RESEARCH PAPER

Management of drinking water and sanitation services in the city of Tacna 2025

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SUMMARY
The sanitation sector in Peru faces critical gaps, with national coverage of 87.8% in water and 70.9% in sewerage. In this scenario, EPS Tacna stands out as a solid entity that serves 321 thousand inhabitants in Tacna, Pachía and Locumba. Its coverage indicators are remarkable, reaching 97.1% in drinking water and 94.7% in sewerage services. The company demonstrates operational efficiency with 2.59 workers per thousand connections and healthy financial management. In 2024, it reported revenues of 53.85 million soles and a net profit of 19.8 million, reflecting solvency and autonomy. However, its sustainability faces the serious threat of water scarcity, with a current deficit of 219 liters per second. This lack of sources has reduced the continuity of the service to 17 hours a day, affecting the quality of the service. Treatment infrastructure is also critical, as the demand for wastewater exceeds the installed capacity by 34%. In addition, there are challenges in commercial management, with 13% of users inactive and a high volume of annual complaints. The execution of investments is another weak point, standing only close to 49%, which delays the necessary improvements. Although new water and treatment plants are planned, the maturation of these megaprojects is slow in the face of population growth. Without new sources of water, it is estimated that the water deficit will escalate to 80% in the next three decades. This could collapse the continuity of the service to levels of between 5 and 8 hours per day, putting regional well-being at risk. In conclusion, EPS Tacna is a profitable and robust company, but extremely vulnerable to the systemic water crisis. It is urgent that the Regional Government and the MVCS expedite major infrastructure projects to ensure the future of the resource.

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Introduction

The sector of drinking water and sanitation services in Peru faces multiple difficulties in reaching the entire population with quality services, despite the fact that this is an indispensable service for the existence of human beings, their well-being and health, as well as the quality of life that is expected. that is why SDG 6 specifically refers to universal access, with safe and quality water. Perry (2024) refers to the fact that in Latin America and the Caribbean the quality characteristics are very similar, having different models of policies and administrations, except in the case of services in Chile, which with a model of total private participation have universal access to services and quality.

In Peru, the company is responsible for the provision of services in the MVCS, and has the support of the Transitional Administration Body (OTASS), the Regulatory Body (SUNASS), Pro-Inversión, Regional Governments, Local Governments, and User Boards. For the provision of services in Peru at the urban level, there are 51 regulated and 48 non-regulated companies, at the level of small cities that are those with between 2,000 and 15,000 inhabitants and that are in total 580 are managed by the UGM, and in rural and jungle areas there are 73,864 are managed by community organizations and user boards with the assistance of the ATMs.

TABLE 1
Number of operators and population covered e country level 2024

Operator Type		uantit	Dens y	opulation (Thousands of inhabitants)				
				Total	With wat P.		With Sewera	
					Hat	Cot	Hat	Cot
SEDA AL	EPS S	1	3.7:	11,0:	10,3:	93.8	10,0	91.4
LARG EPS 1	EPS G1	6	3.9	5,52	4,95	89.8	4,56	82.6
BIG EPS 2	EPS G2	13	3.2:	3,80	3,22	84.8	2,76	72.5
MEDI M EPS	EPS M	15	3.1	1,77	1,47	83.3	1,29	72.9
SMAL EPS URBA	EPS P	15	3.4	504	438	87.0	416	82.6
NOS NO EI	UGI	48	3.4	1,14	1,03	90.1	662	57.6
SMAL TOWI S	UGI	58(	3.7:	2,31	1,97	85.4	1,32	57.2

RURA	OC	73,8 4	3.1(	8,21	6,68	81.5%	3,24	39.6%
TO TA L		**74 ,5 42**	lab/vi	**4,31**	**0,14**	**87.8%**	**4,34**	**0.9%**

Source: Benchmarking SUNASS

However, according to the regulator's Benchmarking (2023) indicators, in Peru there was still a drinking water coverage of 87.8%, which means that 4.17 million inhabitants do not have access to safe water and 70.9% in sewerage coverage, which is 9.97 million inhabitants.

In the case of drinking water and sanitation services in the city of Tacna, they are in charge of the company Emapa Tacna S.A., a company that was created as part of the decentralization process, having been one of the subsidiaries of what until 1985 was the national drinking water and sewerage service (SENAPA). Its date of creation was November 20, 1985 as a public company of private law, its main shareholder being the Provincial Municipality of Tacna, and its responsibility being the provision of services in the cities of Tana, Pachía and Locumba.

Among the main functions we can mention administrative and sustainability management, which is responsible for governance and regulation aspects, administrative issues in general, planning, legal advice, human resources, general services, environmental management and risk management; Commercial management, which is responsible for the control of users, categories, consumption, measurement, billing, collection, commercial cadastre and customer service; Operational management, which is responsible for the operation of the infrastructure, the physical efficiency of operations and technical quality, as well as maintenance operations and investment management; The economic and financial management whose function is to guarantee the sustainability of the company, guarantee the necessary resources to cover institutional costs and expenses, guarantee the resources for the operation and maintenance of the infrastructure, investments and financial commitments.

