SUMMARY OF RESEARCH REPORT 1

SANITATION VALUE-CHAIN IN NUSA TENGGARA TIMUR INDONESIA

UTS:ISF INSTITUTE FOR SUSTAINABLE FUTURES

ENTERPRISE IN WASH

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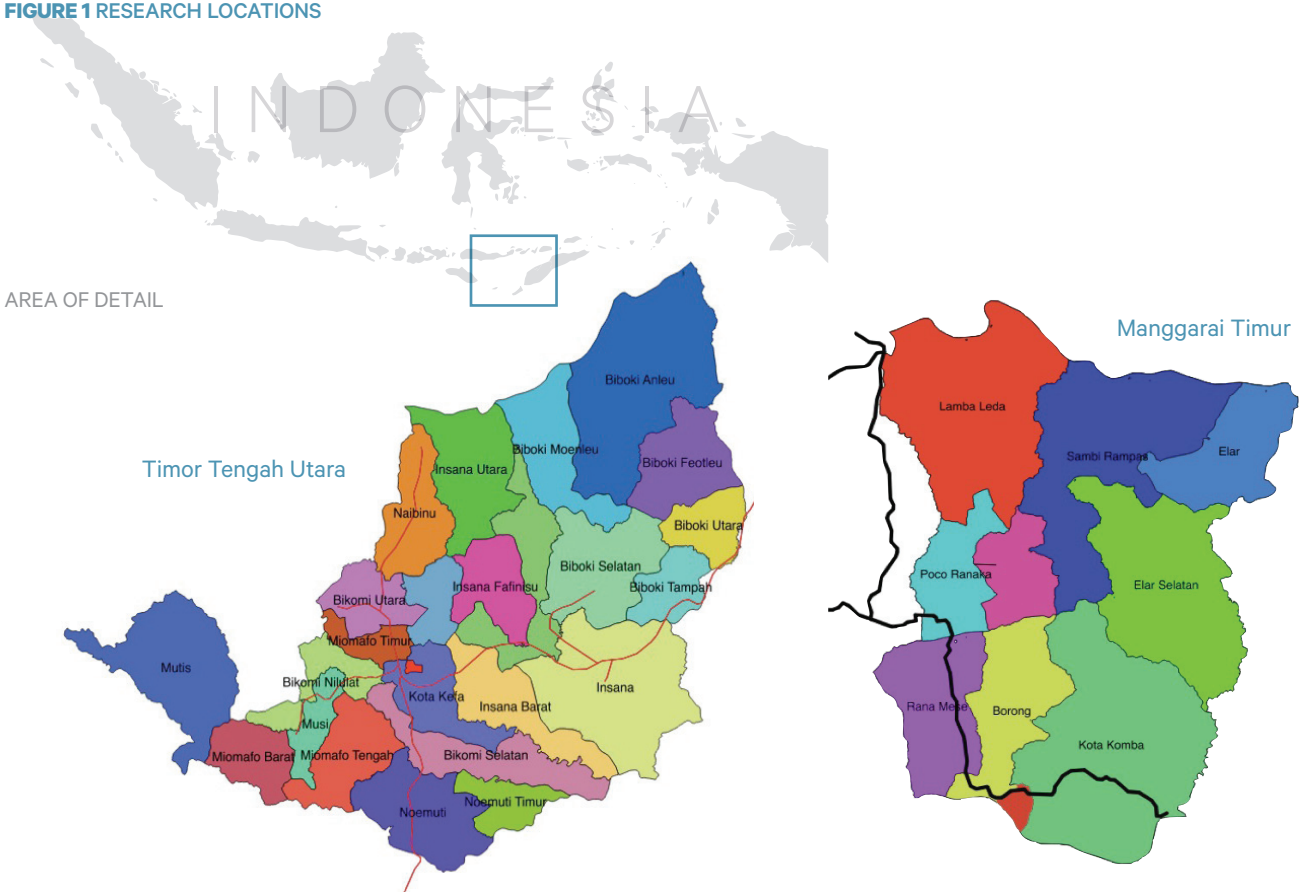
This summary presents key findings of research into the sanitation value-chain in two districts in Eastern Indonesia to understand the viability of market-based solutions in low density settings.

This study examines the sanitation hardware supply in low density settings in Nusa Tenggara Timur (NTT) Indonesia. The research involved a value chain analysis and examined strategies to improve the supply of affordable sanitation products. The research was undertaken in two districts in Nusa Tenggara Timur (NTT), namely Timor Tengah Utara (TTU) and Manggarai Timur (MT) (Figure 1). This study was undertaken by Institute for Sustainable Futures, University of Technology Sydney with University Gadjah Mada in partnership with Plan Indonesia.

