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# CAMBODIA PRIVATE WATER OPERATOR (PWO) BUSINESS PROFILE

## Water, Sanitation, and Hygiene Finance (WASH-FIN)

**DECEMBER 2023**

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## **ACRONYMS AND ABBREVIATIONS**

CWA	Cambodian Water Supply Association
HH	Household
MFI	Microfinance Institution
MISTI	Ministry of Industry, Science, Technology & Innovation
NGO	Nongovernmental Organization
NRW	Non-Revenue Water
OCCR	Operating Cost Coverage Ratio
PDISTI	Provincial Department of Industry, Science, Technology & Innovation
PE	Polyethylene
PWO	Private Water Operator
USAID	United States Agency for International Development
WASH-FIN	Water, Sanitation, and Hygiene Finance

## **ABSTRACT**

Over the past two decades, the number of private water operators (PWOs) in Cambodia has increased, helping to bridge the service delivery gap in the water sector. This brief summarizes findings from a survey on PWO water service provision designed to generate updated data on PWO business models to understand the latest trends, opportunities, and challenges for future efforts to expedite piped service delivery of safe and reliable water in Cambodia. Access to finance has long been considered an important component in helping PWOs to build their business and expand service coverage. The survey looks closely at PWOs' access to finance while also examining mechanics of the business. Findings show that licensed PWOs are accessing finance, even as collateral requirements and interest rates are routinely identified as key barriers. PWO investment in the Cambodian water sector is sizable and primarily from private sources. Performance indicators improve with increases in PWO years in business and number of connections. However, the household coverage rate is low, and growth in household connections is slow. PWOs face additional challenges around frequent pipe breakage and leaks due to external factors, variability and high costs of electricity and maintaining regular water quality testing. Still, PWO owners' outlook on their businesses and prospects for the future remains positive. The brief concludes with the recognition that increasing household access to reliable piped water supply requires multiple levels of support and encourages exploration of new incentive structures to overcome challenges.

## 1.0 INTRODUCTION

Piped water access in Cambodia is limited, reaching an estimated 30 percent of the population. At present, piped water provision is performed by state-managed providers, community-based systems, and private water operators (PWOs). PWOs emerged on the scene in the 1990s in response to inadequate access to piped water provision via the public sector. Since then, PWOs have grown in number and influence. Currently, 600–650 established PWOs (licensed and unlicensed) provide over 50 percent of the piped water consumed nationally.

For the country to see growth in safe and reliable water access, the status quo around water supply requires further attention. This brief was informed by findings from a survey on PWO water service provision designed to understand trends, opportunities, and challenges across a robust dataset. An emphasis is put on understanding business performance and access to finance to enable growth. The survey pulls on lessons learned and the experience of the United States Agency for International Development (USAID) Water, Sanitation, and Hygiene Finance (WASH-FIN) Cambodia Activity, which implemented the survey.<sup>1</sup> In Cambodia, the USAID WASH-FIN project, with its partner, the Cambodian Water Supply Association (CWA), worked with PWOs in Cambodia to address their challenges to access finance.<sup>2</sup>

### 1.1 PWO BACKGROUND AND ENABLING ENVIRONMENT

PWOs often take the form of small family-run businesses that develop and operate private water systems. PWO evolution came about in an ad hoc fashion. Closer government regulation of PWO operations began in 2014 with regulation (Prakas) No. 461, which outlines the procedures for issuing, revising, suspending, and revoking permits for water supply, and increased license terms from three to 20 years. The longer term allows PWOs a more realistic timeframe to meet the license service coverage requirements and better plan for and generate sufficient revenue for capital investments and growth (USAID 2022). To date, there are 377 PWOs licensed through the Ministry of Industry, Science, Technology & Innovation (MISTI), the main entity responsible for the oversight and monitoring of both the public and private operators (MISTI 2022).

While PWOs play a major role in closing the demand gap for water, they face an array of challenges. For instance, receiving a new PWO license often requires long wait times and an opaque review process. PWOs face difficulty in establishing commercially viable service provision due to capital investment constraints and limited technical capacities (i.e., engineering, water quality, operational performance management experience) required to grow their business effectively and sustainably (MISTI 2022). Potential lenders are unfamiliar with the piped water supply business, contributing to reluctance to lend to PWOs without high collateral requirements and high interest rates, which pose a challenge for PWOs. Banks often require physical collateral (e.g., land and buildings) with a value equal to 100 to 300 percent of the loan and that property titles be kept at the bank even after a collateral assessment (USAID 2018).

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<sup>1</sup> The main objectives of WASH-FIN as a global activity are to close financing gaps to achieve universal access to water and sanitation and to increase the potential to reach additional beneficiaries at scale. The program has been implemented in Cambodia, Kenya, Mozambique, Nepal, the Philippines, Senegal, South Africa, and Zambia. In Cambodia, WASH-FIN's administrative and technical closeout wrapped up in March 2022.

<sup>2</sup> Five PWOs closed 14 loan transactions between 2019–2021, with a few contributing additional own equities in their businesses. The total value of these transactions and own equity contributions is just over US\$4.1 million.



## 1.2 SURVEY OBJECTIVE

The survey is an initial large-scale effort to re-examine the PWO business model and generate updated data to inform future efforts to expedite piped service delivery of safe and reliable water in Cambodia. Access to finance is a critical piece of the puzzle in helping PWOs to build their business and extend their service. The survey takes a particularly close look at PWOs' access to finance while also taking stock of current PWO service coverage, business motivation, and outlook for the future.

## 1.3 SURVEY METHODOLOGY AND ANALYTICAL APPROACH

WASH-FIN implemented the survey with CWA to capitalize on their deep relationship with PWOs. This partnership also lends credibility to the results of the survey, ensuring buy-in and long-term accountability. CWA compiled a master list of PWOs using information collected from MISTI and CWA totaling 377 licensed PWOs and PWOs in the process of getting a license. The activity initially planned to pull from a sample of the 600–650 PWOs operating in Cambodia. However, the survey pivoted to focus on the 377 PWOs mentioned above to avoid accessibility concerns around unlicensed PWOs. Within this subset of the larger group of PWOs operating in Cambodia, a sample size was set to 150 to account for the short survey collection timeline while allowing for a 95 percent confidence interval with a margin of error under 10 percent.

WASH-FIN randomly selected PWOs through a stratified approach by province. Fifteen enumerators conducted interviews over a period of two weeks. In cases where a PWO declined to be interviewed, the next PWO in the randomized list was selected. Additionally, two provinces were skipped due to accessibility in reaching them in a timely manner and because of the low quantity of PWOs in those provinces. In total, 152 PWOs were interviewed.

Surveyors endeavored to meet with PWO owners as the respondent, but if they were unavailable, they instead interviewed managers or other employees. Approximately 63 percent of the interviewees were PWO owners, 31 percent were managers, and the remaining six percent fell into the “other” category. In some cases, during and after interviews, the owner was contacted via phone for specific questions and clarifications.

For the analysis, statistics were generated across all PWOs interviewed, with disaggregation by size and age of the business. Not all PWOs responded to all questions, resulting in fewer than 152 PWO responses in some cases. The size disaggregation was determined based off the five official PWO size categories in Cambodia (see Table 1) set forth for PWOs according to household connection numbers. The last column of Table 1 shows the number of PWOs surveyed according to each type. Small PWOs with 501–2,000 household connections make up the majority of PWOs surveyed.

Additional disaggregation was conducted during analysis based on PWO age (i.e., number of years in operation). PWOs were divided into three groups according to the start date of PWO operations (see Table 2). The intent was to try and establish a snapshot of PWO performance and experience at different stages of growth and business development. Often it can take three to four years for PWOs to develop their business and start to recover their costs. Meanwhile, PWOs with over 10

**Table 1: PWO Size Classification Based on Household (HH) Connections**

Type of PWO	HH Connections	Number of PWOs Surveyed
Micro	0–500	25
Small	501–2,000	90
Medium	2,001–5,000	26
Fairly Large	5,001–10,000	7
Very Large	>10,001	4

**Table 2: Cataloging of PWOs According to Business Start Date**

PWO Age	Number of PWOs Surveyed
2019–2022	37
2013–2018	61
2012 and before	54



years of operating experience tend to be in a stronger position and with sustainable business operation, positioning them for higher coverage expansion.