According to the Tariff Study (2023), the company provides services to a total population of 318,309 inhabitants with 97.2% coverage in drinking water and 94.7% coverage in sewerage, the average continuity of the drinking water service in the year is 18.86 hours/day and the average pressure of 17.96 m.c.a. And according to commercial information, the consumption of domestic users measured is 12.6 m3/month, their financial statements show indicators of positive management. Its capacity to execute investments was 44%.

TABLE 2

Population and service coverage EPS TACNA S.A. 2024

Locati	Population		
	To	With drinking water	With Sewerage
	Hab.	Ha	Cover ge
Tacn	314,491	305,81	947.2 %
Pach	2,062	1,817	88.1 %
Locu mba	2,256	2,143	95.0 %
T O T A L	**318,809**	**309,77**	**97.2 %**

	H ab.	Co ge			
Tacn	298,54	94.9 %			
Pach	1,475	71.5 %			
Locu mba	1,997	88.5 %			
T O T A L	**302,018**	**94.7%**			

Source: Directorate of Tariff Regulation (DRT) – SUNASS.

Background

Cieza (2022) carried out research with the aim of designing an environmental management model for the WWTP of the town of Jaén, 2021. I use a quantitative approach and a type of propositional descriptive research. The instrument was a questionnaire with a sample of 26 people. The author concludes that most workers disagree with process management.

Huamán (2021) conducted research with the aim of determining whether there is a relationship between regional public policies and wastewater treatment in a district of Ayacucho 2020. He used a quantitative approach, with a correlational descriptive design, his instrument was a questionnaire that he applied to a sample of 95 workers, the author concludes that there is a strong relationship.

Nunura (2022) conducted research with the aim of designing a monitoring system that improves the efficiency of investment management in a regional entity. The methodology applied was basic, projective, descriptive, analytical, predictive, non-experimental and cross-sectional. I work with 81 investment projects, I use parametric and non-parametric methods. The author concludes that, with a functional monitoring model, costs can be reduced by up to 75%.

Torres (2023) conducted research with the aim of evaluating whether there is a relationship between the PMI and the execution of expenditure in the provincial municipality of Tambopata in Madre de Dios, 2022, his methodology was a non-experimental cross-sectional design of a basic type, applying his instrument to a sample of 70 workers. The author concludes that there is a strong positive correlation.

Proaño et al (2023), carried out a research with the aim of analyzing human talent and administrative management, in the Municipal Public Company of Drinking Water and Sanitary Sewerage of the Canton of Jipijapa (EPMAPAS), verifying compliance with the processes. The methodology applied in the research had a mixed approach, qualitative and quantitative, a survey

was used as an instrument. The author concludes that 85% of the staff have competencies developed by the human talent management unit, a condition that improves team performance and also develops a good work environment.

Redroban et al (2022) conducted research on the deterioration of ethics, a fact that increased with the process of the COVID 19 pandemic, by 2021 corruption had taken root in Ecuador, which they called Compliance. And it is in 2021 when the assembly enacted the Reform Law to the comprehensive organic criminal code in anti-corruption matters, established rules, control systems, and drastic sanctions. The objective of the study is to present the results of the research developed with a mixed qualitative-quantitative research methodology. The author concludes that the results were encouraging and that they can help academia and organizations to rethink their education, training and/or training programs. On the other hand,

Fanzo, M. (2021) conducted research with the aim of evaluating the relationship between service quality and user satisfaction in the Sanitation Service Provider Company EPSEL S.A. in Chiclayo. The methodology was quantitative of the basic type with a correlational non-experimental design. Their instrument was a survey applied to a sample of 85 employees. And that after the analysis with a Cronbach's alpha coefficient of 0.867, the author concludes that, if there is a strong relationship between the quality of the service and the satisfaction of the users in the Sanitation Services Provider Company EPSEL S.A.

Paltán et al (2020). I carry out research based on achieving Sustainable Development Goal (SDG) 6, which proposes water and sanitation for all, an issue that requires Latin America and the Caribbean to change its approach to water management. Incorporating uncertainty and innovation, it is necessary to integrate resilience into the management not only of natural and traditional hazards but also of new challenges, such as climate change, population growth, land use, global and regional conflicts. The document provides strategic reflection, concrete actions and measures for threat management, presents a cutting-edge scientific decision framework and modeling tools.

Comexperu (2025) conducted research on urban population growth, aligned with the UN-Water guidelines, which require Peru to develop more resilient and sustainable water and sanitation systems. Despite the fact that urban development is concentrated on the coast, the country still faces significant gaps in the provision of these services, which translates into greater health risks such as infant mortality and preventable diseases. For this reason, it is essential to have comprehensive project management that adapts to the city's growth by incorporating private investment that facilitates the construction of infrastructure. Referring to Pro-Inversión, mechanisms of works for taxes, and the parallel management of the MVCS through the PNSU and PNSR. Closing gaps requires a focus on water efficiency, modernization of infrastructure, promotion of new projects and strengthening governance.

