JOURNAL OF SECURITY AND SUSTAINABILITY ISSUES
ISSN 2029-7017 print/ISSN 2029-7025 online
2022 Volume 12
http://doi.org/10.47459/jssi.2022.12.9

PUBLIC-PRIVATE PARTNERSHIP IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT ON THE EXAMPLE OF THE WATER AND WASTEWATER SECTOR

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Received 15 March 2022; accepted 25 May 2022; published 30 June 2022

Abstract. The purpose of this paper is to analyze the implementation of investments in the water and sewage sector in Poland and other European countries using the Public-Private Partnership (PPP) formula. The paper identifies the strengths and weaknesses, opportunities and threats arising from the use of this formula for local government public tasks for the delivery and treatment of domestic wastewater, in the context of EU legislation. It also examines the validity of the use of PPP in the context of the implementation of the principle of sustainable development in water management. PPPs are commonly used to deliver strategic public services under financial limitations. Countries such as the United Kingdom and Ireland, based on years of experience and good practices, are effectively implementing PPP projects, including those in the water and sewerage sector. The provision of treated drinking water and the treatment of municipal wastewater is a fundamental task ensuring an adequate quality of life for people by maintaining public health at an appropriate level. The fact that water and sanitation infrastructure and service provision in this sector is expensive, both at the construction and operational stages, has led countries at different levels of development to turn to public-private partnerships. Properly managed PPP projects secure the interests of both the private and public partner and the end user of the services. The analysis of data and examples of European PPPs in the water and wastewater sector shows that PPPs have been successful for most public entities that have chosen them. Good practices from Scotland, Ireland and Poland, as well as projects that have experienced difficulties, show that stable and friendly legislation, thorough pre-feasibility studies and an appropriate allocation of risk make PPPs successful. In the context of the conducted analysis, PPP is a tool enabling the realization of tasks in the water and sewage sector, where the public party's budget possibilities are limited. Moreover, PPP is a component of the realization of the sustainable development principle. The idea that the use of natural resources, including water, which is fundamental to the biological and cultural needs of humankind, should be met in such a way as to save them for future generations, is realized in PPP projects. This paper demonstrates that the use of financial assembly opportunities in PPPs makes it possible to significantly intensify the construction of new and upgrading of existing water and wastewater infrastructure. It contributes to the protection of aquatic ecosystems and securing public health associated with living in direct proximity to surface water and discharging wastewater without affecting the natural environment and human habitats.

Reference to this paper should be made as follows: Łakomy-Zinowik, M. 2022. Public-private partnership in the context of sustainable development on the example of the water and wastewater. *Journal of Security and Sustainability Issues*, 12, 109-119. http://doi.org/10.47459/jssi.2022.12.9

Keywords: public-private partnership; sustainable development**;** own tasks of local authorities; water and sanitation

JEL Classifications: K22**,** E66, H40, H68

1. Analysis of the literature on the research subject

In this article, the author has conducted a desk study of resolutions, strategies, laws, periodic reports and databases on both the public-private partnership market and the issue of urban wastewater treatment. The PPP is based in the European Union on the Council of Europe Directives such as the Bathing Waters Directive (76/160/EEC), Directive 2006/7/EC, the Urban Waste Water Treatment Directive (91/271/EEC), the Drinking Water Directive (98/83/EC), and the Water Framework Directive (2000/60/EC). They define standards for treated drinking water approved for human use, as well as standards for effluent discharged into soil, flowing waters and seas so as not to pollute them. Globally, the UN General Assembly Resolution (2030 Agenda for

Sustainable Development) setting overall goals for humanity in terms of availability and quality of drinking water and sanitation services is also addressed. The state of the public-private partnership market is regularly reported by government agencies in Poland (PPP market report for the years 2009-2021), while individual completed projects are presented synthetically in the Database of Concluded PPP Contracts. On their basis, examples of completed PPP-formula sewage infrastructure projects in Poland have been prepared, such as the Konstancin-Jeziorna and Mława sewage treatment plants, as well as the overall share of the water and sewage sector in the market of such partnerships in general. Projects underway in in Scotland and Ireland, based on the Resource book on PPP case studies, are presented as an example of the success of PPPs. Projects that faced challenges at the construction and operation level, analysed for the purposes of this text, include projects in Zagreb (Vouk, Malus 2016) and the Spanish Aragon region (Carpintero, Petersen, 2016). Their problems resulted, for example, from insufficient pre-implementation analysis and poor risk allocation at the level of PPP contract formation (Batjargal, Zhang 2022). On the basis of the acts and the related literature (Gonet 2009; Antoniuk 2009), the process of making changes to the Polish legislation, rendering a public-private partnership a useful tool in the delivery of public tasks in Poland, is presented.