The question addressed by this research emerged from practitioners in development agencies currently attempting to support development of supply chains for sanitation products in rural areas. They were concerned about how the low population density and difficult geographical challenges would affect the effectiveness of market-based approaches to improving access to products and services. This led to an interest to investigate the actual costs along supply chains and gain a better understanding of costs and logistics involved in such remote, rural locations.

FIGURE 1 RESEARCH LOCATIONS



STUDY PURPOSE AND METHODS

The research objectives were: (i) To analyse the viability of market-based solutions for sanitation products in low-density areas, including the impact of distance and transport cost; (ii) To map and correlate latrine costs against poverty levels, toilet coverage and other socio-demographic dimensions in remote, rural areas; (ii) To identify strategies that could support availability of affordable, acceptable products for the poor in remote, rural areas, with a key focus on the enabling environment for pro-poor business development.

This research methodology was based on a value-chain analysis, working backwards from the costs of component materials to build toilets at households in three villages in each subdistrict of TTU and MT. For externally sourced materials such as cement, toilet pans and iron and zinc we followed the links up the supply-chain to local materials shops, to district and provincial shops and distributors to producers and manufacturers. The study also considered the prices and availability of locally sourced materials. For the purposes of the analysis three main models of toilet were used (see Figure 2), where Model 1 represents a lined pit and upper structure built with local materials, Model 2 represents a brick-lined pit, cement middle and semi-permanent upper, and Model 3 represents a septic tank with water-sealed pan and permanent structure.

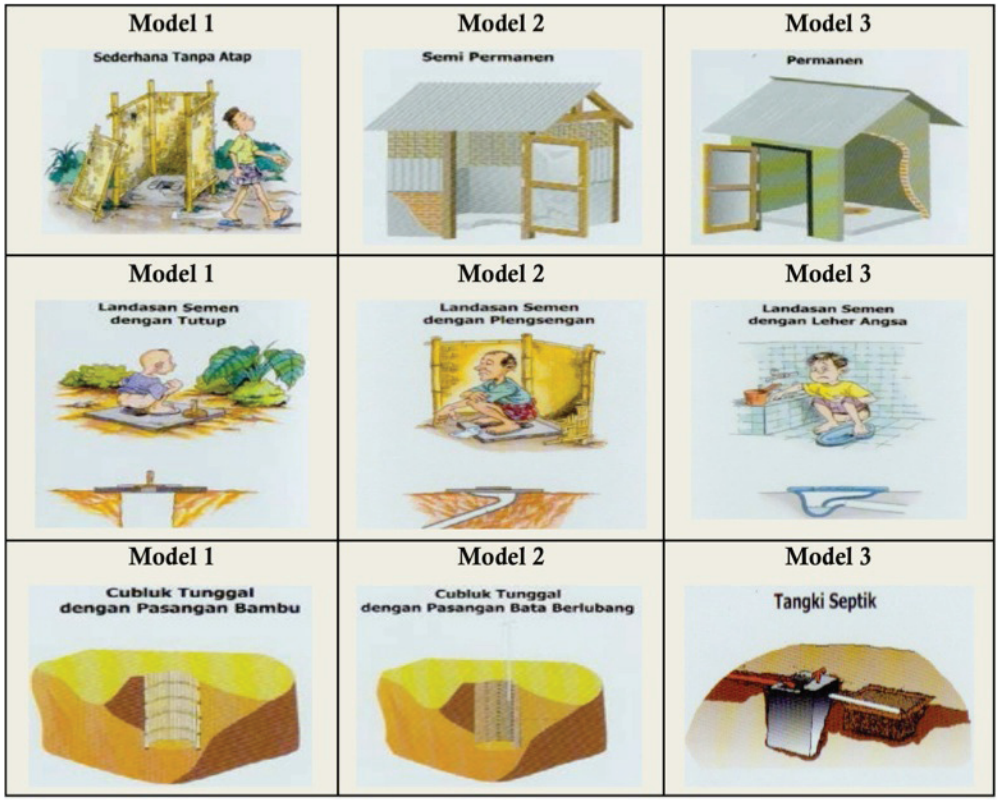
POVERTY, TOILET COVERAGE AND COSTS TO BUILD A TOILET

It was found that in TTU, there was some correlation between level of poverty and subdistricts with the proportion households with durable toilets (Models 2 and 3), in that subdistricts with higher poverty had lower coverage of durable latrines. This was not the case in MT, where no relationship was found, though healthy toilet coverage across the entire district is very low (5-13%).

The real per capital income in TTU was IDR 2.24 million in 2013 (BPS, 2015). In TTU, the materials cost for a Model 3 toilet ranged from IDR 3.8 million in Noemuti Timur to IDR 5 million in Miomafo Tengah. In TTU it was found that the three subdistricts with highest levels of poverty (Miomafo Tengah, Bikomi Nilulat and Musi) also demonstrated the highest costs to build a Model 3 toilet as compared with other locations within TTU.