Mendoza (2024), carried out research with the aim of studying and proposing indicators related to the efficiency of drinking water and sanitation management, in harmony with SDG 6, the research applied the hierarchical process analysis (AHP) methodology, selecting relevant indicators for the management of water resources for the water supply service. The author concludes that based on this approach, there are indicators that consider socio-environmental approaches that impact sustainable water management in a way that contributes to the design, monitoring, evaluation and decision-making of public policies focused on the operating agencies in a comprehensive manner.

Iberico et al (2024), I investigate the problems generated for human beings and society by the lack of access to water and sanitation services, and presents a report by the FAO (United Nations) in which Peru ranks last in Latin America in quality of services and management. It states that during the period 2013-2022, accessibility went from 84.3% to 88.1% in urban water and from 61.9% to 77.3% in rural water, showing deficiencies in the management of companies, which is reflected in administrative, economic, financial, operational and quality indicators. Proof of this is that to date there are 19 companies under the transitional regime administered by OTASS. The author suggests a change in the management model, and evaluate giving way to the private sector as has been done in other sectors, and generate incentives to achieve good results in management. On the other hand, the MVCS could carry out works by government-to-government agreement.

Benites et al (2021), carried out a qualitative research with a descriptive approach, with the aim of evaluating the inefficiencies of the drinking water and sanitation sector in Peru, concluding that municipal and regional governments are the main responsible for sanitation companies, politicizing the sector, with political interference in tariff and investment issues. apart from regulatory deficiencies.

Dianderas (2022) researched the accessibility to drinking water and sanitation, by geographical area and by water availability in different regions of a national territory, concluding that in terms of coverage and accessibility the level of economic development of the country greatly influences, but that to a greater extent it is due to government decisions regarding investment in infrastructure and the clarity and solidity of the regulation of services.

While Bonifaz et al (2023) conducted research with the aim of assessing the level of relationship between investment and accessibility to public services, and calculating gaps in Peru, their study highlights that the gap not only encompasses basic access, but also aspects of quality, sustainability, and mitigation of environmental risks. And it concludes that in planning, investments respond to improvements in management, and that there must be coordination between the public and private sectors.

Ruiz et al (2020), The authors developed the research with the aim of understanding the evolution of this water and sanitation sector in Colombia, taking as a reference the main indicators that measure the provision of the service. It uses a quantitative-qualitative, basic, cross-cutting methodology, through which it studies and analyzes public policies on water and sanitation issues and their evolution over time, for which it uses operational management indicators such as quality, coverage, continuity, quantity and cost. The authors conclude that it is necessary to review the financing and efficiency aspects of spending aimed at universal access to quality services, in line with the sustainable development goals

Buitrago (2023), conducted research with the aim of designing public policy guidelines for drinking water in La Guajira. Its methodology was descriptive with a qualitative cross-sectional approach, its instruments were interviews, documentary techniques and databases. The author concludes with a proposal of 4 guidelines and 21 public policy strategies that involve issues of governance, governance, conservation of ecosystems and cultures. His proposal encourages the participation of private companies in various forms of management.

Deleg et al (2024) developed a research with the aim of designing a management model for a public company providing drinking water and sanitation services to guarantee an effective and efficient provision of the service for the Huamboya Canton in Ecuador. To this end, a mixed research approach was used, combining quantitative and qualitative methods, through a non-experimental descriptive design. The author concludes that the proposal is favorable, that the economic evaluation obtained favorable results, a NPV of 463,693.17; an IRR of 13%, a cost-benefit of 1.27 and a payback period of 8 years, which indicated the feasibility of redesigning the treatment plant and creating the public company.

Rodríguez (2021), carried out research with the aim of generating a proposal for a Management Model of the quality of drinking water production, Based on the Deming Cycle, Six Sigma and SERVPERF. The methodology used was with a qualitative and quantitative approach, a hypothetical deductive and analytical method of non-experimental design, and the techniques used were observation and survey. The author concludes that the application of his model allows the identification of critical points in the drinking water production process that are not reaching quality levels, and with the results of the application of Deming's model, improvements in process quality can be identified.

Cava (2011) investigated the various models of business management, specifying that the management of a company is the art of efficiently combining resources, in order to generate value for customers, employees, shareholders and society, and concludes that it is first necessary to evaluate which type of management is appropriate for the organization. it can be the traditional model, the behaviorist, the decision-making model.

Perry (2024) developed a research with the aim of evaluating whether there is a dependence between the quality of management in the provision of drinking water and sanitation services in Peru, and the number of complaints by users. To do this, it used a basic research methodology, quantitative approach, non-experimental design and descriptive level. The author concludes that, if there is a relationship, and that the more deficient management indicators, the causality of claims is greater.

Perry (2024) researched the needs and possibilities of universal access to drinking water and sewerage services in Peru, with the aim of evaluating the possibilities of closing gaps. To this end, it used a basic research methodology with a quantitative approach, with a non-experimental design of descriptive level. The author concludes that if the quantity of resources is not multiplied and the capacity to execute investments is not made efficient, it will never be possible to close these gaps in accessibility and quality, and suggests considering the project cycle that is estimated to be 8 years.