The purpose of the article is to analyse a public-private partnership as a modern concept of delivery of public tasks in the water and sewage sector. The basic research method is a critical analysis of the literature on the subject and of legal acts. This is the basis for the compilation of figures and the drafting of statements on the PPP market in Poland and the water and sewage sector within it. Information on selected examples of delivery of PPP projects and sources of financing for such tasks by local authorities and special purpose vehicles are extracted from the 2004 report on the PPP market for the European Union member states and the report on and the database of PPP projects in Poland in the years 2009-2021. The said data allowed for first analysing water and sewage sector PPP contracts that were successfully closed, as well as those that revealed problem areas, constituting the main determinants of success of such projects. Next, on the basis of good practices and problematic projects, it is presented which stages and issues should receive special attention when establishing this type of cooperation in order to successfully carry them out in the area of municipal sewage treatment.

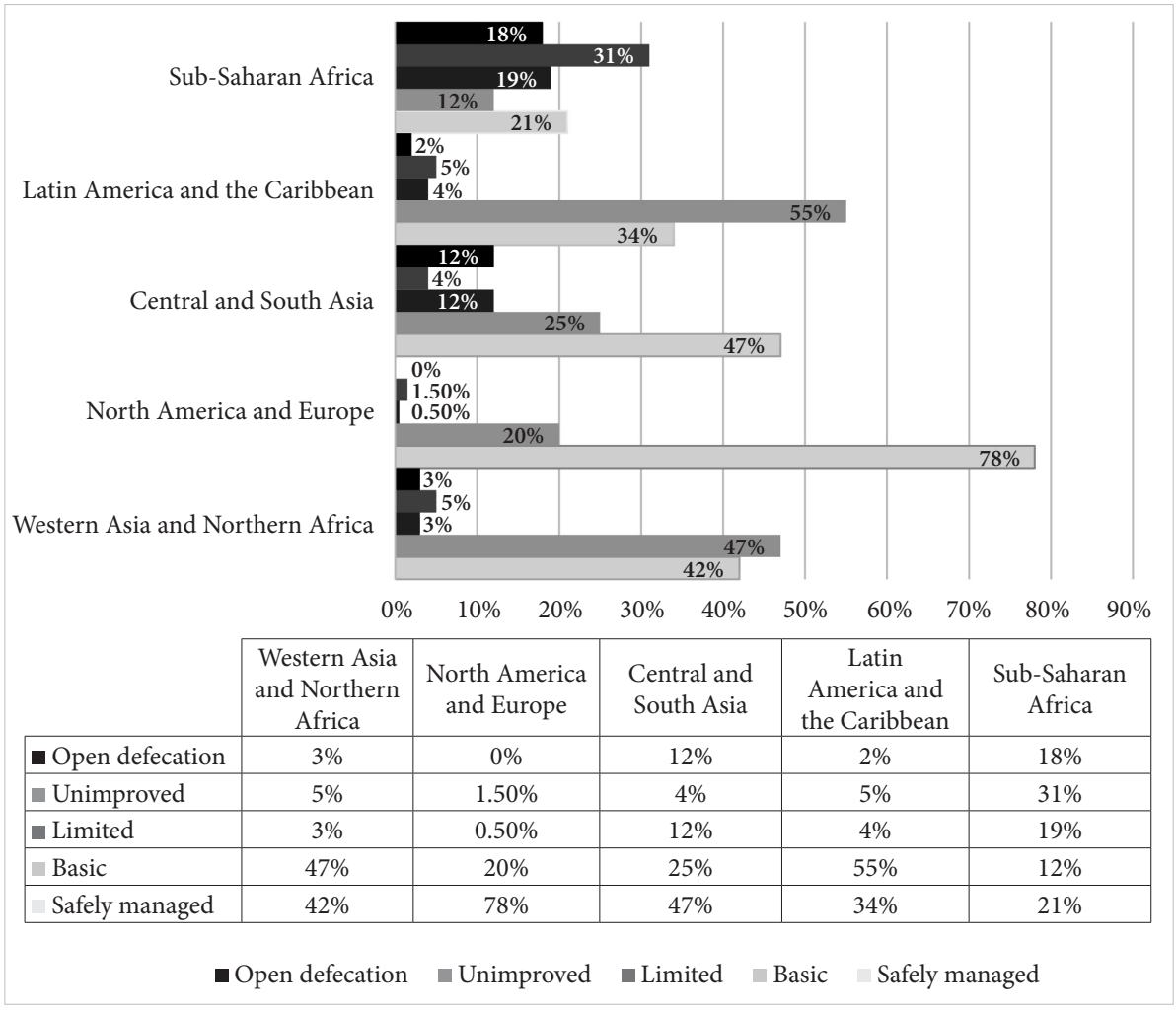
2. Study results

Today, individual developed nations and international organisations, such as the EU and the United Nations General Assembly, are attaching growing attention to issues concerning environmental protection from human activities (Monni, Iorio, Realini, 2018; Moumen et al. 2019; Stankevičius et al., 2020; Antonioli, Chioatto & Mazzanti, 2022; Nassar, Strielkowski, 2022). This interest is rooted in the truism that wise management of water resources and the provision of infrastructure for their post-use recovery and purification for sanitary and industrial purposes is a fundamental condition for the survival of humanity and the improvement of the quality of life of the people of the world. The legislation governing the management of Earth's water resource reflects this view in a special way. Such legislation includes a number of European Union Directives, such as the Bathing Waters Directive (76/160/EEC) of 1976, replaced by Directive 2006/7/EC (DIRECTIVE 2006/7/EC, February 2006); The Urban Waste Water Treatment Directive (91/271/EEC) of 21 May 1991 (Council Directive 91/271/EEC); the Drinking Water Directive (98/83/EC) of 3 November 1998 (Council Directive 91/271/EEC); the Water Framework Directive (2000/60/EC) of 23 October 2000 (Council Directive 91/271/EEC). Major documents that provide a holistic approach to improving the quality of life on Earth include the Resolution of 25 September adopted by the UN General Assembly – "Transforming our World: 2030 Agenda for Sustainable Development," where one of the strategic objectives is to achieve equal access to adequate sanitation and hygiene for all people by 2030 through expanding international cooperation in delivering measures related to water management and sanitation infrastructure (General Assembly resolution A/RES/70/1: 2030)[1]. This is due to the estimated figure of around 2.4 billion people in the world not having access to basic infrastructure such as toilets and latrines, being forced into so-called "open defecation"(World Health Organization and UNICEF, 2014)[2]. The resulting negative effects on the environment and human health and quality of life are evident (see Table 1).

[1] *Cf. General Assembly resolution A/RES/70/1: 2030 Agenda for Sustainable Development: http://www.unic.un.org.pl/files/164/Agenda%202030_pl_2016_ostateczna.pdf*

[2] *Cf. Progress on drinking water and sanitation, 2014, WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (JMP), p. 6.*

Table 1. Share of the population with access to sanitation facilities, 2020



	Western Asia and Northern Africa	North America and Europe	Central and South Asia	Latin America and the Caribbean	Sub-Saharan Africa
Open defecation	3%	0%	12%	2%	18%
Unimproved	5%	1.50%	4%	5%	31%
Limited	3%	0.50%	12%	4%	19%
Basic	47%	20%	25%	55%	12%
Safely managed	42%	78%	47%	34%	21%

