

**Assessment of the Value for Money of supporting the
Western Pacific Sanitation Marketing and Innovation Program:
A Multi-Factor Cost-Benefit Analysis**

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ii. Acronyms

AUD	- Australian Dollar
CBSM	- Community Based Sanitation Market
DFAT	- Department of Foreign Affairs and Trade
FJD	- Fiji Dollar
IWDA	- International Women's Development Agency
IWC	- International Water Centre
K	- Kina
LLEE	- Live & Learn Environmental Education
NPV	- Net Present Value
PNG	- Papua New Guinea
TSE	- Taburah Sanitation Enterprise
VfM	- Value for Money
VIP	- Ventilated improved pits
VT	- Vatu
WASH	- Water, Sanitation and Hygiene
WPSMIP	- Western Pacific Sanitation Marketing and Innovation Program

1. Executive Summary

The Western Pacific Sanitation Marketing and Innovation Program (WPSMIP), funded by the Australian Government's Department of Foreign Affairs and Trade (DFAT) and implemented by Live & Learn Environmental Education (LLEE) in partnership with International Women's Development Agency (IWDA) and International Water Centre (IWC) is the Pacific's first WASH (Water, Sanitation and Hygiene) project that has promoted enterprise-led sanitation improvements in peri-urban settlements. Focusing on urban and peri-urban informal settlements in Fiji, Solomon Islands, Papua New Guinea (PNG) and Vanuatu, the project is expected to make a significant impact on the target communities by its conclusion in mid-2018.

The report contributes to the assessment of the project's potential impact, focusing on the value for money it is likely to create during the implementation period as well as after completion. By investigating this value from a forward-looking and broad perspective including forecasting of sustainability and social impact, it is not an evaluation of the project, but rather a document measuring long-term net benefits.

The intended audience of this report is wide. In addition to the donor, implementing agencies and other organisations working within DFAT's Civil Society Wash Fund, the report is likely to be of interest to organisations and individuals working on monitoring and evaluation, community health, cost-benefit analysis and social enterprises. While some sections of the report are highly technical, efforts have been made to ensure that the report can be understood by a wide audience².

To ensure rigour in the study, three types of analyses have been undertaken for the three best performing sanitation enterprises:

1. An *enterprise profitability analysis* based on standard and agreed cost models.
2. A *community benefit/cost analysis* based on costs incurred by the community and benefits they accrue from such expenditure.
3. A *project-based benefit/cost analysis* considering all relevant project costs and their corresponding benefits.

From an enterprise perspective, the value for money calculation revolves specifically around profitability of the business. In other words, ensuring that revenues exceed costs is the critical measure of whether it is beneficial for the entrepreneurs to maintain the business. For this study, only sanitation (not including hygiene) has been considered as it contributes most to the costs and the main revenue stream. The relevant costs were toilet construction materials, construction labour, marketing and management fees. The revenue stream mainly revolved around selling of cost-effective toilets.

From a community perspective, the main social costs of poor sanitation, identified by World Bank's Water Sanitation Program, are mortality, productivity, healthcare and access³. They can be defined as follows:

- Mortality: The economic cost from instances of premature death due to poor sanitation
- Productivity: The value of economic activity lost due to sanitation related sicknesses
- Healthcare: The cost of treating sanitation-related diseases including both public and private sector treatment
- Access: The value of time foregone due to people not having access to a toilet

² A glossary of terms is provided at the end of the report for those not familiar with certain technical terms.

³ Lixil, Oxford Economic and WaterAID (2016) 'The True Cost of Poor Sanitation'

Reduction of these costs can be considered as an increase in corresponding benefits. Additionally, there are other important benefits that are difficult to monetise and highlight the fact that the overall benefits of improved sanitation are much more than the monetary benefits of the primary four factors, and issues such as greater dignity and safety are often invaluable. However, for this study only the above four factors were considered so that costs and benefits could be compared. In monetary terms, the corresponding benefits result in increased income or savings for households.

In terms of discounting rates used, the same discount rate was used for benefits and costs within each analysis. This is as per the standard practice used within economic analysis of healthcare projects. Also, given that different stakeholders have different time preferences three different rates were used for each of the three country analyses.

All information on costs, revenues and assumptions were based on information provided by the project offices in each of the three countries.

A summary of the main results is given in the table below:

	CBSM - Fiji	TSE – Vanuatu	Topwan – PNG
NPV of 10-year enterprise cash flow	-AUD1,969	AUD 17,703	-AUD15,745
NPV of 10-year community benefits	AUD 33,540,804	AUD 4,360,793	AUD 827,778
NPV of 10-year project benefits	AUD 23,205,311	AUD 1,862,811	AUD 1,713,957

While conclusions should not be drawn simply on the above table, overall results suggest that large benefits are likely to be derived particularly for the communities. There are, however, significant risks about the viability of the enterprises, and the project needs to focus on improving the profitability of the businesses. This is crucial because if the businesses do not become viable, toilets will not be provided and communities will not receive benefits. As the table highlights, from an enterprise perspective, the analysis of the cash flow assuming that the seed capital is used up as a bulk expense suggests that costs will exceed benefits for the two enterprises in Fiji and PNG. For the enterprise in Vanuatu (TSE), total benefits exceed costs, and suggests that it is the most viable of the three at this current stage. The results also highlight that all businesses must maintain a steady growth rate and ensure they receive payments for products sold, or risk becoming less profitable. From a community perspective, significantly large benefits will be derived by communities in all three countries with Fiji community likely to benefit the most. In Fiji and Vanuatu, the beneficiaries' return on 'investments' on toilets will be worthwhile particularly due to increased access and health. In PNG, the greatest benefits would be derived from those related to reduced mortality and better health. From a project perspective, all three countries are value for money, with the Fiji project being significantly more value for money than those of Vanuatu or PNG.