Perry (2025) conducted research with the aim of evaluating the quality of drinking water, sewerage, and wastewater treatment services in Peru. To this end, a basic research methodology was used with a quantitative approach, with a non-experimental design of descriptive level, the inquiry was mainly based on documentary analysis. The order concludes that there are many deficiencies at all levels of service providers, which does not give guarantee or security to the user, with this descriptive research it lays the foundations for future inquiries that can delve into the underlying causes of the deficiencies.

Felgendreher, S., & Lehmann, P. (2016). They studied the impact of the policy on the quality and management of water utilities, and consider that the implementation of reforms in the water sector, especially tariff increases, is hampered by political factors in many developing countries. In Peru, the

electoral structure and the interest of local politicians prevent higher rates, despite being essential to improve the quality of service. To overcome these barriers, deeper institutional reform is proposed, such as the merger of local and regional water suppliers, accompanied by information campaigns that demonstrate how tariff increases translate into tangible benefits for users.

In September 2015, world leaders through the United Nations issued the Agenda for 2030, with 17 Sustainable Development Goals, of which No. 6 refers to ensuring the availability of safe and quality water and sanitation for all. It is an SDG that is linked to the fulfillment of other SDGs. According to him, it is necessary to increase investment levels by up to six times. And it requires integrated management of water resources and protection of ecosystems, with the participation of local communities in the management of these vital resources.

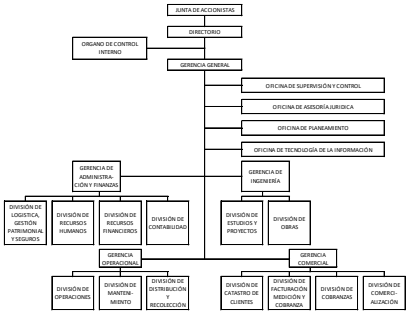
Bravo, (2023) conducted research on the management and quality of services, with the aim of determining how the quality management system influences the drinking water and sewerage services of the company EPS Barranca S. A. Methodologically, it had a quantitative, non-experimental, cross-sectional approach, with a correlational scope. Their instrument was a survey applied to a sample of 80 workers. As a result of the analysis, he obtained a Spearman Rho of 0.945. The author concludes that there is a positive and relevant relationship, and that good management can provide a service that is at the level of the user's expectations.

Methodology

In order to analyze the relationship between the variables "Management of drinking water and sanitation services" and "Quality of sanitation services", a quantitative approach has been developed, cross-sectional, non-experimental, basic and descriptive correlational research, because it is intended to investigate how the variables are related without delving into causes or effects in the EPS Tacna S.A., Arispides (2020).

Result

The EPS TACNA has as its scope of provision of sanitation services the towns of Tacna, Pachía and Locumba. The first two, located in the province of Tacna; and the town of Locumba, located in the province of Jorge Basadre, in the Tacna region. Together, in the three localities administered by the EPS, the total population is 321 thousand inhabitants, and has an organic structure that adjusts to their needs.



Source: SUNASS Tariff Study. In original language. Spanish

The company's workforce is made up of 272 workers, including officials, professionals and technicians. It should be noted that the company has also outsourced certain activities that correspond to the marketing division. Despite this, the company has a ratio of 2.59 workers per 1000 connections, which is quite good. This is also reflected in the company's financial statements, when calculating the employment ratio of 69%. On the other hand, the company has fairly good coverage indicators, 97.1% in drinking water and 94.7% in sewerage, quite acceptable values in relation to the rest of the EPS in the country and has a micro-metering level of 72%.

The company is self-sustainable, has a Tariff Study prepared by SUNASS and approved in 2024 and valid until 2028, through which the regulator approves the rates for that period. The approved rates are for the drinking water service and for the sewerage service, disaggregated by condition, type, category of user and range of consumption, which guarantees the sustainability of the company. In the same Tariff Study, the regulator approved the maximum costs of the activities that make up the collateral services, such as new connections, changes in diameter, feasibility of services, among others.

As a result of the 2024 fiscal year, the company has had revenues of 53.85 million soles, with net profits of 19.8 million soles. One of the main challenges of the company is the scarcity of water resources to supply the population. In this regard, the one who operates the major infrastructure in the Tacna basins is the Tacna Special Project, which is responsible for managing the water resources for the different users in the cradle. This institution has a megaproject in its portfolio that includes damming and water conduction to cover the current deficit and future water demands, however, there is no knowledge that there is any progress on this.

In relation to the claims made by users, the EPS registers 2.82 claims per thousand connections, which indicates that the company has an approximate value of 28 thousand complaints per year, which indicates that, if each claim corresponds to a user, 25% of the users would have made one claim per year. an issue that would be a matter of investigation to identify the reasons that lead

users to complain, is something that the company should consider in order to improve its image.