Source: Own analysis based on WHO/UNICEF (2021).

2.1 PPP in wastewater treatment infrastructure for sustainable development

In view of the above facts, developed countries mutually commit to achieving environmental objectives, including those related to wastewater management. Concurrently, in the developing world, the supply of drinking water for human settlements and the appropriate management of domestic wastewater are of key importance to governmental institutions due to their impact on public health. In both cases, these countries are seeking the optimal way to achieve these goals, one of which is increasingly widespread cooperation between the public and private sectors via public-private partnerships (PPP).

The above activities are part of the so-called "sustainable development" concept. This principle would be understood as intergenerational solidarity, presuming that the present generations of mankind ought to make efforts for further growth and improvement of the quality of life of future generations. This concept does not only refer to the issue of natural resources, but also to economic issues and social progress. Currently, the idea of sustainable development is emerging as a horizontal tenet of most growth policies. In Polish law, it is included in Article 5 of the Constitution, which reads as follows: "The Republic of Poland shall safeguard the independence and integrity of its territory and ensure the freedoms and rights of persons and citizens, the security of the citizens, safeguard the national heritage and shall ensure the protection of the natural environment pursuant to the principles of sustainable development (Constitution of the Republic of Poland, 1997)".

2.2 PPP in water and wastewater projects in Europe – case study

In developed European countries, public-private partnerships are widely practised in water and sewerage projects. The process of building public utility infrastructure based on cooperation between the public and private sector has a long tradition founded on national and European legislation. Great Britain, implementing such ventures in its original Private Finance Initiative (PFI) formula, is a leader in this field. The British model assumes that as part of the granted licence, the private partner will build public utility infrastructure, and from the time of its operation and provision of services, it will collect a fee ensuring return on investment and profit. Due to the strategic nature of the areas of delivery of PFI projects, contracts are long-term in nature; this reduces the business risk for the private partner. Such projects are further coordinated by a state-owned operator, and their management is based on the establishment of special purpose vehicles by the private party. Extensive use of the Private Finance Initiative formula in Great Britain, notably in the construction of educational and health care infrastructure, has led to its expansion and the emergence of the so-called PF2. This model faces the biggest obstacle to the completion of PPP projects (National Audit Office, 2020). PF2 assumes an equal distribution of risk between partners, which is the main determinant for concluding contracts on completing public tasks in the Public-Private Partnership formula (House of Commons Treasury Committee, 2011, p. 4).

Scottish PPP Water Projects, UK

The UK's largest domestic wastewater treatment projects include public-private ventures by the 'Stirling Water' consortium, consisting of three private companies Thames Water (49%), M J Gleeson (41%) and Montgomery Watson (10%). The consortium contractually acquired five wastewater treatment plants in the east of Scotland and invested around £100 million in upgrading those plants European Commission (2004). The Almond Valley and Seafield projects, delivered in partnership with Stirling Water, was the UK's biggest Private Finance Initiative (PFI) contract. The £105 million projects serve a population of nearly 700,000 UK citizens and have been commissioned for 30 years. Thames Water is the private operator that will operate the infrastructure thus built.