Moreover, the findings of the study suggest that great care should be taken to ensure that seed capital that is yet to be provided to the sanitation enterprises is used well. Businesses will need to minimise the use of such funds as upfront expenses, and invest much of it to leverage expansion, innovation or more investment. If the opportunity is lost to use these funds in a strategic manner, the viability of the businesses is at risk, which will in turn have significant implications on community benefits. However, businesses can only take strategic decisions if they are well managed and can move into a stage of expansion. Thus, some of the seed funding should be used at the start of the last year of the program to meet the costs of managers of sanitation enterprises and build their capacity.

2. Background

2.1 Justification

The Western Pacific Sanitation Marketing and Innovation Program (WPSMIP), funded by the Australian Government's Department of Foreign Affairs and Trade (DFAT) and implemented by Live & Learn Environmental Education (LLEE) in partnership with International Women's Development Agency (IWDA) and International Water Centre (IWC) is the Pacific's first WASH (Water, Sanitation and Hygiene) project that has promoted enterprise-led sanitation improvements in peri-urban settlements. Since its commencement in 2014, the project has focused on urban and per-urban informal settlements in Fiji, Solomon Islands, Papua New Guinea (PNG) and Vanuatu. It expects to make a significant impact on the target communities by its conclusion in mid-2018, especially considering that there are no other existing initiatives that focus on improving the sanitation outcomes in the needy target areas. This report contributes to the assessment of the project's potential impact, focusing on the value for money it is likely to create during the implementation period as well after completion.

A recent World Bank study on informal settlements highlighted that they comprised between 25-40% of households in the four countries, and will grow to between 30-65% by 2023⁴. Sanitation in these settlements was not fully available and for those households that did have access to toilets, many had to share. Existing toilets were often unsanitary, uncovered dry pit latrines. Over 40% in the urban areas of PNG, 35% in Vanuatu, 19% in Solomon Islands, and 8% in Fiji use shared or private unimproved latrines and open defecation. These figures can be significantly reduced through interventions that focus on informal settlements⁵.

In all countries, governments did not feel sufficiently obligated to promote sanitation services to informal settlements, partly due to the fact they were technically, legally, and commercially difficult to deliver⁶. The preference by both governments and donors was to primarily provide piped water to formal settlements. In instances where water and sanitation services were available, households were not able to readily access them due to not having land deeds or funds. Therefore, those in informal settlements were often compelled to use sanitation services that were of poor quality and unsafe, and at times costlier. Notably, the effects of poor sanitation were being felt not only by those who cannot access suitable services but also others within and outside the settlements, potentially the entire city⁷.

A project such as WPSMIP was thus clearly justifiable from a need perspective. However, it was unclear if the provision of funding by DFAT and the approach adopted by the implementing agencies were value for money. LLEE wished to investigate this value for money from a wider perspective to include forecasting of sustainability and social impact. This report provides key insights in this regard.

WPSMIP had three focus areas: 1) the establishment of Community-Based Sanitation Enterprises (Sanitation enterprises) in urban and peri-urban informal settlements to improve sanitation and hygiene within these communities; 2) creation of an enabling environment for these enterprises to succeed and thrive, and 3) improvement of sanitation and hygiene outcomes in schools by working with a range of Change Agents. This report assesses the value for money

⁴ World Bank (2015) 'Unsettled: Water and Sanitation in Urban Settlement Communities in the Pacific'

⁵ Ibid

⁶ Ibid

⁷ Ibid

of the project in relation to the first two outcomes. It is not an evaluation of the project, but rather a forward-looking document measuring the long-term value the project is likely to have on the sanitation enterprises and communities. It focuses on three best performing sanitation enterprises at the current stage of the project, one each in Fiji, Vanuatu and PNG.

This report complements the mid-term evaluation of the project progress that was completed in May 2017. The mid-term evaluation did not include an analysis of business financial viability or the community benefits in monetary terms that could be obtained through the project. This value for money study partially fills this gap. At the time of writing, seed funding grants to the sanitation enterprises were yet to be disbursed. Therefore, this report could also be deemed as an essential document to judge the suitability of providing grants to supported community based sanitation enterprises. In that regard, the analysis and conclusions from the report need to be considered carefully along with other relevant documents.

The intended audience of this report is wide. In addition to the donor, implementing agencies and other organisations working within DFAT's Civil Society Wash Fund, the report is likely to be of interest to organisations and individuals working on monitoring and evaluation, WASH, community health, cost-benefit analysis and social enterprises. While some sections of the report are highly technical, efforts have been made to ensure that a large part of the report is understood by a wide audience. A glossary of terms is provided at the end of the report for those not familiar with certain technical terms.

2.2 Community Based Sanitation Enterprises

There is emerging consensus that without behavioural changes to communities, installation of sanitation facilities does not result in optimum outcomes. This has resulted in many WASH practitioners arguing for more market led approaches to toilet construction. This shift has come parallel to the general promotion of market based initiatives to solve other community development problems. Support for social enterprises has the potential to result in social benefits to communities while enterprises make modest or market rate profits, or at least break even. In relation to sanitation, incentivising social enterprises to provide outputs rather than using donor grants directly to meet sanitation needs can result in the use of low-cost and appropriate technology with innovative sustainable approaches.

Sanitation marketing as a market-based approach for improvement of sanitation outcomes in the informal settlements of the Pacific is thus noteworthy. While it was through this project that sanitation enterprises in the Pacific were being supported for the first time, it is not a new approach and had been successful in improving sanitation outcome in many other countries⁸. The significance of the approach globally has much to do with the fact that many past projects that have been subsidised by governments and donors globally have had only limited success⁹. In the Pacific, past grant based assistance have also not had much success particularly due to the lack of local ownerships and non-completion due to insufficient funds¹⁰.