## 2.0 OWNER AND BUSINESS OVERVIEW

A key research question the WASH-FIN team considered was how PWO owner background and business structure helped predict the sustainability of PWO businesses. A 92 percent majority of all PWOs surveyed provide piped water service as their sole water service, with the remainder providing an additional water service, such as bulk water service, bottled water, water truck distribution, pushcarts with water, etc. Fourteen percent of PWOs manage more than one system. Out of the 95 PWO owners interviewed, 65 percent said the PWO is their main source of income and 41 percent said they had previous experience in the water sector prior to starting the business. Owners' rationale and motivation for starting a water business include demand for water in the community and desire to contribute to improved health of local people, interest in the water sector, potential profit and attractiveness of the long-term opportunity, and financial support through nongovernmental organizations (NGOs) or subsidy, among other reasons.

All PWOs interviewed were asked their opinion on the water license. Over 93 percent of PWOs think the national water license is an incentive for good performance. While the majority of PWOs do not find it difficult to meet license implementation requirements (achieving and reporting on performance requirements around coverage, water quality, etc.), 20 percent said it was hard. Seventy-six percent of PWOs report operational data to MISTI. The top three advantages and disadvantages, according to PWOs, to having a national water license is shown in Table 3. PWOs considered exclusivity of water rights and credibility as advantages, and over 50 percent of PWOs say there are no disadvantages.

**Table 3: Water License Advantages and Disadvantages<sup>3</sup>**

Top Three Advantages	Percent of PWOs	Top Three Disadvantages	Percent of PWOs
Exclusivity of rights to provide/operate water service in the area	82%	No disadvantages	52%
Credibility to the establishment among customers and suppliers	59%	Additional costs such as fees and taxes	33%
Ability to use a water source legally	37%	Being subject to additional reporting and other requirements	27%

<sup>3</sup> PWOs were asked the advantages and disadvantages to having a national license. They had the option to select multiple answers.

## 3.0 WATER SOURCE, QUALITY, AND PRODUCTION

### 3.1 WATER SOURCE

The majority of PWOs (88 percent) use surface water (rivers, ponds, lakes, springs, and streams) as their main source of water for distribution, and the remainder use ground water (wells and boreholes). In terms of accessibility to the water source, 84 percent of PWOs report complete access to their primary water source. In most cases, PWOs with less than 100 percent access to their primary water source have a secondary water source. When asked about the top problems faced for operations and growth, only 11 percent of PWOs said limitations in the water source.

PWOs were asked about changes in their water source to understand environmental and climatic impact on supply. Forty-two percent of PWOs said they experienced a change in their water source compared to the same month a year ago. Of the PWOs that indicated there was a change, the majority responded that the main change was more water. The main causes for the changes were an increase in rain and flooding. In terms of whether the change in water source condition impacted operation, 16 percent of all surveyed PWOs said their operation was reduced.

It is important to note the timing of survey implementation. It was implemented at the end of October and beginning of November, which is the end of the rainy season in Cambodia. As such, it is possible that respondents were in the mindset of having more water. Qualitative information collected separately from the survey during the WASH-FIN project indicates that some PWOs experience problems around water source reliability. In particular, this is seen in the dry season, when demand for water increases from households; at the same time, there are reduced surface water levels due to less rain, and groundwater is limited. In response, some PWOs are investing in land to build reservoirs and ponds for increased storage, but this is costly and the application process for water storage rehabilitation is long.

### 3.2 WATER QUALITY

Water testing for treated piped water in Cambodia is done by MISTI's lab through the provincial department of Industry, Science, Technology & Innovation (PDISTI) and by PWOs themselves using their own testing kits. PDISTI is responsible for collecting samples for testing the water quality of PWOs on a quarterly basis. PWOs are supposed to test water daily using five standards set by MISTI. Seventy-seven percent of PWOs said they perform their own water quality tests at site. Thirty-seven percent of PWOs carry out daily water testing, and older and larger PWOs test more regularly, as shown in Tables 4 and 5. Of the PWOs that do not test, 85 percent said it is because they lack the equipment.

**Table 4: PWO Water Testing Frequency (%) Disaggregated by PWO Size**

	Percent of PWOs	Micro (0–500)	Small (501–2,000)	Medium (2,001–5,000)	Fairly Large (5,001–10,000)	Very Large (>10,001)
Every day	37	10	30	62	86	100
Weekly	21	18	24	19	14	0
Once a month	13	24	13	8	0	0
2–3 times per year	4	4	5	0	0	0
Other	3	0	3	8	0	0
Don't Test	23	44	25	4	0	0

**Table 5: Water Testing Frequency (%) Disaggregated by PWO Years in Operation**

	Percent of All PWOs	2012 and Before	2013–2018	2019–2022
Every day	37	45.4	34.4	27.0

Weekly	21	21.3	21.3	20.3
Once a month	13	13.0	14.8	10.8
2–3 times per year	4	2.8	4.9	2.7
Other	3	0.9	6.6	0.0
Don't Test	23	16.7	18.0	39.2

The survey team asked respondents their perspective on water quality at the PWO. Ninety-six percent of PWOs said that the water they supply meets drinking water quality standards. Fifty percent of PWO respondents noted receiving complaints regarding the quality of water service provided to clients. The main complaints include bad color and taste of chlorine.

### 3.3 WATER PRODUCTION

PWOs provide regular water service to customers. The average number of hours of service during both dry and rainy seasons is roughly 22 hours, with the median being 24 hours. Compared to two years ago, PWOs reported essentially no change in the number of hours they supply water.

PWO responses on water production vary in terms of reliability and accuracy, as several PWOs do not have main meters, and some that have main meters do not use them when estimating their production. As such, PWO capacity to accurately estimate their water production is mixed. Seventy-six percent of surveyed PWOs have main meters, but only 57 percent of PWOs said they use the main meter to calculate water production.<sup>4</sup> Table 6 shows water production and sales across differently sized PWOs. The sales-to-production ratio did not change significantly between seasons. A production growth rate was calculated according to the growth between PWO size categories. As PWOs increased in size category, the production growth rate tended to reduce, with some fluctuation.

**Table 6: Average Water Production and Sales in m3**

PWO Size	Annual Production	Production Growth Rate	Annual Sales	Sales Growth Rate
Micro (0–500 HHs)	36,938	N/A	28,793	N/A
Small (501–2,000 HHs)	142,668	74%	105,133	73%
Medium (2,001–5,000 HHs)	397,489	64%	336,617	69%
Fairly Large (5,001–10,000 HHs)	1,456,975	73%	1,104,637	70%
Very Large (>10,001 HHs)	3,396,000	57%	2,784,000	60%