Scottish Water, the public regulator established under the Water Industry (Scotland) Act 2002, is the public operator in the area covered by Stirling Water (Water Industry (Scotland) Act 2002). Under the Act, Scottish Water has been established to supersede the three water and sewerage authorities previously established under the Local authority etc Scotland Act 1994. The 2002 Act includes provisions to the effect that Scottish Water has a board structure separate from the existing authorities and greater commercial freedom than that enjoyed by the existing public authorities (Water Industry (Scotland) Act 2002, part 3). Such a structure of the regulator, such as Scottish Water, allows for flexibility in achieving the purposes of its establishment, especially in the formula of partnerships with private entities. The reform of the system of bodies responsible for Scotland's water and sewage sector was intended to accomplish the tasks resulting from European Union directives concerning, for example, the quality of treated sewage.

Dublin Region Waste Water Scheme, Ireland

The Dublin Bay Wastewater Treatment Plant was officially opened on 30 June 2003 in response to the EU Wastewater Directive. The plant primarily serves the Dublin metropolitan area, delivering on those provisions of the Directive that relate to improving sea water quality (Dublin Bay). At the time of its commissioning, the plant was the most advanced of its kind in Europe and was delivered through a Public Private Partnership, with funding from the EU Cohesion Fund, the Department of Environment, Heritage and Local authority, Dublin City Council, and a private operator. Other supporting infrastructure such as pipelines and pumping stations were constructed with full public funding. The treatment plant is in charge of treating domestic and industrial wastewater from the Greater Dublin Area, comprising Dublin City, Fingal, South Dublin, and Dun Laoghaire-Rathdown. The private operator is an international consortium selected through a competitive tender process, comprising Ascon (IRE), Black & Veach (UK), and Anglia Water (UK) (European Commission (2004) p. 33-37). The 20-year lifespan of the plant obliges the private entity to sustain it and cover the operating costs related to its exploitation. This is an incentive for the consortium to take good care of the plant and increase its performance.

Notably, the Dublin plant incorporates a number of state-of-the-art features that make it more attractive to operate but still comply with the Wastewater Directive. These include UV disinfection of the final effluent, treatment of sewage sludge for use as a fertiliser in agriculture and use of biogas to supply 60% of the plant's power demand (European Commission (2004) p. 33-37). This is an example of a successful public-private partnership relying on cutting-edge technology to mitigate risk for both sectors.

Croatia: Zagreb Wastewater Treatment Plant

Public-private domestic and industrial wastewater treatment partnerships have also been pursued in Croatia. A project completed in 2004 by the private special purpose vehicle Zagrebacke Otpadne Vode (ZOV), targeted the improvement of water parameters in the Sava river basin so that the wastewater treatment effect would meet the standards set out in the EU directive (Vouk, Malus, 2016, p. 324-325). The 28-year licence for the completion of the said task was granted to the company in 2000 and was financed with EUR 55 million obtained from the European Bank for Reconstruction and Development (EBRD), a EUR 115 million credit facility, a EUR 20 million loan, a EUR 42 million sponsorship payment, and profit generated in the course of the project. Under the licence, the private partner constructed both the wastewater treatment plant for the region and the supporting infrastructure such as the gathering pipeline, access roads, bridge, etc.

However, the project delivered in partnership with the private concessionaire ZOV was met with much criticism over the cost of its delivery. The European Bank for Reconstruction and Development (EBRD) has reported a financial close for the project of EUR 326.7 million by the end of 2007, down from the initial target of EUR 176 million. And by the end of 2006, the monthly service charges paid by the public partner amounted to around 76% of the system's value. Thus, questions arose about the rationale for applying a PPP in this case, as the costs incurred could have been fully covered by the public party, which could have offset the incurred outlays and repaid the financial liabilities incurred for that purpose from the income generated at the stage of operation (World Bank, 2017, p. 22-23).

3. Obstacles to successful PPPs

Previous PPP water and sewage projects show that they require a meticulous and thorough analysis of the advisability and profitability of use in order to be successful. Regardless of the risk, many countries legalize, introduce and expand the concept of PPPs, recognizing it as an opportunity for effective action in sectors that are a heavy financial and organizational burden for the public party.