In MT the real per capita income in 2013 was only IDR 1.61 million (BPS, 2015), much lower than the average of all 22 districts (IDR 2.6 million), and the third lowest in the province. MT also demonstrated high relative costs to build a Model 3 toilet, with the materials cost ranging from IDR 5.7 million in Borong to IDR 10.5 million in Poco Ranaka Timur (185% the cost in Borong). In Sambi Rampas, the subdistrict with highest rate of poverty within MT, the cost is also high, at IDR 7.7 million (136% the cost in Borong).

FIGURE 2 THREE MODELS OF TOILET, COMPRISING BOTTOM, MIDDLE AND UPPER PARTS



TTU

Main cost components for each model of toilet in TTU

MODEL 1

9% BAMBOO

71% WOOD

MODEL 2

28% CEMENT

16% SAND

21% WOOD

9.3% ROCK

MODEL 3

26% CEMENT

15% SAND

12% BRICK

10% REINFORCING IRON

IDR 2.24M

The real per capital income in TTU in 2013 (USD 157) (BPS, 2015)

MT

Main cost components for each model of toilet in MT

MODEL 1

44% BAMBOO

29% WOOD

MODEL 2

22% SAND

18% CEMENT

14% WOOD

12% CONCRETE BRICK

MODEL 3

26% SAND

21% CEMENT

16% CONCRETE BRICK

10% ROCK

IDR 1.61M

The real per capital income in MT in 2013 (USD 113) (BPS, 2015)

MAJOR COST COMPONENTS IN BUILDING A TOILET

In TTU, the main cost components for each model of toilet were, on average (see Figure 3): (i) Model 1: Bamboo (9%), Wood (71%); (ii) Model 2: Cement (28%), Sand (16%), Wood (21%), Rock (9.3%): and (iii) Model 3: Cement (26%), Sand (15%), Brick (12%), Reinforcing iron (10%).

In MT, the main cost components for each model of toilet were, on average: (i) Model 1: Bamboo (44%), Wood (29%); (ii) Model 2: Sand (22%), Cement (18%), Wood (14%) and Concrete brick (12%); (iii) Model 3: Sand (26%), Cement (21%), Concrete brick (16%) and Rock (10%). Across both TTU and MT, in particular villages or subdistricts, if a particular material was expensive (e.g. sand) then this material can make up an even high proportion of the overall cost of the toilet.

The cost of the toilet pan relative to the overall cost of a toilet was very low. In TTU the toilet pan comprised 3.6% of the total materials cost (see Figure 4), and in MT it comprised only 2% of the total materials cost.

FIGURE 3 MATERIALS COSTS FOR TOILETS IN TTU

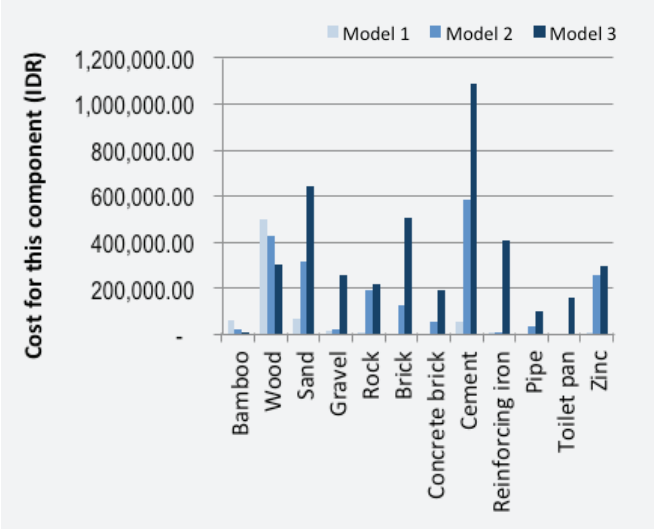
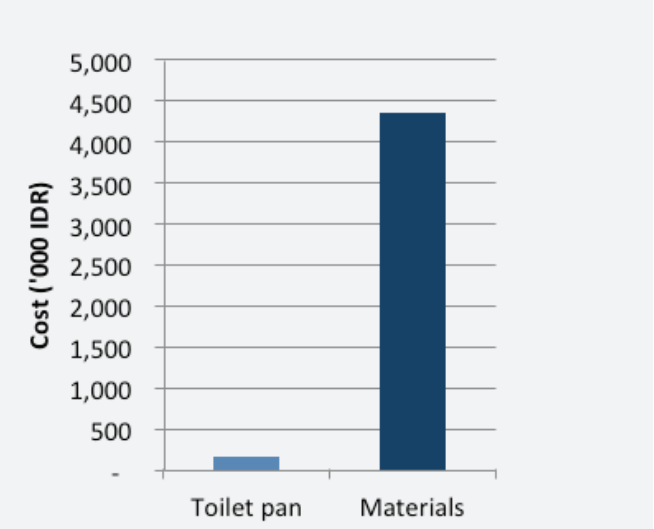


FIGURE 4 COMPARISON OF TOILET PAN WITH TOTAL MATERIAL COST FOR MODEL 3 IN TTU



Significant costs as associated with the upper structure of the toilet, particularly for Model 2 and even more so for Model 3 (see Figure 5). The high cost of the upper structure has also been observed in other country settings, and represents an opportunity to develop light-weight durable, transportable structures to replace current designs.