From the point of view of commercial management, the company provides services to three localities, Tacna, Pachía and Locumba. In drinking water, it has a total of 107,509 connections, and an equivalent of 108,769 units of use, which indicates that it is a city with a population growth that is more horizontal than vertical. It has five categories of users, made up of 97,612 domestic users, 8,703 commercial users, 981 industrial users, 989 state users, and 484 social users. However, it has 13,919 inactive connections, which indicates that 12.95% of users are in an inactive condition, which is a fairly high value, more if we consider that the meaning of inactive user is that user who for personal reasons has requested the EPS to temporarily cut off their service and therefore not billing. The other option could correspond to the group of delinquent users who are cut off due to debt or non-payment. If this is the case, such a condition of closed connection should be verified.

TABLE 3

Structure of users, consumption and billing by locality

User category	Number of users by locality						Average consumption m3/mp/con	Invoicing S/ / month
	Tacna		Pachia		Locumba			
	Drinking Water	Bucket	Drinking Water	Bucket	Drinking Water	Bucket		
Social	352	85	5	0	5	3	84,300	82,964
Domestic	95,644	93,232	588	476	379	372	876,438	1,827,144
Commercial	8,559	8,089	15	11	38	36	224,657	1,135,160
State	929	903	4	4	3	3	26,908	226,366
Industrial	934	685	16	13	38	37	150,882	519,360
Total	106,418	102,9	628	504	463	451	1,363,185	3,790,
			94					994

Source: SUNASS Tariff Study

In relation to micro metering, it should be noted that 85.86% of users have micro metering, that is, the meter park has 92,307 meters. The average consumption of users in general is 12.6 m3/month/connection, which gives an annual sale of 1,363,105 m3 of water sold per month and an annual income of 45,491,928 soles only from sales. Users who do not have a meter are charged for consumption assignment ranging from 8 to 100 m3/month/connection depending on the category and range of user. And finally, monthly billing includes a fixed charge of 4 soles/user/month.

And in relation to sewerage, the company has 103,949 connections and for billing purposes the consumption of drinking water is taken as a reference either by metering or by allocation of consumption, and the rate that corresponds to the category and range of consumption is applied.

TABLE 4

Tariff structure of the locality of Tacna and Pachía

Class	**Category**	**Range**	**Drinking Water Rate S/ /m3**		**Sewerage RateS/ /m3**		**Fixed Charges S/ /mes**	**Maximum consumption allowance (m3 per month)**
			Tacna and Pachía	Locumba	Tacna and Pachía	Locumba		
Residential	Social	0 or more	0.90	0.58	0.38	0.25	4.20	10
	Domestic	0 a 8	1.18	0.63	0.49	0.25	4.20	16
		8 a 16	1.56	1.08	0.66	0.42	4.20	

		16 and over	2.51	2.10	1.12	0.77	4.20	
	State	0 or more	2.55	2.15	1.15	0.77	4.20	50
In the Residential	Commercial and others	0 a 30	2.60	2.20	1.15	0.77	4.20	30
		30 and over	5.29	2.20	2.22	0.77	4.20	
	Industrial	0 a 60	6.39	5.00	2.69	2.00	4.20	100
		60 and over	8.59	5.00	3.63	2.00	4.20	

Source: SUNASS Tariff Study

It should be noted that the rates are approved with a tariff formula that allows them to be updated every time the MPI exceeds 3%, Likewise, the company is in its power to request the regulator to grant it financial balance whenever costs or revenues are above or below as appropriate.

As can be seen, the commercial management is well structured and has an updated commercial cadastre, good levels of coverage, 97% in drinking water and 94% in sewerage, values that are above the national average, it has an approved tariff structure that allows it to have profits.

From the operational point of view, for the supply of drinking water for the cities of Tacna, Pachía and Locumba, 489.6 lps are captured. of surface water from the Calana system that is treated at the Plant of the same name, and 52.8 lps. of the Caplina River that are treated at the Alto Lima plant. On the other hand, the company has 9 operating wells with an average production of 271.3 lps., which in summary gives a total average production capacity of 812.93 lps. It should be noted that this represents to date the entire capacity of existing water sources.

The operating system in the city of Tacna has a new water treatment plant in Calana, with a capacity of 1000 lps but due to restrictions on the source of raw water it is only processing 580 lps., and on the other hand, for Tacna there is also an old plant in Alto Lima with a production capacity of 50 lps. And finally the Pachía plant with a small plant with a maximum production capacity of 8 lps.

The water distribution system has 04 conduction lines with diameters from 10 to 16 inches with a total of 8.33 km. With 11 impulsion lines with diameters of 10 to 14 inches with a total of 26.87 km. With 90.06 km of primary network with diameters ranging from 8 to 22 inches, and with 745.65 km of secondary distribution network with diameters ranging from 2 to 6 inches. Including accessories, macro meters, valves and fire faucets. Additionally, e3l system has 07 drinking water pumping stations with a total capacity of 758 lps and using 1,050 HP of energy. And to regulate continuity, it has 19 operational reservoirs with a total storage capacity of 28,620 m3. The distribution system culminates with 107,509 drinking water connections and 92,307 micrometers.