The analysis of the projects listed above and of the data collected by bodies established to study the PPP market in individual countries and globally shows the fundamental areas decisive for the success or failure of such ventures. The most important stage impacting the outcome of any public-private partnership is a stable, clear and adequately risk-adjusted legislation regulating the PPP market in a specific country/international organization. Experience shows that allowing space for public and private partners to specify their relations in a licensing agreement is conducive to the growth of the PPP market. Poland's first regulation in this area is a good example of this. The Act of 28 July 2005 on a public-private partnership (Journal of Laws of 2005, no. 169, item 1420; hereinafter referred to as the Public-Private Partnership Act of 2005), specifying the principles and mode of cooperation of public and private partners under PPPs, echoed far-reaching officialism at the initial analytical stage, a reservation that PPPs may be employed if they are preferable to other possible ways of completing a specific venture, and an overly extensive reporting duty (Gonet, 2009, p. 88-92). Only the new act of 19 December 2008 on public-private partnership (Journal of Laws of 2009, no. 19, item 100) brought solutions appealing to representatives of both sectors, and above all, it removed the duty to provide public services by public entities as part of a public-private partnership, providing only for such a possibility (Antoniuk, 2009, p. 98). In the same year, the Act of 9 January 2009 on concession for construction work or services (Journal of Laws of 2015, item 113) came into force, then repealed once the Act of 21 October 2016 on licensing agreement for construction work or services (Journal of Laws, item 1920) became effective. Successive regulations, both on the Polish and the European Union grounds, increased the trust in this formula by clarifying the definitional scopes and indicating the ways of running the proceedings, which currently results in 165 signed PPP contracts in Poland for the total value of PLN 8.605.315.971,14 (Pub-

lic-Private Partnership Platform (2022)). Presently, it is possible to discern a preference being given to projects of this type, as evidenced by the adoption on 26 July 2017 by the Council of Ministers of a document entitled "Government Policy on the Development of Public-Private Partnerships," a thorough diagnosis of the PPP market in Poland (Public-Private Partnership Platform (2022)). The document outlines the direction of measures to make even more effective use of PPP in the process of building public utility infrastructure, considering it a tool for a quantum leap in the growth of public services in Poland in the coming years.

Insufficient analysis of the financial effects at the stage of a venture's operation is an important threat to the success of PPP projects. The partnership delivered in the Zagreb metropolitan area cited earlier is a good example in this respect. The drastic increase in the project value from EUR 176 million to EUR 326.7 million was counterbalanced by high tariffs for public services provided by the private licensee. The unreliable and in-depth preliminary analysis was the weak point of the project. Much of the work critical for the smooth operation of the wastewater management system was not addressed in the analytical documentation underlying the project. This caused an underestimation of the initial costs, and thus of further costs, which were shifted to the residents serviced by the system so designed. Thus, in 2004, the prices of the service provided by the company increased by more than 200%. The example of Zagreb agglomeration shows the key issue of reliable data and estimated operational cost analysis for the success of PPPs. It is conclusive in determining the suitability of this formula for use in general.

The appropriate allocation and management of project risk is the third, extremely important element of the success of PPP projects (Batjargal, Zhang, (2022), p. 7-8). For example, more than 100 wastewater treatment plants were delivered as public-private partnerships between 2005 and 2014 by the regional government in Aragon, Spain. Most of the 116 projects suffered significant delays in delivery, up to 50% of the time initially allocated for completion and commissioning. Some contracts were even terminated and renegotiated. The tasks assigned to the private and public parties and the difficulties involved resulted in procedural delays. Thus, transferring the procedure for land expropriation for the project to municipalities instead of the regional government, protracted the project delivery procedure in this initial phase. In turn, the private party was obliged to obtain all approvals and permits for the construction and further exploitation of the resulting infrastructure. Encountering procedural and institutional obstacles that would not pose a problem for the public party, the private partners were forced to postpone project delivery deadlines. The participation of numerous public bodies at different tiers -municipal, regional and national, with no coordination of actions between them, added to the complexity of formal procedures for the private party, and thus prolonged the process of securing approvals and permits (Carpintero, Petersen, (2016), p. 4-5),

The misallocation of risk in terms of demand for the services provided is also a problem. In the "Aragon partnership," the demand risk was placed on the private side, which has little influence on the demand for public services. This risk should be placed on the side that has genuine influence on this factor, which is a cornerstone of project success. I.e. the provision of adequate security for the private licensee should be based on a good diagnosis of needs and a forecast of the maintenance and evolution of demand for the services provided under the contract. By providing for the possibility for the company to change the tariff every year in order to improve its financial result in the event of lower demand for services than assumed, an impression of price instability is conveyed to the end user of the services (Carpintero, Petersen, (2016), p. 7). Therefore, as in the Croatian city of Zagreb, it may undermine trust in public entities that place the strategic public service sector in the hands of private companies without considering the costs borne by the service users.