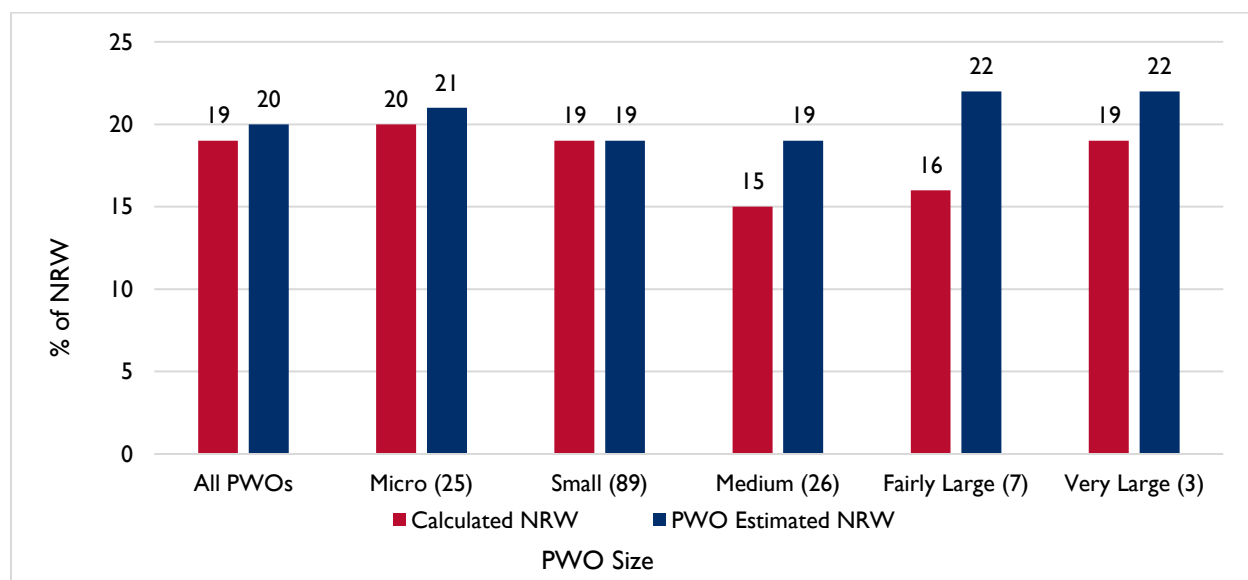
<sup>4</sup> Twenty-eight percent of PWOs said they calculate water production based on the capacity to pump while the remaining 15 percent use their own estimations or other means.

## 4.0 OPERATIONAL AND FINANCIAL EFFICIENCY

Operational and financial efficiency indicators are important for understanding PWO business health and ability to expand coverage and access to finance. Key indicators covered include non-revenue water (NRW), staff-to-1,000 connection ratio, and operating cost coverage ratio (OCCR), among others.

### 4.1 NON-REVENUE WATER

NRW is an important indicator for measuring the technical and commercial efficiency of water service operations. Production and consumption estimates are used to calculate NRW. Not all PWOs are able to accurately track their water losses due to the absence or lack of use of main meters to monitor production, limited record-keeping, etc. In some cases, consumption is used to predict production rates. To account for these potential NRW inaccuracies, two options for NRW calculations are provided for context in Figure 1. First is the direct estimate provided by PWOs asked about their monthly distribution system losses as a percentage of the total amount of water provided to the network. Second is the calculation of NRW using PWOs' production and consumption estimates. The different modes of assessing and disaggregating NRW result in similar NRW averages of 19 and 20 percent. This indicates that PWOs have a good sense of their NRW. Figure 1 shows the breakdown of NRW calculations for PWOs according to size. The average PWO NRW of 19–20 percent is relatively low compared to global numbers. For instance, 2021 data for 62 countries from the UN-Water GLAAS data portal shows the average NRW at 38 percent (World Health Organization n.d.). The lower-than-average NRW for PWOs is likely related to the small size of PWOs compared to other service providers around the world.



**Figure 1: PWO Non-Revenue Water (the number of PWO respondents are shown in parentheses after the size categories)**

A major problem PWOs face throughout the country is the destruction of pipes due to road construction and/or other infrastructure projects. This was confirmed by PWOs when asked the most common problems experienced with the network and/or equipment (Table 7) and also through regular engagement with PWOs under the WASH-FIN Activity. In these cases, there is often no restitution by those that damage the pipes, and PWOs must reinvest in pipe replacement on their own. The vast majority of PWOs (98 percent) responded that they have high-density polyethylene (also called polyethylene [PE]) pipes, with 37 percent of those with PE pipes also confirming use of polyvinyl

chloride pipes. Pipe depth across averages approximately .5 m<sup>3</sup>. Pipe depth did not appear to correlate to NRW.

**Table 7: Top Recurrent Problems Faced by PWOs**

Challenge	Percent of PWOs
1. Pipe breakage due to external causes	91
2. Electricity cutoff or overload	58
3. Pumps	30

The ability to identify leaks quickly is important for water service providers for detecting system issues, such as broken or damaged pipes, and reducing water losses. PWOs were asked whether they have a leak detection program and 75 percent responded affirmatively. However, only three percent of

respondents said they used automation software for leak detection. The majority of PWOs defined their leak detection program as an estimate between production and distribution or through individuals and local authorities informing them about leakage. When PWOs were asked if they experience problems within their network and/or with equipment that can lead to stops in service, 46 percent of PWOs indicated that this happens at least once a month, with some indicating a higher frequency (see Table 8). In cases where service is halted, 77 percent of PWOs are able to fix the problem and rarely need external assistance.

**Table 8: Frequency of Problems That Lead to a Stop in Service**

Responses	Percent of PWOs
1. % Rarely (less than one time a month)	45
2. % Frequently (one or more times a week)	26
3. % Not so frequently (one or two times a month)	20
4. % Very often (daily or almost daily)	9

#### 4.2 STAFF-PER-1,000 CONNECTION RATIO

The staff-per-1,000 connection ratio is generated as an indicator for water service provider efficiency and management. The international standard sits around 2 staff-per-1,000 but often five to eight staff-per-1,000 connections could be acceptable (OECD 2009; ESAWAS 2021). However, benchmarking standards depend on the conditions in the country (density of coverage, treatment systems, etc.) and size and type of provider. Across all PWOs interviewed, the staff-per-1000 connection ratio averages 5.4. Considering PWOs are small private providers, financed with owners' equity, the 5.4 average is assumed to be a reasonable benchmark. Furthermore, the staff-per-1,000 ratio improves as PWOs increase in size and number of years in business (see Table 9 and 10). Longer established and larger PWOs should be more efficient with better management systems and higher labor productivity. Micro PWOs have a higher average staff-per-1,000 due to the low number of connections combined with the likelihood that many are new PWOs (with fewer years in operation).

**Table 9: PWO Average Staff Number and Staff-per-1,000 Connections Disaggregated by PWO Years in Operation**

PWO Years in Operation	Average Number of Full-time Staff	Average Staff/1,000 Connections
2019–2022	4.8	8.5
2023–2018	5.8	5.5
2012 and before	7.5	3.2

**Table 10: PWO Average Staff Number and Staff-per-1,000 Connections Disaggregated by PWO Size**

PWO Size	Average Number of Full-time Staff	Average Staff/1,000 Connections
Micro (0–500 HHs)	3.7	12.3



PWO Size	Average Number of Full-time Staff	Average Staff/1,000 Connections
Small (501–2,000 HHs)	6.7	4.5
Medium (2,001–5,000 HHs)	15.3	3.3
Fairly Large (5,001–10,000 HHs)	17.1	2.6
Very Large (>10,001 HHs)	19.8	1.7

### 4.3 FINANCIAL RECORDING

Proper record-keeping is important to ensure accuracy of financials and production estimates. For PWOs, exact record-keeping of financial information is limited and varies. This can seriously impact business operations, growth, and access to finance—where PWOs are expected to submit their financial records to potential lenders as part of the loan application. Even for PWOs that keep records, they may not keep them in an orderly way on a computer, which can contribute to accuracy and streamlining issues. Many responses to revenue and expense questions were largely estimates. Across the PWOs, 68 percent said they have accounting staff. The majority of PWOs keep account of their revenues and expenses, but only approximately 50 percent keep automated records. Table 11 shows the breakdown of record-keeping for revenues and expenses.

*Table 11: PWO Record-keeping for Revenues and Expenses*

Preparation of Monthly Account of Revenues and Expenses	Percent of PWOs
Preparation of monthly account of revenues	89%
Keep monthly account of revenues on a computer	54%
Preparation of monthly account of expenses	80%
Keep monthly account of expenses on a computer	51%

### 4.4 OPERATING COST COVERAGE RATIO

To get a better sense of PWO financial performance, an OCCR, which is shown in disaggregated form in Table 12, was generated. OCCR is an indicator for operational efficiency and financial sustainability of a water service provider but not necessarily creditworthiness. It compares total operating revenues to operating expenses, excluding depreciation and finance costs and taxes. Expenses for PWOs include maintenance, labor, water treatment, electricity, etc. The OCCR tables below show an average OCCR of 1.52. Given the loose record-keeping of PWOs, these numbers were further validated through additional calculations of OCCR using a revenue calculation based on consumption, average tariff, and a 95 percent collection ratio, resulting in an average OCCR of 1.44.