⁸ See for example WaterSHED's work in Mekong (<http://www.watershedasia.org>) or the 'Sanitation in Peri-urban areas of Africa' project of the Dutch Government (<http://www.waste.nl/en/project/sanitation-in-peri-urban-areas-in-africa-spa>)

⁹ PSI (2016) 'Market Based Approaches to Sanitation'

¹⁰ The mid-term evaluation identified examples of failed past grant based sanitation projects including a donor funded community compost toilet in Blacksand community, Vanuatu; a Local Suva-based Town Council funded toilets in Kalekana; and a government funded community toilets in communities new Kavient, PNG.

2.3 Sanitation Products

While it is not feasible to describe all the types of sanitation products available, noting those that have been promoted through the project highlights not only the need to target affordability and accessibility but also meet aspirations. Often, the ones most desirable are those that potential beneficiaries cannot afford. The ones most affordable (i.e. open defecation or open pit latrines) are also neither suitable nor preferable. Beneficiaries make sub-conscious ‘value for money’ decisions when purchasing toilets, and most often they are likely to choose ones that they can afford and provide at least minimum level of comfort and access. Therefore, it comes as no surprise that sanitation enterprises cannot build their businesses in poor urban informal settlements around provision of flush toilets surrounded by concrete walls. Rather, in Vanuatu, sales forecasts show that the greatest financial and social impacts are likely to be derived from ventilated improved pits (VIP) with/without seats and with/without appropriate (tin or wood) structures. In PNG, the main product being promoted in the peri-urban settlements was the ‘set, raiser and slab’. In Fiji, the products being promoted was the ‘slab and riser’. The suitability of these units is further enhanced by the fact that households in these settlements have no title deeds and thus if necessary should be able to ‘move’ their sanitary facilities.

2.4 Value for Money Analysis

Value for Money (VfM) is a concept that has increasingly become an important means of judging whether a project has made a valuable contribution to a development context. Some are undertaken at the end of a project looking back at past activities and achievements. These analyses, such as those for projects funded by DFAT often use an analytical framework focusing on overarching principles including economy, efficiency, effectiveness and ethics¹¹. In addition, development projects have also benefited from forward looking economic analysis of value for money studies specifically using cost-benefit frameworks that appraise potential projects before commencement or prior to disbursement of key tranches of funding¹². These studies have been particularly useful for projects that are likely to have clear economic returns. The methodology that should be chosen must be based on the purpose of undertaking the study, availability of data, and the business and social context. While the accuracy of cost-benefit analysis depends highly on the quality of available data, securing such data is often very challenging in most developing contexts¹³. Often assumptions based on these circumstances are adopted to provide guidance and fill information gaps. This is particularly the case in situations where evidence based on secondary data is not available and data collection through primary research such as surveys and interviews with stakeholders is challenging. For this study, significant efforts were made to secure the best possible data and develop needed assumptions based on project, community and country contexts, and in discussion with country project managers. All information on costs, revenues and assumptions were based on information provided by the project offices in each of the three countries.

To ensure rigour in the study, three types of analyses have been undertaken for the three best performing sanitation enterprises. The first is an enterprise profitability analysis based on standard and agreed cost models. The second is a community benefit/cost analysis based on costs incurred by the community through purchase of toilets and intangible social benefits

¹¹<http://dfat.gov.au/aid/who-we-work-with/value-for-money-principles/pages/value-for-money-principles.aspx>

¹² See for example Asian Development Bank (2013) ‘Cost-Benefit Analysis of Development Projects’

¹³ World Bank (2010) ‘Cost-benefit Analysis in World Bank Projects’

households gain from such expenditure based on the four overarching categories that are described in the next section. The third is a project-based benefit/cost analysis considering all relevant project costs and their corresponding benefits. It would have also been possible to undertake a fourth comparative analysis based on the hypothetical case where the project did not exist, but where each beneficiary country government was interested in bearing the costs to promote sanitary facilities. This was not undertaken due to reasons explained in the latter part of the methodology section.

2.5 Use of Seed Capital

The project has allocated an amount of AUD 28,000 for each enterprise to receive as seed capital to be used by the business. So far the enterprises have only received a small part of this funding. However, when they receive it, the businesses are likely to see an immediate positive cash flow. Seed capital of this nature is rare for social businesses such as the sanitation enterprises that are part of this project. They are, however, particularly valuable to create strong incentives for businesses to operate in ventures that are not easy to commence due to large start-up costs and do not generate large immediate profits. Businesses that bear only variable costs from the start can make immediate profits without the need for seed capital.

3. Methodology

3.1 Selection of Benefits and Costs

a) Enterprise Level Benefits and Costs

From an enterprise perspective, a cost-benefit calculation revolves specifically around profitability of the business. In other words, ensuring that revenues continue to exceed costs over a substantial period is a critical measure of whether the business is viable. Most businesses, irrespective of their size, do not make profits immediately due to initial fixed costs. Nonetheless, they generally have a business structure such that revenue continues to increase year on year until the business breaks even and subsequently starts making a profit.

Indeed, without enterprise profitability, external benefits cannot be maintained. Therefore, it is often expected that the business models of these enterprises are as fully developed as possible before commencement and that all costs and revenue streams are clear. Not surprisingly, however, these business models are rarely static and evolve over time. Indeed, for the sanitation enterprises under this review, the original business models developed at the start of the project in 2012 appear to be different to the ones currently being used and costs relate to both sanitation and hygiene¹⁴. This study benefited from new costing models developed by project teams, and only sanitation related components have been considered as they are the primary costs and the main revenue stream. Specifically, the relevant costs were toilet construction materials, construction labour, marketing and management fees. The revenue stream mainly revolved around selling of community appropriate toilets.