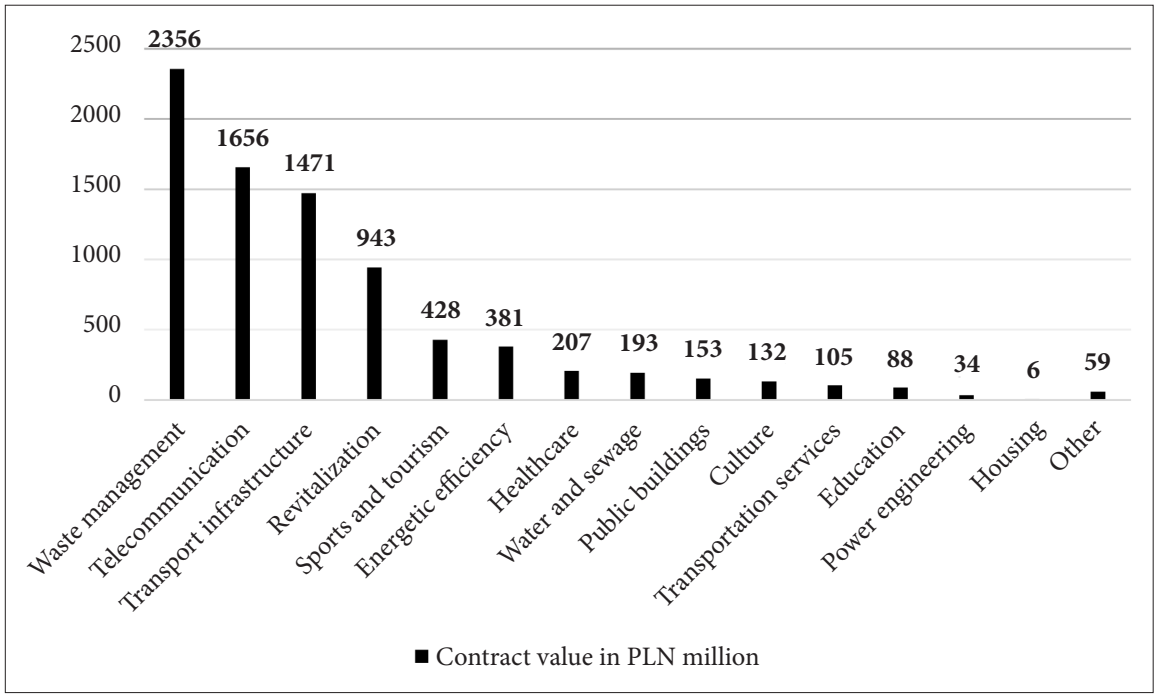
Solutions that might address the how and why of using public-private partnerships in general, and in the water and sewerage sector in particular, include the Scottish and Irish projects described in this paper. The said projects were based on earlier "good practice" from the home market, supported by experts in the field of PPPs. The formula was regarded as an opportunity to achieve a good balance of risk on both sides and to ensure profit for the private partner. It was in the interest of the private party to use the finest technologies, which secured the stability of set prices at the stage of operation, by avoiding unplanned costs of upgrades and repairs. The costs for the final service user were reduced to a minimum by means of suitable financial assemblies, which reduced the amount of necessary loans and credit facilities for the delivery of the project by the private licensee, and thus passing them on to the service user in the tariffs.

4. PPP in sanitation management in Poland – projects, opportunities, threats

PPP market in Poland in the years 2009-2021 with reference to the water and sewage sector

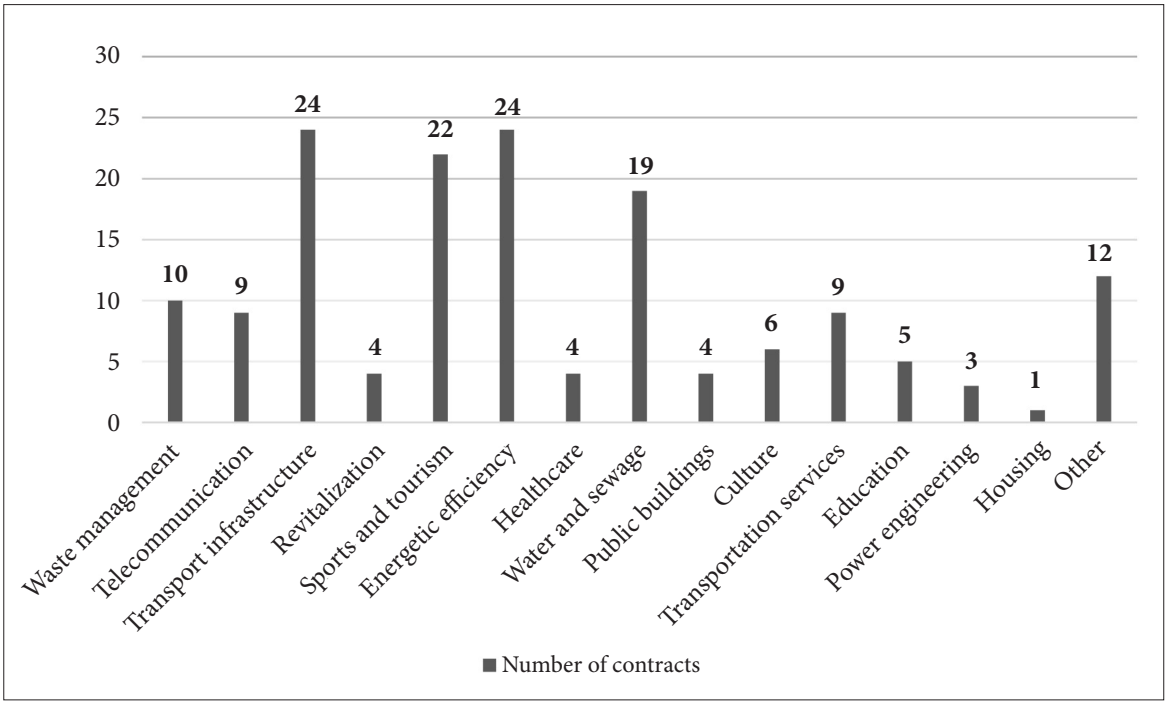
As previously discussed, the growth intensification of Poland's PPP market followed the enactment of the PPP Act of December 2008 and the 2009 Act on licences for construction work or services (repealed) and the 2016 Act on licencing contract for construction work or services. Since 2009, there has been an actual roll-out of the public-private partnership formula in the Polish public services market, including the water and sewage sector. In this period, a total of 624 PPP proceedings were initiated and 164 contracts were signed on their basis (Public-Private Partnership Platform (2022)). Of those, most related to the energy efficiency sector (25), then transport infrastructure and sport (24 each) and water and sewage management (22) (Public-Private Partnership Platform (2022)). The value of the concluded contracts, based both on the procedure for granting licence for services and in the PPP mode based on the procedure regulated by the Public Procurement Law, totalled approximately PLN 8.6 billion, of which PLN 184 million for the water and sewage sector, i.e. slightly more than 2%. The prevailing sectors of public activity in this respect are waste management (26%), telecommunication (19%), and transport infrastructure (19%). Notwithstanding the small share in the total PPP market, it should be noted that there were 4 PPP contracts concluded in the water and sewage sector in 2021, which accounted for 40% of all contracts concluded in that year (Public-Private Partnership Platform (2022)). (See Table 2 and Table 3).