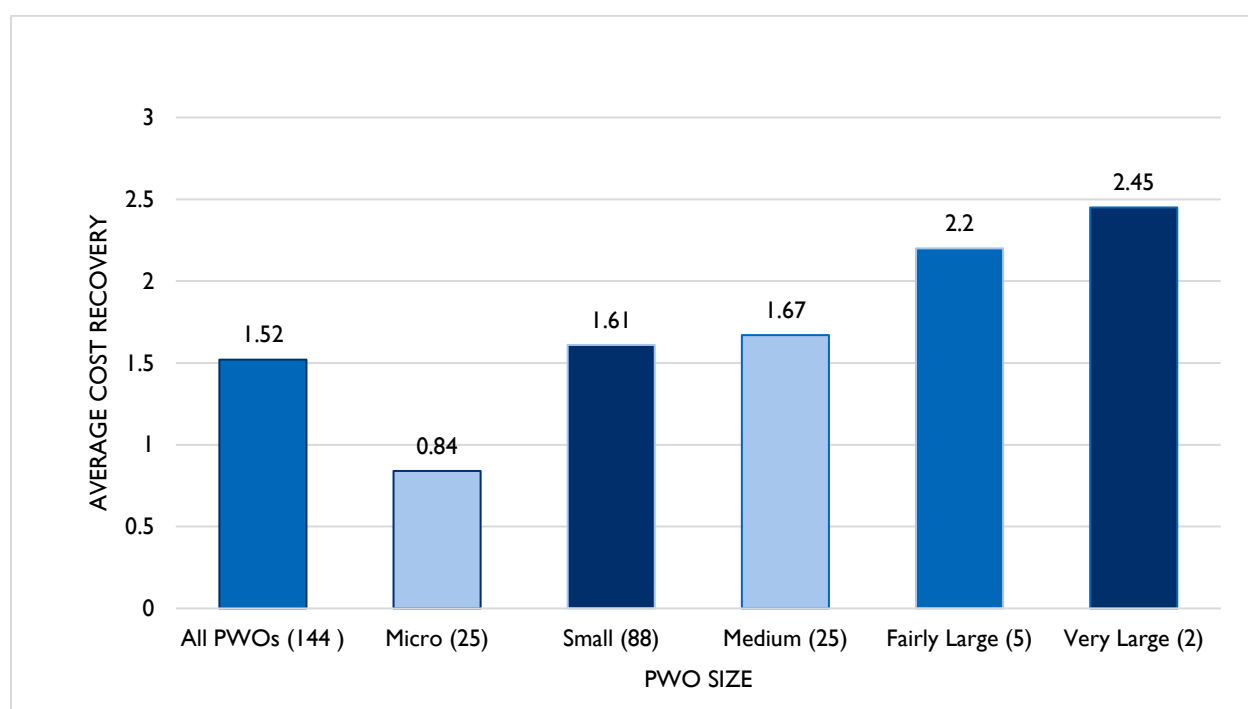
OCCR is often grouped into three broad categories along the financial sustainability spectrum, shown in Table 12. Operationally viable water service providers can see varied OCCRs; some recommendations are for an OCCR of 1.2 or better, giving them 20 percent additional cash to buffer for future expenses and service debt (Goksu et al. 2019). However, there are operationally viable water service providers with OCCRs below 1.2.

*Table 12: OCCR Descriptions*

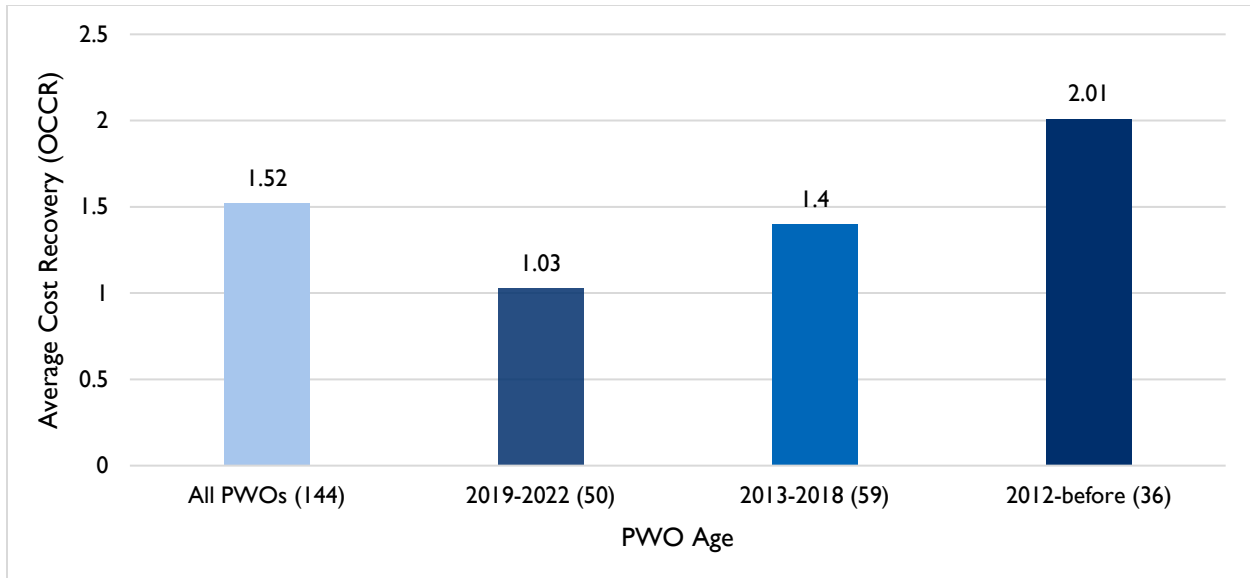
OCCR	Category Description
<1	Lower-tier service providers. Per the World Bank, an OCCR of 1.0 “means that the utility is just covering its operational expenses but not any other charges. As such, it is incurring a financial viability gap which can mean that either (i) the provider is inefficient with many performance

OCCR	Category Description
	problems; (ii) tariffs are too low; or (iii) the providers are inherently unviable” (World Bank 2017).
1.0–1.5	Water service providers with an OCCR between 1.0 and 1.5 that have some level of cost recovery.
>1.5	An OCCR above 1.5 indicates that a service provider is well positioned to access commercial finance (World Bank 2017).

Micro PWOs have an average OCCR below 1.0, and Small PWOs’ average OCCR rests just at the boundary of cost recovery and financial sustainability. Larger PWOs are substantially financially stronger, with OCCRs above 1.5 and in many cases above 2.0 (Figure 2). OCCR is noticeably low for younger PWOs and increases with age. PWOs operating for four years or less (often many Micro PWOs) have an OCCR around 1.0, while PWOs with 10 or more years of experience have an average cost recovery of 2.01 (Figure 3).