¹⁴ Financial models were developed for five businesses before the start of the project in 2012, but these could not be used for this analysis as they had significant gaps and did not consider several administration, management and other costs

b) Community Level Benefits and Costs

The main social costs of poor sanitation, identified by World Bank's Water Sanitation Program, are grouped into four categories – mortality, productivity, healthcare and access¹⁵. They can be defined as follows:

- Mortality: The economic cost of premature death due to poor sanitation
- Productivity: The value of economic activity lost due to sanitation related sicknesses
- Healthcare: The cost of treating sanitation-related diseases including both public and private sector treatment
- Access: The value of time foregone due to people not having access to a toilet

Additionally, there are other important benefits that are difficult to monetise. For example, women and girls face safety risks due to venturing out into secluded places in the absence of a toilet close to home. Girls also may miss out on education due to challenges of passing through a menstrual period without access to toilet. Malnutrition among children is also generally higher among communities that have high diarrheal diseases and aggravated when sanitary waste is not disposed well¹⁶. Household toilets can also be markers of status and bring general happiness simply by their very existence. While these costs are difficult to account for in monetary terms, they do highlight the fact that the overall benefits of improved sanitation are much more than the monetary benefits of the primary four factors, and issues such as greater dignity and safety are often invaluable. This report uses standard benefit/cost monetary calculation methodology. The key indicators for the four key benefits used for this study are as follows:

Mortality: The key indicator used was the reduced incidence of death in the target households due to better sanitation. This was calculated by finding the potential net loss in income for a 20-year period because of death. To prevent the discrimination of persons due to their employment status, income or age, the value of all losses was calculated based on the average monthly wages of employed persons in the community. While noting that different wage rates were used in different countries due income differences, from an ethical perspective one should not conclude that lives in some countries are more valuable than others.

Productivity: The key indicator used was the additional income generation potential due to reduced incidence in disease because of better sanitation. Calculations were undertaken based on the loss of income because of income earners and their dependents falling sick. In other words, in addition to a loss of income when an employed person falls sick, there is likely to also be a loss in income to the household due to wage-earners being compelled to engage in care duties of sick children or elderly. This indicator accounts for time lost when treatment in a clinic/hospital is not sought.

Healthcare: Two indicators were used in relation to treatment for sanitation related illnesses. The first was the time saving in travel to the clinic/hospital and the second was the saving in hospital charges due to better sanitation. For the first indicator, a patient's time was valued as a 'cost of healthcare', and based on having to spend 5 days in hospital due to a serious sanitation related incident. In the second, actual loss of savings due to payment to a hospital or purchase

¹⁵ Lixil, Oxford Economic and WaterAID (2016) 'The True Cost of Poor Sanitation'

¹⁶ ibid

of medicines was calculated. In countries where hospital fees were not charged or medicine was free, this second indicator was not used. It must be noted, however, that this is not to suggest that the indicator was not important especially considering that the government was subsidising that cost. Rather it was because the quality of services may not be optimum and government statistics were not available.

Access: The key indicator used was the time saving in travelling to the toilet. This was calculated by the additional income potential of employed persons who do not have to ‘waste’ their time waiting to access communal toilets or travelling to distant secluded locations. It could be argued that time of other members of the family should also be monetised and indeed, many household members engage in non-paid work. However, given that time saving was unlikely to derive an additional payment in the communities studied, only the time of employed persons was used.

c) Project Level Benefits and Costs

One of the key cost components of the project was the start up seed funding grant as was described in the ‘Enterprise Level Benefits and Costs’ section. In addition, the project provided significant support beyond the start-up capital and these are considered as part of the costs. They include the project expenditure related to the sanitation marketing component such as field team costs in each country, advisory support to sanitation enterprises, and technical and management support provided by Melbourne based staff.

The benefits attributable to the project mainly include enterprise profits stated in the ‘enterprise level’ description as well as community benefits stated in the ‘community level’ description. There are other benefits to the community arising from better hygiene, but for this research, it is assumed that the sanitation benefits largely account for the hygiene benefits as well.

d) Country Level Benefits and Costs

Without projects such as WPSMIP, Pacific country governments would have to bear the costs of providing toilets to the beneficiaries. While this is a hypothetical situation, it highlights the fact that the project is a potential ‘saving’ for the governments. In other words, the project saves the beneficiary country governments from providing free sanitary facilities to the beneficiaries through budgetary expenditure. If the country governments were interested in providing such social dividends, they would have to pay through tax revenue or take concessionary loans from an international donor agency. Technical support would be through the existing technical officers or through an external consultancy firm. Analysis of the situations of the four countries suggest that there are varying degrees of interest by governments. In Fiji, the government is supporting the sanitation enterprise though its support to sanitation in informal settlements is, in general, minimal. In PNG, the provincial government subsidised the installation of a few public toilets. In the other two, there is neither any policy direction nor any fiscal or budgetary space for there to be any possibility for governments to spend on sanitation facilities of informal settlements.

3.2 Discounting and Net Present Value

For costs and benefits to be compared across several years, they need to be discounted so that they are shown in terms of current costs. Discounting is undertaken to recognise the fact that stakeholders value costs and benefits in the future differently from that of the present. This

'time preference' adjustment has been undertaken for each analysis in addition to the price inflation related adjustment that will be accrued beyond the current year.

The choice of discount rate depends greatly on the context and the nature of the analysis, but generally based on the opportunity cost of capital. For the enterprise analysis, a net present value calculation was undertaken towards the end assuming that seeds funds would be completely used either as a fixed cost or as a one-off bulk expense, and each business would continue to maintain a certain percentage of profit. For the community analysis, the individual savings rate in a commercial bank in each of the respective countries was adopted as the discount rate. For the project analysis, the discount rate used was the market interest rate in each respective country. The use of these different rates is reflective of the diversity of each economy and the fact that no single discount rate is applicable across all stakeholder time preferences.