The sewerage system begins with the collection of wastewater discharge through 101,265 household connections, which are transported by 783.46 km of secondary collection pipes with diameters ranging from 6 to 8 inches. With a system of primary collectors made up of 9 primary collectors with 25.82 km of pipes with diameters ranging from 12 to 36 inches. All wastewater discharges into two emitters; one called the old emitter with 1.91 km of 36-inch pipes and which currently transports 40 lps to the Southern Cone Plant, and the second emitter with 8.6 km of 36-inch pipes that transports 385 lps. Towards the Magollo plant. Finally, the system has two wastewater treatment plants, the Southern Cone Plant operates with aerated lagoons with a capacity to treat 35 lps. And the Magollo Plant, which operates only with optional lagoons and with the capacity to treat up to 385 lps. Which gives a maximum capacity of 420 lps treatment.

From the operational point of view, it can be said that the infrastructure works well, and that the operations staff does the impossible to make this so, the continuity of the service is 17 hours a day, and despite the fact that the population has a fairly rational consumption at the EPS level with 12.6 m3/month/connection. Taking as a reference that at the regulated company level there are a total of 3,781,382 drinking water connections and the total production of drinking water is 15,129,962 m3/month, which gives a national average of 17.26 m3/month/connection, according to Benchmarking Sunass (2024).

To facilitate operation, the EPS has divided the supply area into 7 sectors and these in turn into 30 subsectors identified cadastrally with a geo-referenced system, each one represents a supply area of the continuity and average pressure in the network. On the other hand, it should be noted that the infrastructure of the distribution and collection systems is in good physical and operational condition, with the exception of the micrometers that have a very short useful life, no more than 5 years, which forces the company to carry out the annual renewal of at least 15,000 units with cumbersome bidding processes. On this particular issue,

it should be noted that due to wear and tear of its parts, underreporting is generated that increases water losses.

It should be noted that the company has its geo-referenced technical cadastre in drinking water at 100% and in sewerage at 97%, water losses of 29%, average continuity of 17 hours/day, average pressure in the network of 17 m.c.a. Regarding the investment execution indicator, the company has achieved 93% compliance with the infrastructure investment schedule, 87% of investments in ecosystem mechanisms and 5% of risk and climate change investments, with an average of 49% compliance in investment execution. This also presents 100% compliance with the goal in recovery of inactive connections.

During the year 2025, the new water treatment plant in Calana has come into operation with a capacity to treat 1000 lps, ceasing to operate the old plant that produced no more than 500 lps. The plant has currently started operations with 580 lps. And on the sewerage side, the company was evaluating with the support of the MVCS the construction of a wastewater treatment plant with which it could triple the current capacity, however, this project was discarded.

Making a population projection and a balance of supply and demand, considering that the population growth rate is 1.3% (INEI), that the density is 3.04 inhabitant / dwelling, that water losses are 30% and the coefficient of maximum daily demand is K1 = 1.3., it is necessary to:

TABLE 5

Projection of the Supply Demand Balance of Water Source EPS Tacna S.A.

YEAR	Specification	0	5	10	15	20
		2025	2030	2035	2040	2045
Population	Hab	321,166	342,591	365,446	389,826	415,832
What a defendant	lps	1,032.32	1,112.21	1,198.17	1,290.64	1,390.12
What Offered	lps	812.93	812.93	812.93	812.93	812.93
Gap	lps	-219.39	-299.28	-385.24	-477.71	-577.19

Source: Own elaboration

As can be seen, since year zero there is already a deficit of water source, approximately 20% of what is required, and this is reflected in the continuity that has already reached 17 hours/day, this indicator will worsen every year more if there is no solution to this problem. It should be noted that any macro investment project has a maturation period of between 8 and 10 years. And in this case, taking the equivalence of the projections as a reference, the continuity could be 12 hours/day less.

In relation to the balance of supply demand for wastewater treatment capacity, it has to.

TABLE 6

Projection of the Supply Demand Balance of Wastewater Treatment EPS Tacna S.A.

YEAR	Specification	0	5	10	15	20
		2025	2030	2035	2040	2045
Population	Hab	321,166	342,591	365,446	389,826	415,832
What a defendant	lps	561.98	605.47	652.26	702.60	756.75
What Offered	lps	420.000	420.000	420.000	420.000	420.000
Gap	lps	-141.98	-185.47	-232.26	-282.60	-336.75

Source: Own elaboration

As can be seen, demand has exceeded supply capacity by 34% and if the project for the new Treatment Plant is not completed by year 20, demand may exceed supply capacity by up to 80%.

In relation to the economic and financial diagnosis of the company, a summary of the EEFF for the years 2023 and 2024 is shown, which will serve as a basis for estimating the respective ratios and their interpretation, which will give us an image of the current situation of the company and whether or not there was progress during the 2024 fiscal year.

TABLE

Balance General de la EPS TACNA S.A.