**Figure 2: PWO Cost Recovery (OCCR) Disaggregated by PWO Size (the number of PWO respondents are shown in parentheses after the size categories)**



**Figure 3: PWO Cost Recovery (OCCR) Disaggregated by PWO Age (the number of PWO respondents are shown in parentheses after the years)**

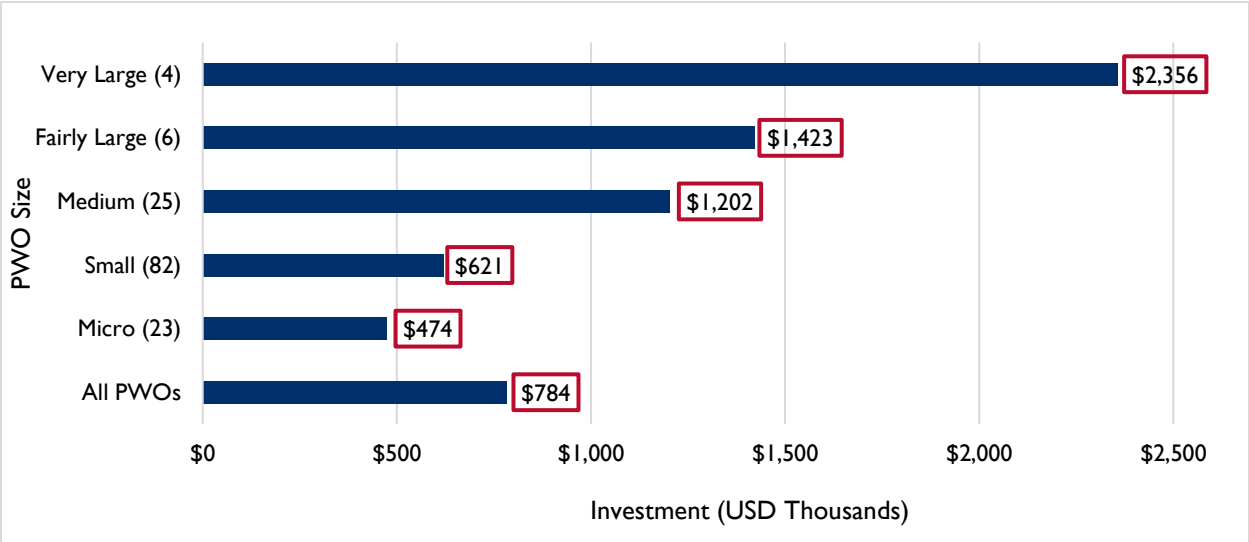
The above data speaks to the amount of time it takes a PWO to become operationally and financially viable. At the same time, OCCR is not an exact measure for creditworthiness and viability. In the case of PWOs surveyed, Table 13 shows the average monthly OCCR of PWOs that successfully accessed a commercial loan disaggregated by PWO business start date. Many PWOs with commercial loans have OCCRs under 1.5 and 1.2, which may be due to PWOs needing financing to start and expand their business early on.

**Table 13: PWO OCCR Disaggregated by Commercial Loan Access**

PWO Years in Business	Number of PWOs with Commercial Loans	Average OCCR
2012 and before	38	2.09
2013–2018	45	1.44
2019–2022	26	1.16

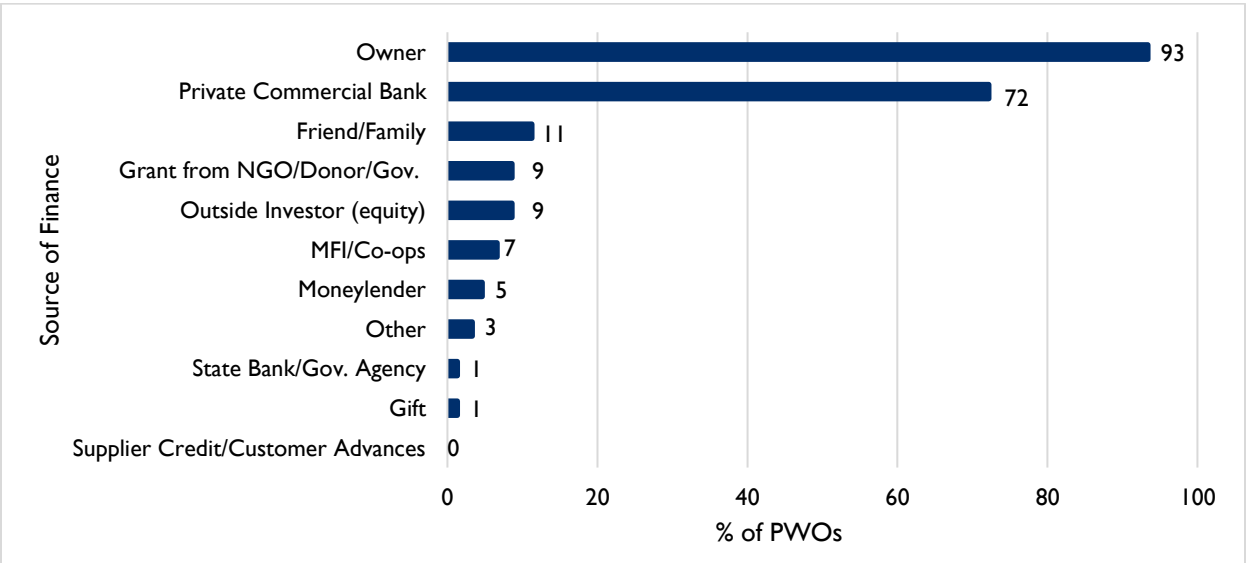
## 5.0 INVESTMENT AND FINANCING

PWOs are the primary investors in their water system infrastructure. The estimated cumulative total cost of investment since the beginning of PWO operation (i.e., the total investment cost) across PWOs that provided data is US\$109,808,769. The average total investment cost is US\$784,348 per PWO. Investment costs range significantly across PWOs, dependent on size as shown in Figure 4. In the last year alone, PWOs surveyed said they spent a cumulative total of approximately US\$14,500,000 on their water systems.



**Figure 4: Total Investment Costs Based on PWO Size (the number of PWO respondents are shown in parentheses after the size categories)**

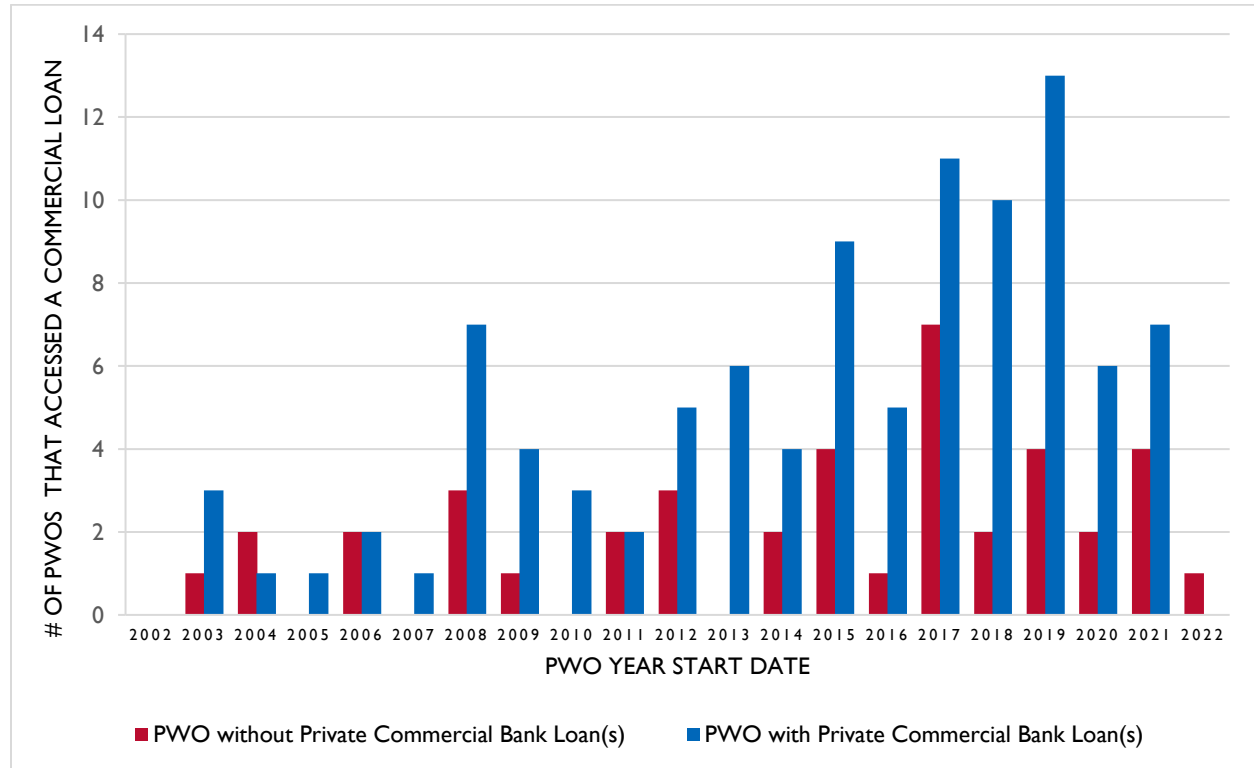
PWOs were asked to indicate all the sources of finance they have ever used to invest in their business from startup through later expansion. Figure 5 shows the breakdown of the percentage of PWOs that used different financial resources. Ninety-three percent of PWOs have invested personal funds in their business.