It is standard practice to use the same discount rate for both benefits and costs for each analysis assuming that they are impacted similarly in terms of time preference. However, there have been instances where different rates are used due to specific situations where benefits occur only at a point in the future or where benefits accrue for an extended period. While such differential discounting practices are justified in many cases, the impracticality of undertaking such analysis generally makes it difficult to use. For this study, the same discount rate has been used within each analysis reflective of the standard practice in economic analysis of healthcare projects. The separation of the overall analysis into the three different analyses considers the need to reflect different discounting rates among stakeholders to the extent possible.

The formula used for the net present value calculation of cash flow for the enterprise level calculations was as follows:

$$NPV = \sum_{t=1}^n \frac{C_t}{(1+r)^t} - C_0$$

where:
 C_0 = initial cost
 C_t = net cash flow
 t = year
 n = final year
 r = discount rate

The net present value (NPV) calculation formula used for the community and project level calculations was as follows:

$$NPV = \sum_{t=0}^n \frac{B_t - C_t}{(1+r)^t}$$

where:
 B = benefits
 C = costs
 t = year
 n = final year
 r = discount rate

4. Findings

4.1 Fiji's Community Based Sanitation Enterprise

4.1.1 Fiji Enterprise Level Analysis

a. Cost Estimates and Expected Sales Revenue

The Fiji CBSE, “Community Based Sanitation Market” (CBSM) has been able to tap the sanitation market of informal settlements with a contract with the Fiji government. This contract presents a strong possibility for long term viability of the business. 154 units of the ‘slab and riser’ are expected to be sold in 2017 with 150 of those being through the government contract and the other four sold directly to the beneficiaries. Initial seed capital that is likely to be provided to the business in 2017 is FJD 17,949 (AUD 28,000). New cost estimates and expected sales revenue projections developed for 2017 in relation to the product are as follows:

Slab and Riser	FJD/unit	FJD for 154 units	AUD for 154 units @1.56
Material costs	FJD 120/unit	18,480	11,846
Construction costs	FJD 25/unit	3,819	2,448
Management cost	20% of net profit	862	553
Sales price	FJD 172.8/unit	26,611	17,058

b. Key Assumptions

The following assumptions were made for the analysis:

1. Full depreciation of the asset within the first year but product lifetime of 10 years before repair/replacement
2. 20% growth rate on sales every year from previous year
3. Price of costs will increase only as per inflation
4. Sales prices will increase only as per inflation
5. Inflation rate of 3%
6. Exchange rate: AUD 1 = FJD 1.56

c. Key Findings

The financial analysis highlighted that on the 10th year, the business would have sold 795 units, a five-fold increase from 2017 and a total of 3,998 units would have been sold over the 10-year period.

The seed capital will provide significant cash flow for the business. However, even without the seed capital provided through the project, the CBSE will make a profit from the first year since fixed costs were not borne. The gross profit for the first year is likely to be FJD 4,312 (AUD 2,764) without the seed capital income, and by the 10th year, the business will make a profit of FJD 17,799 (AUD 11,409). While this may seem to be almost equivalent to the start-up capital provided in the first year, in present value terms it is only FJD 5,243, not very different from the first year’s profit.

A sensitivity analysis was undertaken to see if the business would remain profitable with a 3% increase in product costs above inflation and a reduction in sales increases every year to 5% from the original 20%. In such a situation, the business will make a decreasing profit until it starts making a loss from year 5. In addition, if the management increases its management fee from 20% to 50% of the income, then the business is likely to make loss from year two. Most significantly, the sensitivity analysis also highlighted that payments for the products must be above 84% for CBSM to maintain at least a minimum profit throughout the ten-year period. Overall, it is evident that the business must maintain a healthy growth rate, profit margin and limit management fees until the business reaches a substantial size.

The seed capital has yet to be provided to CBSM and it is unclear how it would be utilised by the enterprise. A net present value calculation was undertaken of the cash flow assuming that the seed capital would be used up within the first year either as a fixed costs or bulk expense and a profit rate of 13% would be planned. In such a scenario, the present value of the cash flow over the 10-year period was (negative) -FJD 3,072 (-AUD 1,969).

4.1.2 Fiji Community Level Analysis

a. Key Assumptions

The government contract with the CBSM offers a strong possibility for the target households to benefit through the project. To monetise the potential benefits, the following assumptions were used for 2017:

Number of beneficiary households	154
Number of members per household	10
Number of income earners per household	3
Hourly wage per income earner	FJD 9.35
Percentage of community members who are affected by sanitation related diseases due to insufficient or poor sanitation facilities	5%
Percentage of community members who may die because of sanitation related disease	0.1%

The following assumptions relating to community member habits were also used:

Number of hours saved in travel if the new household toilet is used	1 hour/day/person
Number of hours saved travelling to the hospital due to not having a sanitation related disease	6 hours per month

Even though costs for the toilet were being borne by the government, for this analysis, it is assumed that the community was bearing the costs as it was not clear if they were fully subsidised by the government.

b. Key Findings

In 2017, the total value of the monetised benefits was FJD 2,758,848 (AUD 1,768,492), a significantly larger amount than the FJD 26,611 (AUD 17,058) in expenses, and a ratio of 104:1 between benefits and costs. The benefits were broken down as follows:

- Time saving – travel to the toilet: FJD 1,555,092 (AUD 996,853)

- Time saving – travel to the hospital: FJD 1,036,728 (AUD 664,569)
- Reduction in disease: FJD 28,798 (AUD 18,460)
- Reduction in mortality: FJD 138,230 (AUD 88,608)

Using an inflation rate of 3% and discount rate of 2%, the net present value of total net benefits over a 10-year period was FJD 52,323,654 (AUD 33,540,804).

