	**855 920**
Industry	50 978	20 348	30 630
Water supply; sewerage, waste collection and distribution control	2 628	1 518	1 110
Percentage of registered SMEs as of January 1st, 2020	**0.2%**	**0.59%**	**0.13%**
Total as of January 1st, 2019	**1 238 708**	**231 325**	**809 115**
Industry	44 863	18 621	26 242
Water supply; sewerage, waste collection and distribution control	2 264	1 340	924
Percentage of registered SMEs as of January 1st, 2019	**0.18%**	**0.58%**	**0.11%**
Total as of January 1, 2018	**1 143 376**	**208 742**	**747 107**
Industry	41 692	18 053	23 639
Water supply; sewerage, waste collection and distribution control	2 075	1 290	785
Percentage of registered SMEs as of January 1st, 2018	**0.18%**	**0.62%**	**0.11%**

Source: composed by the authors

As seen from the presented data, the number of SMEs is increasing, even considering pandemic starting March 2020. However, the share of SMEs in the total number of both registered and operating entities remains nearly stable.

Proper regulation of business activity - it is a powerful tool that can help SMEs overcome serious barriers, such as low productivity and corruption. By world standards, there are many SMEs in Kazakhstan, but their contribution to the economy is low (see data in Table 7 and Figure 2).

Table 7. Output of products by SMEs by type of economic activity, KZT mln

Indicator name	2015	2016	2017	2018	2019
Total	15 699 405	19 609 010	23 241 125	26 473 049	32 386 960
Agriculture, forestry and fisheries	1 298 194	1 540 413	1 822 652	2 057 209	2 510 170
Industry	3 128 662	4 305 235	4 713 248	5 687 301	6 453 733
Water supply; sewerage system, control over the collection and distribution of waste	69 783	117 615	130 762	132 653	116 997
Construction	3 033 443	3 990 829	3 963 633	3 979 704	5 239 904
Financial and insurance activities	285 895	182 241	461 536	274 764	289 505
Professional, scientific and technical activities	1 116 794	1 430 320	1 863 875	1 819 601	2 213 320
Education	102 703	128 955	165 506	188 216	244 568
Provision of other types of services	307 601	379 529	539 955	759 201	835 089

Source: composed by the authors

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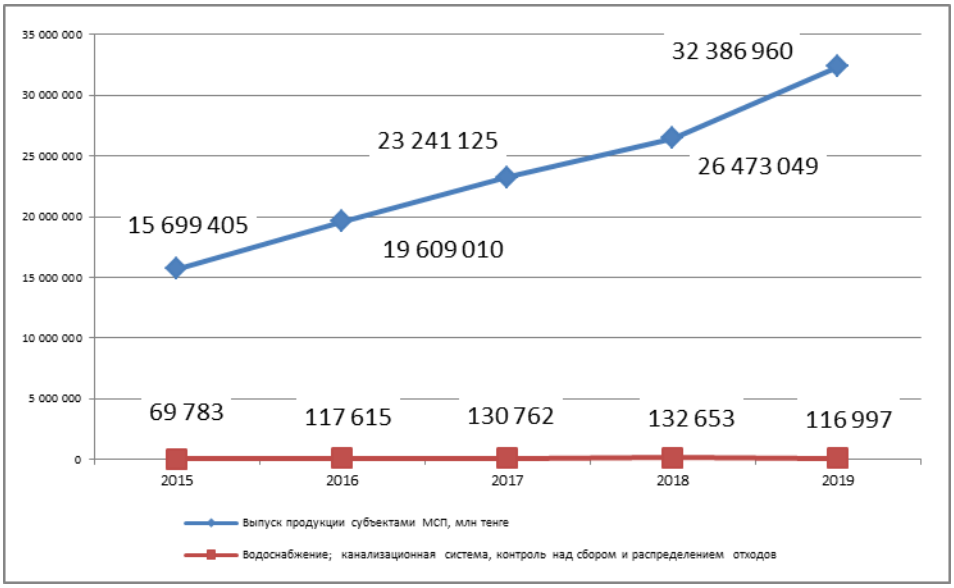

Fig. 2. Output of products by SMEs in section E, million tenge

Source: composed by the authors

To increase their contribution to the economy, entrepreneurs should spend less time on administrative matters and more on developing their businesses and creating jobs.
This requires effective regulation of business activities. The state has already set a goal to double the contribution of SMEs to the economy by 2050 up to 50% compared to 25% at present, and to increase the level of productivity, which has been declining in recent years.