Table 2. Value of PPP contracts in the years 2009-2021 by sector



Source: Own analysis based on MFPiR, (2021).

Table 3. Number of PPP contracts in the years 2009-2021 by sector



Source: Own analysis based on MFPiR, (2021).

4.1 PPP in the water and sanitation sector – case study

Among all the PPP projects in the water and sewage sector that have been completed or are in the process of operation, so far only two have exceeded their value of PLN 40 million and related to the construction of new infrastructure or the upgrade of existing infrastructure for the treatment of domestic sewage. These were "Service of municipal sewage treatment from the Konstancin-Jeziorna Municipality" and "Construction and operation of the sewage treatment plant in Mława".

The first of the listed ventures consisted in selecting a private partner in the PPP mode in the PPL (Article 4 (1)), who would run a comprehensive upgrade and expansion of the wastewater treatment plant located in Konstancin-Jeziorna, and then for 32 years would manage and maintain the newly built infrastructure. A public-private partnership contract in this regard was signed on 22 October 2012 with the company SAUR Konstancja Sp. z o.o., and the value of the project amounted to PLN 62,500,000.00. In the division of risk, the public party was to secure an appropriate amount of sewage delivered to the system, due to the fact that the project was to be financed with funds charged under the tariff. In this case, the private partner was to take on the burden of upgrading the sewage network and ensuring service availability for the duration of the contract (Public-Private Partnership Platform (2022)).

The existing condition of the systems and the obligations and deadlines imposed on the local authority by the EU wastewater directive were the main reason why the urban-rural municipality of Konstancin-Jeziorna decided to enter into cooperation with a private entity with respect to wastewater treatment. Firstly, most of the network and treatment plant dated back to the 1960s and relied on primitive and unreliable devices, some of which had been upgraded in 1986. The wastewater treatment process was thus inefficient and posed a threat to the environment and a nuisance to residents. Therefore, in view of the condition of the existing infrastructure and the lack of municipal know-how in terms of wastewater treatment, the local council elected to delegate this task to a private entity with specialist expertise in the area (MIiR, 2018). It was important for the appeal of the project for the private partner to share the economic risk, by securing the financing of the project for a period of 5 years, in view of the uncertainty of payment of charges for sewage treatment services by the inhabitants. Both parties also share the risk of inflation/deflation, as well as law changes (MIiR, 2018).

As regards the project "Construction and operation of the sewage treatment plant in Mława," the purpose of the proceedings was to select a private entity to ensure completion of a public task of the Town of Mława in the scope of ensuring collection and treatment of municipal sewage from the area of the town, through construction of a new sewage treatment plant. A PPP contract was signed on 01 July 2016 with Suez Woda Sp. z o.o. (formerly: ONDEO Polska Sp. z o.o.). Its total duration is 33 years, of which a period of three years was intended as the time to run the old treatment plant and build the new one in parallel.

As the existing infrastructure was inefficient and did not meet EU environmental standards, the municipality of Mława faced the challenge of delivering a high-cost infrastructure project. Lack of public funds for this purpose, with its final value amounting to PLN 58,024,050.00, was the reason for using the PPP formula. In the division of risks, the private entity was charged with acquiring financing, building the new facility, running and operating the old one, and then managing the new infrastructure. This task was made possible by securing a PLN 33 million loan from the National Fund for Environmental Protection and Water Management (Public-Private Partnership Platform (2022)).