YEAR	31.12.2024	31.12.2023
ACTIVE		
Current Assets		
Cash and cash equivalents	27,114,521	30,454,224
Accounts by Salespeople	12,068,510	9,755,779
Other accounts receivable	10,498,350	3,044,585
Inventory	1,243,544	2,243,089
Total, Current Assets	**50,924,925**	**45,497,677**

Commented [u1]:

Non-Current Assets		
Investments (net)	324,267	0
Property, Plant & Equipment	351,034,576	327,832,976
Intangible assets	2,657,488	3,191,695
Deferred Earnings Tax Assets	0	2,321,027
Total, Non-Current Assets	**354,034,331**	**333,345,698**
TOTAL, ASSETS	**404,959,256**	**378,843,375**
LIABILITIES AND EQUITY		
Current Liabilities		
Trade Accounts Payable	2,188,580	4,621,835
Other accounts payable	2,494,496	4,513,170
Employee Benefits	924,352	2,705,272
Total, Current Liabilities	**5,607,428**	**11,840,277**
Non-Current Liabilities		
Other accounts payable	15,884,916	16,261,777
Income tax liability	11,857,284	0
Provisions	1,605,756	673,156
Employee Benefit	71,174	71,805
Other liabilities	199,308,944	205,090,992
Total, Non-Current Liabilities	**228,728,074**	**222,097,730**
TOTAL, PASSIVE	**234,355.502**	**233,938,077**
Heritage		
Capital	76,005,100	44,625,510
Additional capital	38,082,431	53,242,229
Legal Reseras	1,566,972	1,566,972
Cumulative results	19,065,548	16,904,472
Other heritage reserves	35,903,703	28,566,185
TOTAL, EQUITY	**170,623,754**	**144,905,368**
TOTAL, LIABILITIES AND EQUITY	**404,959,256**	**378,843,375**

Source: SUNASS Tariff Study
EEFF of EPS TACNA S.A. (SUNASS website)

TABLE

Comprehensive income statements of EPS TACNA S.A.

YEAR	31.12.2024	31.12.2023
Revenue from the provision of services	53,875,153	56,167,850
Cost of Sales	-33,770,348	-32,284,671
Gross Profit (Loss)	**20,104,805**	**23,883,179**
Sales and distribution expenses	-7,149,424	-7,800,937
Administration Fees	-12,557,690	-10,306,189
Other Operating Income	21,328,487	11,605,468
Operating Profit (Loss)	**21,726,178**	**17,381,521**
Financial income	352,186	48,010
Exchange Difference (Profit)	16,566	2,012
Financial expenses	-113,162	-157,914
Exchange difference (losses)	-18,099	-393
Profit before income tax	**21,963,669**	**17,273,236**
Income tax expense	-2,161,741	-1,053,444
Net Profit (Loss) from Continuing Operations	**19,801,928**	**16,219,792**
Net profit (Loss) for the year	**19,801,928**	**16,219,792**
Total comprehensive income (after tax)	**19,801,928**	**16,219,792**

Source: SUNASS Tariff Study
EEFF of EPS TACNA S.A. (SUNASS website)

As can be seen, during the year 2024, the EPS Tacna recorded income from the provision of its services of approximately S/ 53.88 million. This amount is slightly lower than that obtained in 2023, when revenues reached S/ 56.17 million, which represents a reduction of close to 4%. For its part, the cost of sales amounted to S/ 33.77 million, and as a result, the company obtained a gross profit of S/ 20.10 million, lower than that recorded in 2023. On the other hand, administrative

and sales expenses reached a total of around S/ 19.7 million, absorbing a large part of the gross profit, however, the company managed to compensate for this situation thanks to other operating income, which allowed it to achieve an operating profit of S/ 21.33 million, higher than that of the previous year. Finally, EPS Tacna closed the year 2024 with a net profit of S/ 19.80 million, a figure higher than that obtained in 2023. This result shows that, despite the slight reduction in revenues, the company managed to maintain a good economic performance, consistent with management aimed at ensuring financial balance and continuity of service.

By making an analysis of financial ratios, through which the main economic and financial ratios of EPS Tacna S.A. corresponding to the years 2023 and 2024 are compared. The aim is to show, in a simple and clear way, how the company's situation has evolved between the two years and what can be concluded from these indicators.

TABLE 7

Economic Ratios of EPS TACNA S.A.

Ratio	Formula	2023	2024
Gross margin	Gross Profit / Revenue	42,5 %	37,3 %
Operating margin	Operating Result / Revenue	31,0 %	39,6 %
Net margin	Net Income / Revenue	28,9 %	36,8 %
LENGTH	Net Income / Assets	4,3 %	4,9 %
SWIR	Net Income / Equity	11,2 %	11,6 %

Source: SUNASS Tariff Study

The gross margin indicator shows how much the company has left after covering the direct costs of the service, in this regard in 2023 the gross margin was 42.5%, while in 2024 it was reduced to 37.3%, this means that in the last year the company had a lower margin after covering its basic costs. On the other hand, the operating margin went from 31.0% in 2023 to 39.6% in 2024. This result indicates that, despite the reduction in gross margin, the company managed to improve its operating performance and this is mainly explained by the presence of other operating income that helped offset administrative and operating expenses. And the net margin shows the final result of the year. In 2023 it was 28.9%, while in 2024 it increased to 36.8%, this increase reflects that EPS Tacna managed to close the year with a higher net profit, even though total revenues were slightly lower.