Despite the relative speed and lower costs, there are still challenges associated with the complexity of procedures. The process of meeting regulatory requirements in Kazakhstan is still more burdensome than that in the OECD countries, Europe and Central Asia. Problems remain, in particular, in obtaining construction permits, as entrepreneurs need to get a large number of approvals both before and after construction. While it takes an average of 13 procedures to obtain a construction permit in high-income OECD countries and 16 procedures in ECA countries, in Kazakhstan, this process consists of an average of 18 procedures. In Almaty, where this process is the least burdensome, entrepreneurs still need to meet 17 requirements to obtain a construction permit.

In the context of rapid reforming, providing training for local interested persons on issues related to the applicable regulations is very difficult. The high turnover of staff in government agencies, especially in PSC contributes to that as well. Retention rates are generally low across the country. To ensure that entrepreneurs provide better services, it is necessary to find ways to retain trained employees, e.g., by offering them a clear and rewarding path to professional growth.

The output of small and medium-sized businesses in January-March 2020 amounted to 6528 billion tenge. In the total number of SMEs, the share of individual entrepreneurs was 63.5%, small business entities – 20.1%, peasant or farm enterprises – 16.2%, and medium businesses – 0.2%.

Monitoring reforms and assessment of their impact require high quality data across the country, regions and cities. Without access to detailed statistics, policy makers at both national and local levels are unaware of issues in some areas or are unable to explain them. However, statistics on the performance of government agencies, the level of

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service use, and customer demand remain incomplete in most cases, and policy makers in the regions often do not have access to them. For example, there is no data on the number of entrepreneurs who have registered new companies on the e-government platform, be it independently or through the PSC, or on the number of entrepreneurs who use lawyer services.

Results of assessing water supply and sanitation sector's attractiveness for SMEs show that it is closer to the average, and the main reason is its high capital intensity and low profitability, as well as a high degree of government intervention and regulation, including in tariff setting.

Table 8 shows the results of the analysis of competitive forces in Kazakhstan's water supply and sanitation sector (using M. Porter method.)

Table 8. Results of the analysis of competitive forces in water supply and sanitation sector

Factors	Components	Projection	Impact	Threats	Reaction
Consumers	Water supply	Moderate growth in demand	Capacity utilization and expansion (creation of new ones)	Decrease in the incomes of the residents and a systemic economic crisis due to the pandemic impact, delayed payment and/or non-payment of invoices	Continuation of work (possibly with state support)
	Water discharge	Moderate growth in demand	Capacity utilization and expansion (creation of new ones)		
Suppliers	Energy carriers, reagents, materials, etc.	Rise in prices, growth of accounts payable	Expenditure growth	Exceeding the approved tariff estimates, losses	Supplier rotation, search for new forms of cooperation
Competitors	Number of competitors	Monopoly	Strengthening the market position	Low	Dictate terms to a reasonable extent

Source: composed by the authors

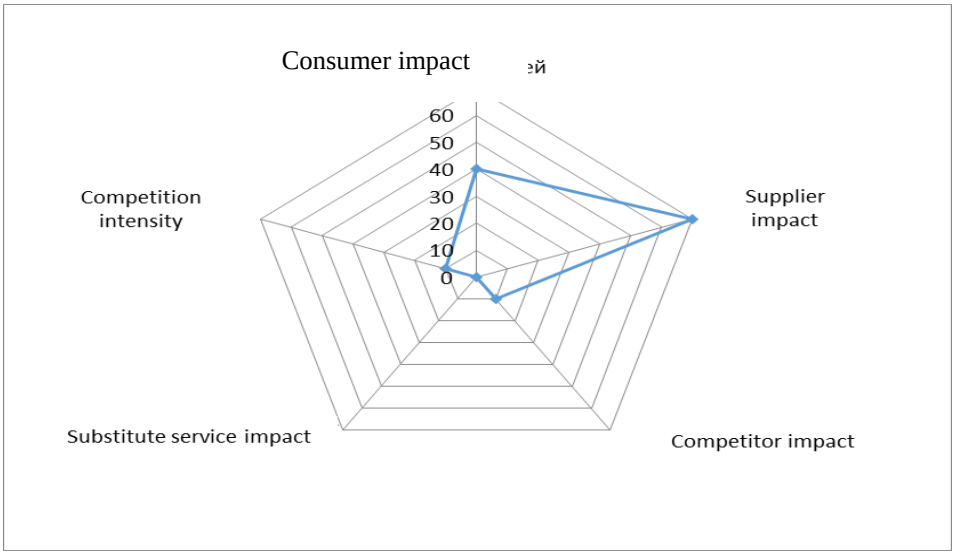

Fig. 3. Radar for assessing the impact of five competitive forces in the water supply and sanitation sector

Source: composed by the authors

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In addition, we can note the following as factors reducing the W&S sector's attractiveness:
- Low financial resources;
- The lack of qualified human resources;
- Low level of protection of the entrepreneur rights; and
- Low utilization of public-private partnership and/or state support mechanisms.