**Figure 5: PWO Source of Finance**

## Commercial Banks

Following owner investment in the system, the next most common financing option is borrowing from commercial banks. Seventy-two percent of PWOs reported accessing private commercial bank loans (Figure 5). Access to finance has long been a challenge for PWOs, but recently banks have warmed up to the water sector. This can be observed in Figures 6 and 7, which illustrate a rise in the number of PWOs taking out loans over the last decade. This corresponds with both the updated licensing regulation and growth in the number of PWOs.



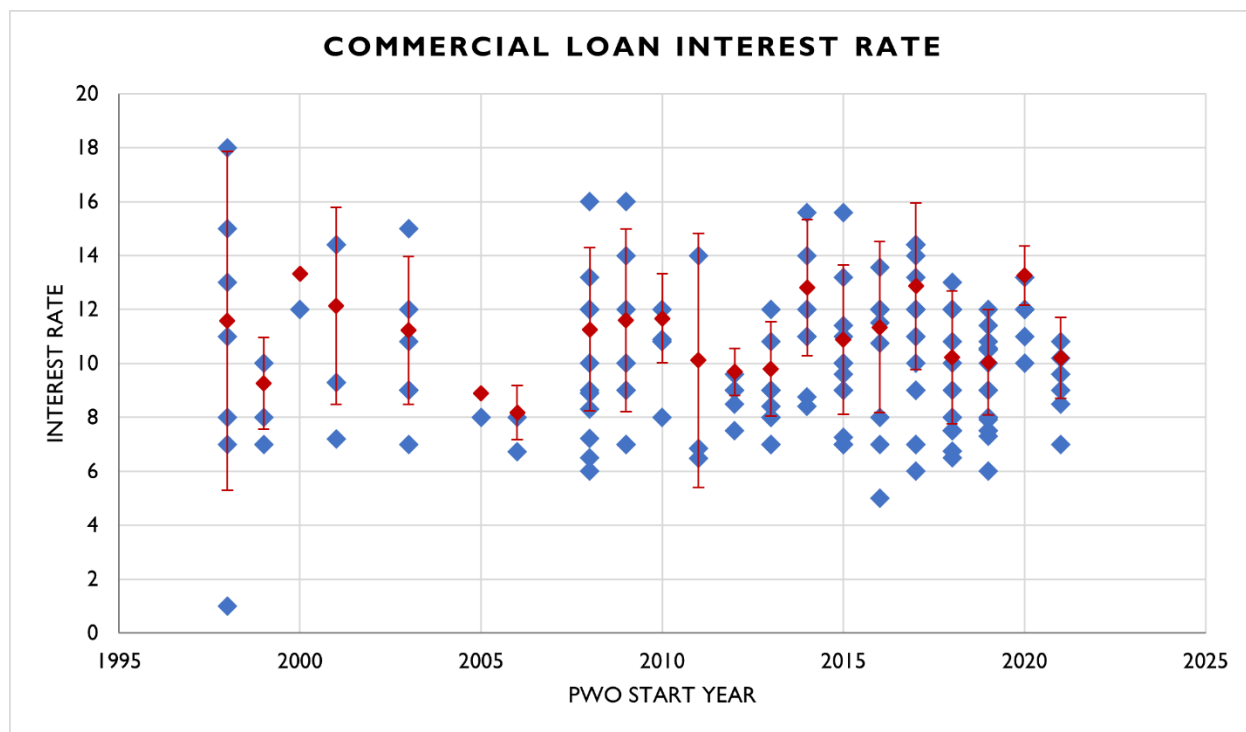
**Figure 6: PWO Commercial Bank Financing According to Their Start Date**

While 72 percent of PWOs indicated they borrowed from commercial banks, only 66 percent (101 PWOs) provided details about these commercial bank financial transactions. Table 14 includes a factsheet on the commercial loan data provided by PWOs.

**Table 14: PWO Commercial Loan Data**

Loan Information	Data (101 PWO Respondents)
Percent of PWOs with multiple loans	48%
Cumulative number of loans	181 loans
Cumulative value of all loans	\$38,173,842
Average loan amount	\$215,671
Median loan amount	\$100,000
Percent of refinanced loans	35%
Percent of loans requiring collateral	97% (primarily land and/or buildings)
Average tenure	78 months
Average interest rate	10.1%

Figure 7 shows the commercial bank interest rates on PWO loans plotted against the start of business date for PWOs with the red points marking the average. The interest rate does not appear to show any significant trend but crowds around 10 percent as noted in Table 14.



**Figure 7: Commercial Loan Interest Rate over Time**

### Microfinance, Cooperatives, Credit Unions

Ten PWOs indicated receiving financing from a microfinance institution (MFI), cooperative, or credit union. Seven PWOs provided data on a total of 13 loans, totaling US\$2,366,000. The average loan size was US\$182,000, and median loan size was US\$105,000. The average tenure was 91 months and average interest rate was 11 percent. This data points toward a longer tenure than commercial banks with a slightly higher average interest rate.

### Government Agencies, NGOs, and Development Partners

Roughly nine percent of PWOs received funding in the form of grant money from government entities, NGOs, or development partners. Less than two percent of PWOs had borrowed from a state-owned bank or government agency, with two PWOs accessing a total count of four loans. The sum of all loans was US\$175,000, averaging US\$43,750 per loan.

### Informal Finance

Sixteen percent of PWOs said they have applied or requested a loan from an informal source, with seven PWOs affirming they accessed 10 loans through money lenders. The sum of all loans from money lenders is US\$440,000, and the average loan size was US\$44,000. The average tenure across seven loans was 21 months, and the average interest rate across the 10 loans was 20 percent. The tenure is much shorter than the previously mentioned sources of finance, with significantly higher interest rates, double that of commercial rates. The low uptake of such loans can also be attributed to the length of time required for water infrastructure and rehabilitation projects that do not see an immediate payback.



## PWO Finance Challenges

In 2018, the WASH-FIN Cambodia Activity assessed the investor landscape to develop a picture on the state of financing for PWOs in Cambodia and produced the Cambodia Investor Landscape Assessment Report (USAID 2018). The assessment reports that banks in Cambodia use collateral as the main credit risk management strategy, resulting in high collateral requirements of 100 to up to 300 percent of the loan value (USAID 2018). Often banks prefer hard collateral, such as formally registered land and buildings, compared to soft collateral (i.e., informally registered land) and want property titles kept at the bank. Banks and MFIs interviewed in the Investor Landscape noted concern over limited collateral availability and poor accounting practices of PWOs with financial records in a format not conducive to commercial bank review (USAID 2018). The financial record-keeping issues were further identified by the WASH-FIN Activity through technical assistance to PWOs to prepare business plans and financials as part of an application for a bank loan.

The PWO survey results corroborate the investor perspectives and WASH-FIN technical assistance experience. PWOs that borrowed money from a formal financial institution were asked the main challenges to accessing the finance. Table 15 shows the top challenges were high collateral requirements and high interest rates. For the PWOs that accessed commercial loans, close to 100 percent had collateral requirements, and 97 percent of collateral included land and buildings. For PWOs that borrowed money from an informal source, 76 percent said that the main challenge was high interest rates, and 16 percent said that it was the risk on repayment.