When a sensitivity analysis was undertaken with only a 50% payment rate on the products, not surprisingly there was a much higher present value of net benefits, but this was not viable from a business perspective and thus not realistic. When another sensitivity analysis was done assuming that all sanitation related diseases were in fact due to poor hygiene, the benefits related to reduction in disease, productivity and mortality were eliminated. Nevertheless, the time saving benefits were so significant that the present value of the net benefits over the 10-year period was still as large as FJD 29,743,800 (19,066,538).

4.1.3 Fiji Project Level Analysis

For the project level analysis, the data and results from the enterprise and community level analyses were combined. In addition, the indirect support costs, technical advisory costs were included. Moreover, costs related to improving the enabling environment were also included in the analysis. Converting all such additional costs to FJD, and assuming that all project costs were used up by the end of 2017, the total costs up to 2017 were FJD 1,195,740 (AUD 766,500). The corresponding benefits for 2017 were FJD 2,762,298 (AUD 1,770,704). Using a discount rate of 8.9%, the present value of net benefits over a ten-year period is expected to be FJD 36,200,285 (AUD 23,205,311).

4.2 Vanuatu's Community Based Sanitation Enterprise

4.2.1 Vanuatu Enterprise Level Analysis

a. Cost Estimates and Expected Sales Revenue

Two Sanitation enterprises are being supported by the project - Taburah Sanitation Enterprise (TSE) and SAMAPATA. However, this cost-benefit analysis focuses only on TSE given that it has a greater chance of becoming viable. It expects to sell 51 units of the VIP toilet slab and vent pipe (Product 1) and 15 units of VIP toilet with a structure (Product 2) in 2017. Initial seed capital that is likely to be provided to the business in 2017 is VT 2,338,000 (AUD 28,000). New costing and expected sales revenue projections developed for 2017 in relation to the product are as follows:

VIP toilet slab with vent pipes	VT/unit	VT for 51 units	AUD for 51 units
Materials cost	14,099	719,049	8,611
Construction labour cost	6,000	306,000	3,665
Admin and Management	3000	45,900	550
Organisational margin	2,000	255,000	3,054
<i>Total</i>	25,099	1,325,949	15,879
Sales price	28,099		

VIP toilet with structure	VT/unit	VT for 15 units	AUD for 15 units
Materials cost	73,114	1,096,710	13,134
Construction labour cost	15,000	225,000	2,695
Admin and Management	6,600	99,000	1,186
Organisational margin	5,000	150,000	1,796
<i>Total</i>	<i>99,714</i>	<i>1,570,710</i>	<i>18,811</i>
Sales Price	104,714		

b. Key Assumptions

The following assumptions were made for the analysis:

1. Product lifetime of 10 years before repair/replacement of the product
2. 20% growth rate on sales every year from previous year
3. Material price of costs will increase only as per inflation
4. Construction, admin and management will change in equal % to material cost increases
5. Sales prices will increase only as per inflation rate
6. Inflation rate of 3%
7. Exchange rate: AUD 1 = VT 83.5

c. Key Findings

The financial analysis highlighted that on the 10th year, the business would have sold 263 units and 77 units of Product 1 and Product 2 respectively, a combined total of 340 units, a five-fold increase from 2017 and a total of 1,713 units over the 10-year period.

Even though the business is likely to receive start-up capital, the fact that it has developed its model based on the assumption that there would no fixed costs is important to note. Moreover, all non-material costs are expected to change in line with material costs, and therefore, the business will have positive cash flow even without the seed funding. The gross profit for the first year is likely to be VT 228,000 (AUD 2,731) without the seed capital income, and by the 10th year, the business will make a profit of VT 1,176,430, which is VT 588,508 (AUD 7,048) in present value terms. Considering the seed capital as a one-off expense, and with a discount rate of 8% the value of the total ten-year period net present value of the cash flow was VT 1,478,190 (AUD 17,703).

A sensitivity analysis was undertaken to see if the business would remain profitable with a 3% increase in costs (including labour, admin and management costs) above inflation and a reduction in sales increases to 5% from the original 20%. In such a situation, the business would continue to be viable (not considering further positive cash flow still available from the seed funding). In present value terms, the total net profit for the enterprise (without seed funding) would be VT 501,110 (AUD 6,001), a significant drop in value.

Maintaining a sales growth rate of 20%, the sensitivity analysis also highlighted that if the payments for the products fell to below 93%, the sanitation enterprise would incur a loss from the second year. Overall, it is evident that for the business to maintain financial viability, it

must maintain a high growth rate, high payment rates for products by beneficiaries and not significantly increase its administration, management and profit margins.

4.2.2. Vanuatu Community Level Analysis

a. Key Assumptions

To monetise the potential benefits at the country level, the following assumptions were used for 2017:

Number of beneficiary households	66
Number of members per household	6
Number of income earners per household	2
Hourly wage per income earner	VT 750
Percentage of community members who are affected by sanitation related diseases due to insufficient or poor sanitation facilities	7%
Percentage of community members who may die because of sanitation related disease	0.1%

The following assumptions relating to community member habits were also used:

Number of hours saved in travel if the new household toilet is used	30min/day/person
Number of hours saved travelling to the hospital due to not having a sanitation related disease	3 hours per month

b. Key Findings

In 2017, the total value of the monetised benefits was VT 29,267,828 (AUD 350,513), a significantly larger amount than the VT 3,003,759 in expenses. The ratio of benefits to costs in 2017 is 10:1. The benefits were broken down as follows:

- Time saving – travel to the toilet: VT 17,820,000 (AUD 213,414)
- Time saving – travel to the hospital: VT 10,692,000 (AUD 128,048)
- Hospital charges saving: VT 85,697 (AUD 1,026)
- Reduction in disease: VT 822,690 (AUD 9,853)
- Reduction in mortality: VT 2,851,200 (AUD 34,146)

Using an inflation rate of 2% and discount rate of 12%, the net present value of total net benefits over a 10-year period was VT 364,126,180 (AUD 4,360,793).