In relation to return on assets, ROA went from 4.3% in 2023 to 4.9% in 2024. This result indicates that the company's assets were used slightly more efficiently in the last financial year. Since it is a company with a high investment in infrastructure, these values can be considered adequate. And the return on inventories, it can be seen that ROE remained relatively stable, going from 11.2% to 11.6%. This shows that the capital invested in the company continues to generate reasonable results and that there are no sudden changes in the profitability of equity.

TABLE

Ratios Financieros de la EPS TACNA S.A.

Ratio	Formula	2023	2024
Current Ratio	Current Assets / Current Liabilities	7,3	6,4
Total indebtedness	Total Liabilities / Total Assets	0,62	0,58
Equity leverage	Total liabilities / Equity	1,61	1,37
Financial autonomy	Equity / Total Assets	38 %	42 %

Source: SUNASS Tariff Study

The current liquidity ratio fell from 7.3 in 2023 to 6.4 in 2024. Despite this decline, the level of liquidity remains high. The company has sufficient resources to meet its short-term obligations without major difficulties. On the other hand, the level of indebtedness decreased from 0.62 in 2023 to 0.58 in 2024. This result indicates that a smaller proportion of assets are being financed with debt, which represents an improvement in the company's financial structure. Equity leverage fell from 1.61 to 1.37. This reflects a strengthening of equity and less dependence on third-party financing. And financial autonomy increased from 38% to 42%, which means that a greater part of the company's assets is financed with its own resources. This result is positive and contributes to the financial stability of EPS Tacna.

In summary, from the economic and financial information of EPS Tacna S.A. for the year 2024 analyzed, it can be seen that the company maintains a solid economic and financial situation. which generates positive results, with adequate liquidity and manageable debt levels.

Conclusions

As has been seen, EPS TACNA S.A. is a strong company from the point of view of administrative management and organization, it has a ratio of 2.6 workers per 1000 connections which is quite good. It is robust from the point of view of commercial management, has a portfolio of users identified by type of service, category, condition, and range of consumption, has tariffs and tariff formulas approved by the regulator, and has an updated commercial cadastre. From the operational point of view, it is solid and has infrastructure with ample capacity, in good operational condition and trained personnel, it has very good indicators such as coverage, continuity, pressure, micro metering and non-revenue water and has an updated

technical cadastre. And from the point of view of economic and financial management, the company shows its efforts to increase its income and control its costs and expenses, a fact that allows it to show solvency and profitability.

However, there are some factors that the company should take into account if it intends to improve management and not jeopardize its good level of management. Such as the fact of having to study why the high number of inactive or unbilled users, which in quantity represent almost 13%. This could even improve your revenue and profitability. On the other hand, there is the high number of complaints, which apparently more than 90% of them correspond to billing problems. By applying better controls, this could be reduced and thus improve the company's image. It is also seen that the company has problems for the execution of investments, which according to what has been evaluated does not exceed 45% of execution, a situation that if there are no corrective measures in the medium term, on the one hand, will complicate the operation of the infrastructure and will generate infrastructure capacity gaps, directly affecting continuity. pressure, hedging and losses among other indicators.

A critical aspect facing the company is the limited capacity for wastewater treatment, a situation that has been aggravated by previous attempts to build new infrastructure that have not borne fruit. To reverse this scenario, it is essential that the company manages joint solutions with the Ministry of Housing, Construction and Sanitation (MVCS), with Pro-Inversión, or with national or international financial entities with the aim of developing a project according to the needs, technology and cost demanded by the company. The urgency of these actions lies in the fact that, in the event of an eventual closure of the Southern Cone treatment plant that demands high operating costs, they have low treatment capacity and because it has already been reached by urban development, the processing capacity would fall to 68% today, and it is estimated that in a decade this figure would decrease to 58%. which would represent an operating deficit of great magnitude for the region.

The most critical challenge facing management is obtaining new water sources, a problem that already significantly affects the continuity of supply, limiting it to only 17 hours a day. Currently, the company operates with a deficit of 219 liters per second, which is equivalent to 20% of its total production, but the future outlook is even more worrying. According to projections, in three decades the shortage could reach 577 liters per second, which is equivalent to 80% of the current capacity, this would affect indicators of coverage and continuity pressure and water losses, clandestine and delinquency would increase, specifically the issue of continuity could be reduced to critical levels of just 5 to 8 hours a day. On the other hand, it is vital to consider that any macro works project and often multipurpose works have very long maturation periods from the conception of the project to its entry into operation, During these 10 years the production deficit should have already increased from 21% to 32%.

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