**Table 15: Challenges to Access Finance from Formal Financial Institutions**

Challenges	Percent of PWOs
1. High collateral requirements	27%
2. High interest rates	23%
3. No challenges	22%

## PWO Future Investment Planning

Eighty-three percent of PWOs are considering an investment in fixed assets over the next 12 months, for a cumulative investment of US\$23,002,000 and an average of US\$209,000 per PWO. For 67 percent of PWOs, the main purposes of the investments are to expand operations to serve new clients compared to 32 percent who said the main purpose is improving existing operations to provide better service and/or enhance technical efficiency. Table 16 ranks PWO objectives for potential upcoming investment needs. The majority of PWOs (61 percent) said their specific objective of the investment would be expanding and/or refurbishing pipelines.

**Table 16: PWOs' Main Objectives of Future Investment over the Next 12 Months**

Objective of Investment	Percent of PWOs
1. % Expanding and/or refurbishing pipelines	61%
2. % Buying and/or refurbishing water storage tanks	15%
3. % Buying and/or refurbishing water treatment systems	11%
4. % Other	6%
5. % Drilling and/or refurbishing deep wells	3%
6. % Buying and/or refurbishing other equipment (vehicles, etc.)	2%
7. % Buying and/or refurbishing premises (excluding for private purposes)	1%
8. % Buying and/or refurbishing pumps	1%
9. % Buying and/or refurbishing water distribution vehicles	0%

## 6.0 CUSTOMERS

The average PWO coverage rate (current households covered compared to all households included in the license [i.e., potential coverage]) is 40 percent. Tables 17 and 18 show the number of connections, coverage rate, and growth rate for PWOs disaggregated by size and start date. As PWOs increase in size and age, their coverage rate increases. Medium-to-Large PWOs, which constitute approximately a quarter of respondents, show an average coverage rate of 50 percent or over, with a similar figure for median coverage. PWOs with 10 or more years in operation, consisting of a third of respondents, have a similar coverage rate just under 50 percent.

PWOs' piped water connections show slow growth over time. For household connections, the median annual growth rate is six percent, and the average growth rate is 28 percent. The median is included here for measurement benchmarking, as the averages appear skewed due to the rapid growth rates typical of newer PWOs in their early business years combined with a couple Fairly Large PWO expansion projects. The average number of new connections per month is 21 with a median of six. Notably, Micro PWOs and PWOs with a business start date after 2019 demonstrate a higher growth rate given their recent operational start and initial expansion in the early years. The Fairly Large PWOs category, which is notably few, also experienced a significant expansion at one or two PWOs, which skewed numbers toward a higher average growth rate considering that the median was two percent.

**Table 17: Coverage Rate by PWO Connections**

PWO Size	Average Number of Connections	Average Coverage (%)	Median Coverage (%)	Average Growth Rate (%)	Median Growth Rate (%)
Micro (0–500)	269	28%	32%	65%	6%
Small (501–2,000 HHs)	1,037	38%	44%	14%	7%
Medium (2,001–5,000 HHs)	2,922	50%	50%	8%	6%
Fairly Large (5,001–10,000 HHs)	6,569	56%	50%	163%	2%
Very Large (>10,001 HHs)	11,637	57%	80%	6%	2%

**Table 18: Connections and Coverage Disaggregated by PWO Start Date**

PWO Age	Average Number of Connections	Average Coverage (%)	Median Coverage (%)	Average Coverage Growth Rate (%)	Median Coverage Growth Rate (%)
2019–2022	792	28%	17%	63%	16%
2013–2018	1,306	39%	33%	8%	5%
2012 and before	2,859	48%	47%	29%	6%

PWOs described 69 percent of the areas they serve as rural, 22 percent as peri-urban, and 9 percent as urban formal settlements. When asked the main reason that households do not connect, 71 percent of PWOs responded that it was due to access to another water source, with 17 percent attributing the reason to money. For poor households specifically, PWOs largely cited a lack of money and existence of other water sources as more balanced rationales. In Table 19, PWOs shared multiple approaches to encourage poor households to access piped water supply, with 53 percent offering a lower connection fee as the top approach. The average connection fee is US\$68, but the data shows that it declines slightly as the PWO's number of years in business increases.

**Table 19: PWO Approaches to Encourage Poor Households to Connect to Piped Water**

<b>Approaches to Encourage Connection</b>	<b>Percent of PWOs (146 Respondents)</b>
1. % Lower connection fee	53%
2. % Payment in installments	39%
3. % Other	22%
4. % Subsidies	17%
5. % Specific water tariff	13%

According to the PWOs, 91 percent of all household connections are metered. The main method of billing clients for water use is according to metered actual consumption. Approximately 25 percent of PWOs also include a maintenance fee or monthly flat fee on top of the actual consumption measure. The average tariff per cubic meter is approximately US\$0.54 with a median of US\$0.55. Table 20 shows the average and median unit tariff disaggregated by PWO size.

**Table 20: Average Tariff per m<sup>3</sup>**

<b>PWO Size</b>	<b>Average Tariff per m<sup>3</sup> (US\$)</b>	<b>Median Tariff per m<sup>3</sup> (US\$)</b>
All PWOs	.54	.55
Micro	.56	.55
Small	.55	.58
Medium	.53	.51
Fairly Large	.48	.46
Very Large	.47	.45

## 7.0 BUSINESS PERSPECTIVE AND COMPETITION

Overall, PWOs expressed satisfaction with their current operations and optimism toward the future. PWOs were asked how they would rate the current conditions of their business, and 94 percent responded that they are very satisfied or fairly satisfied, as shown in Table 21. No PWOs noted disappointment. Compared with two years ago, 92 percent of respondents said their business situation had experienced some level of improvement (Table 22).

**Table 21: PWO Business Satisfaction**

Current Conditions of Business	Percent of PWOs (152)
% Very satisfied	47%
% Fairly satisfied	47%
% Neither satisfied nor disappointed	6%
% Fairly disappointed	0%
% Very disappointed	0%

**Table 22: PWO Perspective on Business Conditions in Comparison to Two Years Prior**

Business Conditions Compared to Two Years Ago	Percent of PWOs (152)
% Improved significantly	33
% Improved somewhat	59
% Remained more or less the same	7
% Worsened somewhat	0
% Worsened significantly	1
% (blank)	1

PWO were asked the top three problems they faced for operation and growth. Electricity topped the list with 37 percent, followed by transportation and cost and access to finance. On average, electricity makes up about 30 percent of PWO expenses. This percentage tends to increase as PWOs aged (Table 23) and as they grow in size, with the exception of the Very Large PWOs, which averaged electricity expenses as 13 percent of expenses (albeit only two Very Large PWOs provided data for this question), and the Fairly Large PWOs averaged electricity costs at 34 percent of total expenses.

**Table 23: Electricity Cost as a Percentage of Total Expenses**

Percent of all PWOs	2012 and Before	2013–2018	2019–2022
30%	35%	29%	27%

To gauge the level of competition PWOs experience, they were asked whether, over the next two years, they expect competition from other operators—such as piped network operators, mobile water vendors, and public utilities—to change. Table 24 shows the responses, the majority of which indicate little concern around competition. Approximately 75 percent of PWOs said there is no illegal water supplier in their coverage area, while 24 percent said there is an illegal supplier.

**Table 24: Perceptions around Competition in the Coming Two Years**

Competition Risk over the Next Two Years	Percent of PWOs (152)
% Competition will decline	12
% Competition will increase	6
% Competition will remain more or less as it is now	2
% Don't know	5

Competition Risk over the Next Two Years	Percent of PWOs (152)
% No competition	75

The majority of PWOs expressed confidence that they will still be in business in two years, and 97 percent of respondents said they expect their business situation to be better. Table 25 shows responses from PWOs when asked what the outcome would be if they sold their business today, with 50 percent responding they would make good money.

**Table 25: PWO Business Value Today**

If You were to Sell Your Business Today, What Would You Expect the Outcome to Be?	Percent of PWOs (152)
% Don't know	36
% Would be able to recoup the money invested, but with no profit	10
% Would lose money	4
% Would make good money	50

## 8.0 CONCLUSIONS

PWO businesses take time to establish themselves and reach profitability. Access to finance is important for early capital investment and later expansion. Investment for PWOs in the Cambodia water sector is sizeable and almost entirely private. PWO owners' self-investment and commercial loans are the two most common sources of financial support. While collateral requirements and interest rates are routinely identified as central impediments to access to finance, PWOs are successfully accessing commercial loans from banks, even in cases where PWO financial stability may not be firmly established. PWO key performance indicators improve with increased years of experience and increased connections. At the same time, despite low household coverage rates and slow growth, PWOs maintain a positive outlook on their business and the future.