4. Conclusion

Maintaining even the existing state of water and hydroelectric facilities, carrying out reconstruction of the entire system of water channels and numerous hydraulic structures, as well as research, design and construction of new water management facilities and protective structures are possible only in the presence of qualified performers at all levels: administrative, managerial, engineering and production personnel.

Personnel support for the development of the water sector of the economy is possible only in the presence of highly qualified experts, whose training under the state order has decreased in recent years, and, for example, in 2018, state order has removed the specialty "Hydraulic engineering." In Kazakhstan, 10 of 131 universities operating for the academic year 2020—2021 train industry experts; see sub-paragraph 7.1.1 for details.

The main reason for the decline in demand for water specialties among applicants and students is the discrepancy between their training and modern requirements of the market economy. All active specialists in the water sector are well aware of and understand the objective and subjective factors, which is shown by our survey and interviewing. Experts give the following reasons for the critical situation in providing the water sector with young experts:
- Training does not consider employer requirements, offers and demand in the labor market,
- Low attractiveness of working conditions and nature in reclamation and water management organizations,
- Insufficient level of remuneration in reclamation and water management organizations,
- Absence of order for the delivery of professionals from water sector operating companies and infrastructure companies;
- A bigger emphasis in educational institutions on a theoretical part, rather than on practical skills and abilities.

Many initiatives implemented in Kazakhstan for the development of SMEs involve active measures of state support and, thus, reduce the role of the market and may distort business incentives. Many of Kazakhstan's SME development programs make extensive use of import tariffs, soft loans, subsidies (including transport and operating subsidies, subsidized loans), support for quasi-public sector entities, taxes or export restrictions, origin requirements, etc. This creates an unequal environment for SMEs, which is compounded by the lack of transparency in the process of allocating subsidies. These SME development programs also lead to a shift in incentives for companies to receive subsidies instead of improving competitiveness. For example:

1) Small and medium businesses development in mono and small cities within the framework of the State Program for Business Support and Development Business Roadmap-2025, and the State Program for the Development of Productive Employment and Mass Entrepreneurship for 2017—2021 "Enbek";

2) Provision of basic state and social services stipulated by the legislation of the Republic of Kazakhstan, and a system of regional standards.

The draft state programs for the development of education and science of the Republic of Kazakhstan for 2020—2024 and the development of healthcare of the Republic of Kazakhstan for 2020—2025 provide for measures to increase the human capital of young people in cities that are not part of the FUR. This will allow the youth of mono and small cities to be competitive in the large city labor markets.

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Current employment of the population of these cities will be supported under the Program for the Development of Productive Employment and Mass Entrepreneurship for 2017—2021 "Enbek", and the State Program for Business Support and Development "Business Roadmap-2025."
Two consequences of the current approach to increasing the role of SMEs are as follows:
- High perceived risk for private foreign investors;
- Insufficient attention to local SMEs.

Strong state control over economy and the state's interventionist approach to supporting SMEs create an environment in which mostly large companies with good connections and support thrive. As a result, foreign investors, excluding those in the oil and gas sector, value Kazakhstan on a par with Kyrgyzstan, Russia, and Ukraine because of commercial risks associated with weak competition policies (price controls, special interests, distorted decision-making, unfair competition practices, and discrimination against foreign companies).

At the same time, local SMEs, which usually play a leading role in innovation and growth in transition economies, make a very small contribution in Kazakhstan (relative to their share of GDP) compared to other countries.

The main constraints Kazakhstan faces while implementing an approach to economic growth based on the development of SMEs include the following:
- A protracted process of recovery of the financial sector, which does not provide active support for investors;
- A broad presence of the state in the economy, which affects competition in certain sectors;
- An impact of government support measures on creating a level playing field for businesses.

If we do not remove these restrictions, private investment in the water sector essential for the implementation of structural changes and achievement of a higher economic growth trajectory will be unlikely.

Reducing the state's presence in the economy and supporting the environment for SME development: Kazakhstan is well aware of the need to develop competitive, diversified SMEs, and there are appropriate strategies and programs to support necessary policies. However, a macroeconomic environment that weakens competitiveness, a financial sector that does not provide effective pricing and resource allocation, and a governance environment that has created unequal conditions in which quasi-public sector entities and connected companies displace SMEs and potential innovators undermine these efforts.

Development of a competitive, diversified SME requires reduction of the presence of quasi-public sector entities, including in key network industries such as water supply and sanitation. At the same time, broader measures will be required to support competitive markets by encouraging foreign direct investment (FDI), opening markets to imports, and other measures. Finally, there is a need for a more effective support for SMEs by improving the business regulatory environment and encouraging the development of competitive value chains instead of credit subsidies.

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