When another sensitivity analysis was undertaken assuming that all sanitation related diseases were in fact due to poor hygiene, the benefits related to reduction in disease and mortality, and increased productivity were eliminated. Nevertheless, the time saving benefits remained significant. In such a scenario, the present value of the net benefits over the 10-year period was still as large as VT 182,355,674 (AUD 2,183,900), due to the very large contribution that saving in travel time to the toilet makes on derived total benefits.

4.2.3. Vanuatu Project Level Analysis

For the project level analysis, the data and results from the enterprise and community level analyses were combined. In addition, the indirect support costs, technical advisory costs were

included. Moreover, costs related to improving the enabling environment were also included in the analysis. Converting all such additional costs to Vatu, and assuming that all project costs would be used up by the end of 2017, the total costs up to 2017 were VT 73,174,557 (AUD 876,342). The corresponding loss up to end 2017 was - VT 40,674,970 (- AUD 487,125). Using a discount rate of 28%, the present value of net benefits over a ten-year period is expected to be VT 155,544,694 (AUD 1,862,811).

4.3 Papua New Guinea's Community Based Sanitation Enterprise

4.3.1 PNG Enterprise Level Analysis

a. Cost Estimates and Expected Sales Revenue

The mid-term evaluation indicated that of the two sanitation enterprises being supported through the project, Topwan in Kavieng was likely to be more viable when considering non-financial aspects of the business. Saraklok and Dagi in Kimbe was less mature as a business. Though facing more constraints from a business perspective, it was however operating in an environment that was perhaps more conducive for enhanced sales particularly given the potential opportunities for diversification of products and services. Indeed, given that the target households lived in an area where there was a Palm Oil company that provided jobs to these household members, the likelihood of payment was also higher. However, progress of the business was still too weak and thus this analysis focuses only on Topwan.

At the time of writing this report, the new costings were being developed by the project team and the sanitation enterprise. One of the key challenges was the fact that income levels were not large enough for many households to be able to afford toilets. 30 toilets had been sold in early April with a payment scheme that allowed beneficiaries to make part-payments over a period, but due to some inconsistent payments, a decision had been taken to request full payment on delivery. This was expected to reduce the sales targets. For this analysis, data used was not fully updated. Given that the cost/revenue may continue to be refined, this analysis may to a certain extent be hypothetical, but it nevertheless gives a strong indication of the likely situation the business is likely to face.

Topwan expects to sell 120 units of the set, raiser and slab as the main sales product in 2017. Initial seed capital that is likely to be provided to the business in 2017 is K 67,200 (AUD 28,000). The best available estimates of costs and expected sales developed for 2017 in relation to the product are as follows:

Set, slab and riser	Kina/unit	Kina for 120 units	AUD for 120 units @ 2.4
Material and transport costs	K125	15,000	6,250
Labour and Admin costs	K 125	15,000	6,250
Sales Price	K 262.5	31,500	13,125

b. Key Assumptions

The following assumptions were made for the analysis:

1. Full depreciation of the asset within the first year but product lifetime of 10 years before repair/replacement
2. 20% growth rate on sales every year from previous year
3. Price of costs will increase only as per inflation

4. Sales prices will increase only as per inflation
5. Inflation rate of 5%
6. Exchange rate: AUD 1 = K 2.4

c. Key Findings

With an expected growth rate of 20% every year, sales by the 10th year would have grown to 619 units with the total units sold over the 10-year period being 2,496. The business model currently being used focuses on having an equivalent percentage of funds for labour and administration to the material and transport. Topwan expects to make a 5% profit per unit sold assuming that beneficiaries pay in full for the units sold.

As with the other businesses, seed capital is expected to be provided to Topwan to provide significant buffer to the cash flow. Moreover, as with the other two businesses, the business model has been created such that the business is expected to make a profit from the first year because fixed costs are not being borne. The gross profit for the first year is expected to be K1,500 (AUD 625) without the seed capital income, and by the 10th year, the business will make a profit of K7,740, which is K4,989 (AUD 2,078) in present value terms.

A sensitivity analysis was undertaken to see if the business would remain profitable with a 3% increase in product costs above inflation and a reduction in sales increases every year to 5% from the original 20%. In such a situation, the business will still make a very minor profit every year, and by year ten, the total profit will be K 2,327, which is K 1,500 (AUD 625) in present value terms. The sensitivity analysis also highlighted that even if sales growth increased by 20% year on year, if the payments for the products fell to below 95%, the CBSE would incur a loss from the second year. As with both other sanitation enterprises in this study, Topwan's priority must be to both maintain a healthy growth rate and ensure timely payment by beneficiaries.

A net present value calculation was undertaken of the cash flow assuming that the seed capital would be used up within the first year either as a fixed costs or bulk expense and a profit rate of 5% would be planned. In such a scenario, the present value of the cash flow over the 10-year period was (negative) -K 37,788 (-AUD 15,745). The significance of this negative value is that unless most of the seed capital is used to improve the profitability of the business rather than as just a pure expense, the likelihood that the business will become viable is low.

4.3.2. PNG Community Level Analysis

a. Key Assumptions

To monetise the potential benefits for the community, the following assumptions were used for 2017:

Number of beneficiary households	120
Number of members per household	6
Number of income earners per household	1
Hourly wage per income earner	K 3.2
Percentage of community members who are affected by sanitation related diseases due to insufficient or poor sanitation facilities	20%
Percentage of community members who may die because of sanitation related disease	0.5%

The following assumptions relating to community member habits were also used:

Number of hours saved in travel if the new household toilet is used	15min/day/person
Number of hours saved travelling to and waiting in the hospital due to not having a sanitation related disease	3 hours per month

b. Key Findings

In 2017, the total value of the monetised benefits was K 246,528 (AUD 102,720) compared to the costs of K 31,500 (AUD 13,125) borne as expenses by the households. The ratio of benefits to costs in 2017 was almost 8:1. The benefits were broken down as follows:

- Time saving – travel to the toilet: K 34,560 (AUD 14,400)
- Time saving – travel to the hospital: K 82,944 (AUD 34,560)
- Reduction in disease: K 18,432 (AUD 7,680)
- Reduction in mortality: K 110,592 (AUD 46,080)

Using an inflation rate of 5% and discount rate of 15%, the net present value of total net benefits over a 10-year period was K 1,986,667 (AUD 827,778).