The town of Mława did not incur any costs with the project so built. The contract, however, obliged it to supply 1,640,000 m3 (± 3%) of sewage per year to the treatment plant in order to ensure the profitability of the project for the contractor and, also, the facility operator. It also guaranteed staff to be transferred from the old plant to operate the new one. The network operator's profit is based on a fee per 1 m^3 of incoming sewage, with an agreed mechanism for indexing the rate to account for inflation, changes in energy prices and wages (PFR dla Miast). (See Figure 1)

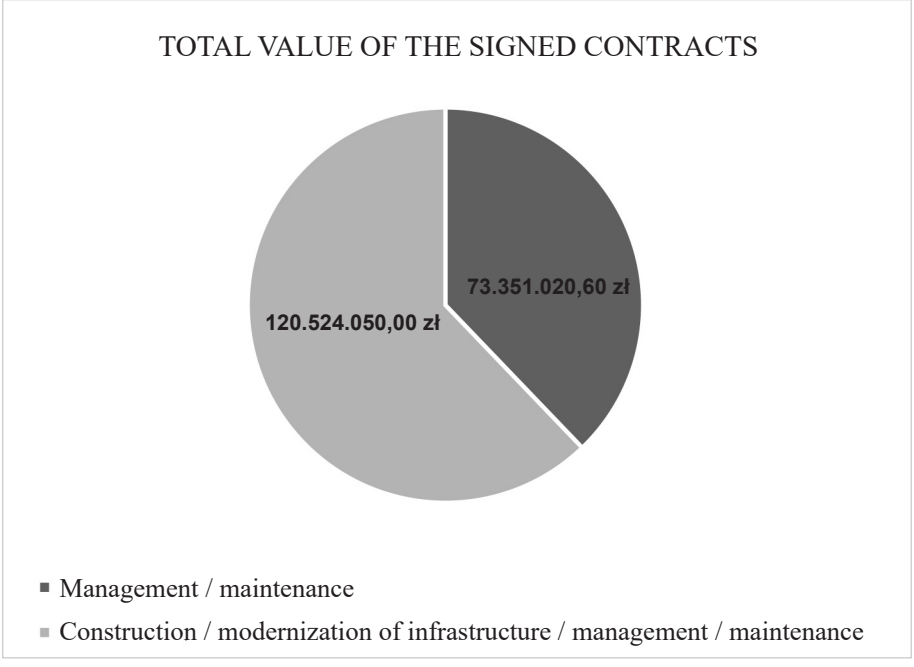


Figure 1. Gross value of PPP water and sewage sector contracts in the years 2009-2021 – by scope of contract

Source: Own analysis based on Public-Private Partnership Platform (2022).

The optimal distribution of risk in the outlined Polish examples of large public-private partnerships makes them now two cases of "good practice", significantly demonstrating how to implement PPP projects in the water and sewage sector in Poland.

5. Summary and conclusions

Local authorities are constituted to meet collective public needs, including water and sanitation, a strategic sector for citizens that determines their quality of life in their region. Developing countries are challenged to provide these services in general, while developed countries are challenged to meet the objectives set out in strategies, plans and accords. In both cases, the public entities mandated to deliver on these tasks confront the issue of funding. This is the main factor that draws their attention to the public-private partnership formula.

As a tool for unlocking financial potential for the delivery of projects involving strategic public services, a public-private partnership is in line with the pursuit of the concept of sustainable development. The intensified development of infrastructure that protects natural resources for future generations and rationalises their use considerably contributes to linking present positive actions with future effects. This is of particular importance for the limited water resources on Earth and the preservation of ecological balance.

The analysis of PPP water supply, sewage collection and treatment projects cited in this article shows a number of benefits for public entities. To begin with, most if not all the costs of construction, upgrading and repairs are usually borne by the private party, and local authorities retain the ownership rights to the land and the resulting infrastructure, which prevents the service from being made permanently private, permitting only service operation according to rules strictly laid down in the contract. Importantly, it is in the interest of the private partner to design and construct the infrastructure with due diligence, based on cutting-edge technology, as failures and unplanned upgrades will result in financial losses that are not factored into the preliminary estimate. This is also a guarantee of long-term high-quality service. In terms of local authority finances, the debt of companies founded to complete multi-million projects does not impact the level of the public partner's debt. In many cases, completion of such projects would be impossible due to statutory requirements, in particular with regard to the feasibility of debt repayment. The charge to the end user is also warranted by contractual provisions, including cases where the unit rate for sewage treatment is increased. This protects residents against uncontrollable price spikes and unjustified excessive profit generation by companies. All such preferences must be secured in the process of meticulous analysis at the initial stage of developing the concept of the venture so as to secure the interests of the public party but also fostering conditions to encourage private partners to work together. A well-prepared public-private partnership is an effective tool for tackling the problem of limited financial resources in the strategic sector of public services for each local authority.

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