Findings from the survey contribute to the below high-level conclusions, recommendations, and remaining questions around future action for responding to water demand in Cambodia. Information collected can inform future efforts to work with PWOs to improve and expand service delivery of piped water.

### 8.1 TAKEAWAYS

**Licensed PWOs are accessing finance.** Seventy-two percent of PWOs surveyed used commercial bank financing to invest in their business. Of those that provided data, 48 percent took out multiple loans. The data shows an increase in PWO loan uptake with time as more PWOs come into existence. Commercial bank interest rates and tenures are more amenable than moneylenders with high interest rates and shorter tenures and MFIs with high interest rates and slightly longer tenures. However, PWOs still rank access and cost of finance as an issue for their business, and 34 percent of loans were refinanced. PWO operating cost coverage increases with PWO experience, indicating improved financial strength and theoretically attractiveness to lenders, but this is not a strict indicator for creditworthiness or ability to access finance in Cambodia, as several PWOs with lower-than-expected OCCRs obtained financing.

**Collateral requirements and interest rates are the main hurdle for PWOs to access finance.** PWOs surveyed responded that collateral requirements and interest rates posed challenges to accessing commercial loans. The collateral requirements of banks and MFIs paired with the collateral constraints of PWOs raises a question on whether different risk monitoring and assessment strategies should be explored or whether credit enhancements could be considered as a method to improve the risk profile of loans and protect banks from credit risk. An earlier partnership between Foreign Trade Bank with the French Development Agency (*Agence Française de Développement*) extended over 25 loans to PWOs under a structured finance arrangement involving a credit line to lower cost of wholesale capital and a credit enhancement, resulting in more favorable lending terms for PWOs (USAID 2018). Continued examination of credit enhancement mechanisms and support that allows better financing terms could help PWOs to better position themselves to handle high start-up and capital investment costs and accelerate growth to meet demand more quickly. De-risking support can come in different forms. One question is whether the government could play a more active role through already-existing mechanisms such as the Small and Medium Enterprise Bank of Cambodia (SME Bank) SME Co-Financing Scheme that the Royal Government of Cambodia created, which has already extended loans to some PWOs at a competitive single digit rate (Cambodia's Ministry of Economy and Finance 2020).

**Key PWO performance indicators are encouraging and improve with PWO years in business and number of connections.** On average, key financial and operational indicators, such as the OCCR, staff-to-1,000 connection ratio, and NRW, are acceptable and show improvement over time and with PWO expansion. Often those with more years of operation are closer or have reached economies of scale with a higher number of connections, which allows them to operate at higher



efficiency. However, the low average connection rate of six percent for PWOs impedes the speed at which PWOs will reach higher efficiency and effectiveness in water supply delivery.

**PWO investment in the Cambodian water sector is sizable and primarily private.** The survey sample recorded the total investment for 104 PWOs at over US\$100 million. A broad extension of that figure to all PWOs nationally brings the estimate to around US\$600 million. Much of this investment funding comes from PWO self-investment, private financing, and other non-public funding options. When looking at options to expand water coverage of PWOs, public funding could carry the sector forward and if used strategically serve as an incentive system to leverage additional private investment while applying additional pressure around regulation and license requirements.

**PWO coverage rate is low, and growth is slow.** The average coverage for PWO license areas is 40 percent. This increases according to PWO size, with the Large and Very Large PWOs maintaining an average coverage rate between 55 percent and 57 percent. Similarly, the coverage rate increases with the number of years in which a PWO has been in business. The median growth rate across all PWOs is just over six percent annually. The growth rate is faster for younger PWOs who are establishing their network, but it tapers off in later years. The low coverage rate and slow growth can be attributed to a mix of reasons, including costly capital expansion, especially as households are further away and more spread out. Seventy percent of PWOs described the area they serve as rural. PWOs said the main reason households do not connect is due to other sources of water, followed by money limitations. PWOs try to address the financial challenges of poor households through lowering connection fees and allowing for payment in installments. Additional information and customer voice on whether and to what extent supplementary financial support might entice them to connect to piped water systems could help inform on the value of investing in more formalized incentive and subsidy programs for households and PWOs nationally.

**The majority of PWOs do not regularly test water quality.** Approximately 37 percent of PWOs test their water daily. This number increases for larger PWOs with more time in operation and experience. Reinforcing existing regulation and providing additional support for testing to PWOs, especially on water quality monitoring, could help ensure quality water provision. PWOs that do not test regularly cited the lack of equipment as a central reason. Under WASH-FIN, a group of PWOs was provided with testing kits and received training on how to use the testing kits with regular coaching follow-up. Exploring additional options for testing kits could be valuable. This could even be done as part of the license granting process. Improving the water quality testing and monitoring, and in turn the water quality, also improves household confidence in PWO water and increasing uptake.

**Pipe breakage due to external factors is a frequent issue.** When asked the top three most common problems experienced with the network and/or equipment, 91 percent of PWOs said pipe breakage due to external causes (i.e., road work). Pipe damage from external factors is costly due to the needed repair and the water lost. In most cases, the PWO bears the burden of costs. Earlier WASH-FIN efforts to host communication sessions between the local government and PWOs shed light on how better coordination and communication on construction and road projects could help lessen these incidents. Furthermore, by understanding the exact cost and restriction responsibilities placed on PWOs for pipe repairs, future project teams can determine if they need to create a remuneration fund for such situations.

**Electricity presents a challenge for operation and growth.** When asked about critical challenges, many PWOs indicated electricity was the most serious. Fifty-seven percent of PWOs said electricity cutoff and overload was a major issue for the network. Ninety-eight percent of PWOs use power from the electrical grid, and 47 percent use diesel-powered generators. For some, the financial costs of electricity as a portion of their operating costs are very high, averaging 30 percent. Few PWOs (11 percent) use solar as a power option, which can have high upfront costs. Additional investigation into

ways to reduce electrical costs, and the feasibility and sustainability of solar options in Cambodia could reveal viable approaches for improving PWO financial and technical health going forward.

**PWO outlook is positive for growth, improvement, and low competition.** Overall, PWOs did not indicate concern over their business and the future. Instead, they responded positively about the business progress and outlook. However, this positive outlook could pose reason for concern if PWOs feel too comfortable and are not motivated to strive for continued rapid expansion past the present average coverage rate of 40 percent with a six percent median growth rate, let alone achieving universal coverage. At the same time, this concern could be partially quelled by PWO responses to future investment planning where 83 percent of PWOs said they are considering an investment in fixed assets over the next 12 months, and the main purposes of the investments will be to expand operations to serve new clients for 67 percent of PWOs. Of note is the increase in OCCR for PWOs with higher household connections and more years in business, which also points toward increased profitability. Future planning for increased piped water coverage in Cambodia should ask what incentives, if any, could further help motivate PWOs to expand.

## **8.2 FORWARD LOOKING**

Improving the water supply coverage and quality of PWOs requires multiple levels of support. Over the past decade, strengthening of regulation has helped PWOs and water provision in Cambodia, and additional regulatory attention could continue to help push the sector forward, with closer monitoring around expansion and water quality. Increasing coverage requires a combination of financial support for PWOs to expand, marketing and household financial support to connect to systems, technical and operational business support, and capacity building for PWOs.

Moving forward, awards and recognition systems for good performance of PWOs could provide some motivation for PWOs to increase their household coverage rate. Moreover, other incentives from financial support to cancellation of licenses for poor performance are options for exploration. PWO systems receive little public financial or coordination support, but both offer opportunities for additional PWO growth, while high investment costs, low-density license areas, and limited local coordination pose challenges. While this survey provides a large swath of data and various takeaways, further questions remain on how best to improve piped water supply coverage in Cambodia.

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