As with other countries, a sensitivity analysis was undertaken assuming that all sanitation related diseases were in fact due to poor hygiene, and therefore the benefits related to reduction in health, productivity and mortality were eliminated. In such a scenario, the access to benefits were not significant enough to maintain a positive net present value. In other words, with a NPV of -K 51,964, the benefits related to access were not considered sufficiently valuable for the community.

4.3.3. PNG Project Level Analysis

For the project level analysis, the data and results from the enterprise and community level analyses were amalgamated as relevant. Thereafter, indirect support costs, technical advisory costs, and enabling environment improvement costs were added to the enterprise support costs. Converting all such additional costs to Kina, and assuming that all project costs were used up by the end of 2017, the total costs up to 2017 were K 2,324,983 (AUD 968,742). With the total benefits for 2017 being K 248,028, the net loss for the year was -K 2,076,955 (-AUD 865,397). Using a discount rate of 20%, the present value of net benefits over a ten-year period is expected to be K 4,113,497 (AUD 1,713,957).

5. Conclusion

This report described the different levels of value for money that have been derived by the WPSMIP in three countries – Fiji, Vanuatu and Papua New Guinea. It highlighted that the project is likely to provide very significant benefits to the community, and is without doubt highly beneficial to the informal settlement households. In Fiji and Vanuatu, their return on an ‘investment’ of a toilet will be worthwhile particularly due to increased access and health. In PNG, the greatest benefits would be derived from those related to reduced mortality and better health.

The analysis of the cash flow based on the assumption that the seed capital is used up as a bulk expense suggests that costs will exceed benefits for the two enterprises in Fiji and PNG. On the other hand, in the enterprise in Vanuatu (TSE), total benefits will exceed the costs, and

suggests that it is the most sustainable of the three at this current stage. The results also highlight that all businesses must maintain a steady growth rate and ensure they receive payments for products sold, or risk becoming less profitable. If they face constraints in expansion or do not receive payments for products sold, they are likely to face significant challenges.

From a project perspective, all three countries are value for money, with the Fiji project being significantly more value for money than those of Vanuatu or PNG.

This study suggests that great care should be taken to ensure that seed capital is used well. Businesses will need to use such funds not as upfront expenses but rather to ensure that they leverage expansion, innovation or more investment. If the opportunity is lost to use these funds in a strategic manner, the viability of the businesses is at risk. Such a risk has significant implications on community benefits. However, businesses can only take strategic decisions if they are well managed and can move into a stage of expansion. Thus, some of the seed funding should be used at the start of the last year of the program to meet the costs of managers of sanitation enterprises and build their capacity.

For policy makers, this study reinforces the fact that sanitation interventions make significant contributions to the community. The lack of policy priority given to sanitation improvements in urban and peri-urban settlements impact on people's ability to improve their economic and social circumstances, and this must be reversed. Donors and governments can be confident that improvements are likely to have significant impacts on target populations. Using market based models for interventions are particularly noteworthy because the likelihood of improved sustainability. However, there must be close, measured and multi-pronged support to social businesses so that maintain both social and financial objectives.

This study also highlighted the importance and challenges of undertaking cost-benefit analyses for WASH and other development projects. They are particularly useful prior to the commencement of projects during design or appraisal, but can also be important during and after completion to assess potential value to stakeholders. As with all cost-benefit analyses, results depend on the data available and while all efforts have been made to ensure that data was accurate and reflected realities on the ground, changes to the contextual and businesses data will have corresponding changes to the results. However, stakeholders can be assured that at this stage, the project is indeed value for money in relation to the three CBSE analysed herein. It is noted that WPSMIP is also supporting five other sanitation enterprises, and it will be important to undertake analysis of these enterprises if they achieve a suitable level of maturity. While there is a greater likelihood of the three analysed herein to be more viable in the future, efforts must be maintained to ensure that as many businesses as possible succeed and if successful, significant and long-term benefits will continue to grow in all countries.

Therefore, as an urgent next step, it is recommended that 'social impact and business viability plans' be developed for selected businesses. These must not simply be costing models or business plans but rather documents that can provide the guiding insights to ensure optimum social impacts and profitability reflecting each social context, organisational structure and business approach. They should also help guide project teams and businesses on the use of seed funding. The project has a chance to make sanitation marketing a successful approach in the Pacific and continued to efforts to achieve key milestones by the end of the project will reinforce or even enhance the benefits highlighted in this report.

Annex 1: Glossary of Terms

- Value for Money:* The total value of the benefits derived from total expenditure of funds.
- Net Present Value:* The difference between the present value of benefit inflows and the present value of cost outflows.
- Present Value:* The current worth of a future sum of money or stream of money flows over a given period of time given a specified discounting rate.
- Discounting:* The process of determining the present value of a payment or a stream of payments that is to be received in the future, considering that money is worth more today than in the future.
- Discounting Rate:* The interest rate used in analysis of flow of money over a period of time to determine the present value given the opportunity cost of capital.
- Sensitivity Analysis:* Type of analysis used to predict the outcome of a decision based on a predetermined set of variables how changes in one variable impact the outcome.
- Opportunity cost:* Opportunity cost refers to a benefit that a person could have received, but gave up, to take another alternative.
- Social impact:* The net social effect of an activity on a community based on the benefits they have received from an external action or activity.