AVERAGE COSTS IN EACH DISTRICT

The labour cost for toilets was significant for all three models (Figure 6). On average, for all materials, but excluding labour, a Model 1 toilet costs IDR 697,000 in TTU, Model 2 costs IDR 2.2 million and Model 3 costs IDR 4.4 million. If labour costs are taken into account, these rise to IDR 1.1 million (Model 1), IDR 3.4 million (Model 2) and IDR 6.1 million (Model 3). The average materials cost in MT, of a Model 1 toilet is IDR 1.6 million, for Model 2 is IDR 5.8 million, and Model 3 costs IDR 7.6 million. If labour costs are taken into account, these rise to IDR 2.1 million (Model 1), IDR 7.6 million (Model 2) and IDR 10.5 million (Model 3).

FIGURE 5 AVERAGE COST OF BOTTOM, MIDDLE AND UPPER PARTS OF THREE MODELS OF TOILET IN TTU

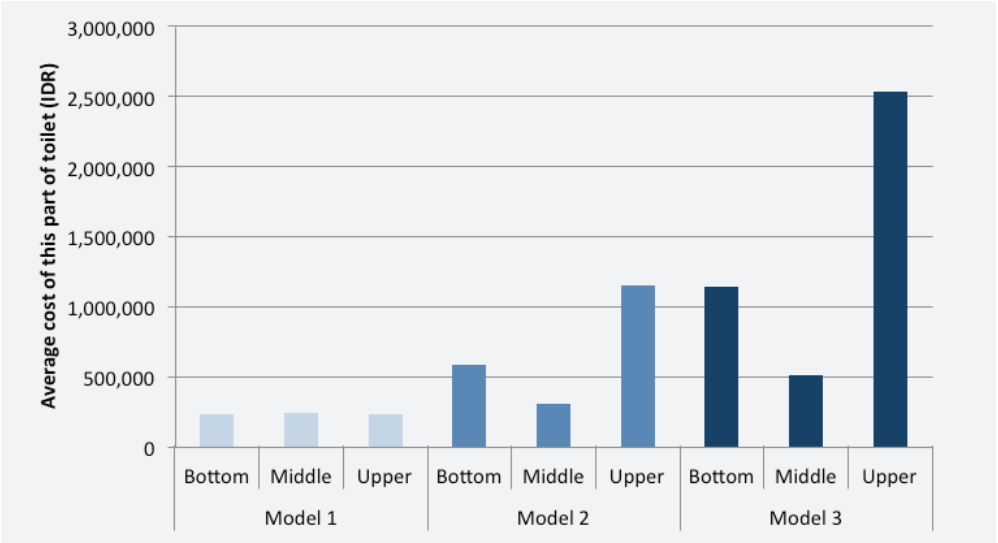
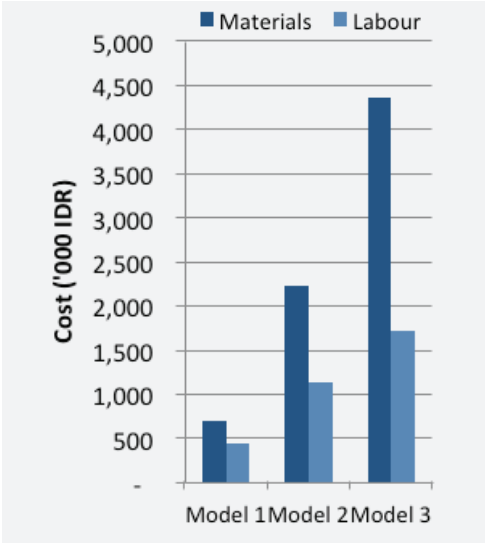


FIGURE 6 COMPARISON OF LABOUR AND MATERIALS COSTS FOR TOILETS IN TTU



TTU

	Cost of toilet: materials only	Cost of toilet: materials & labour
MODEL 1	IDR0.7m (USD 49)	IDR1.1m (USD 77)
MODEL 2	IDR2.2m (USD 154)	IDR3.4m (USD 239)
MODEL 3	IDR4.4m (USD 309)	IDR6.1m (USD 428)

MT

	Cost of toilet: materials only	Cost of toilet: materials & labour
MODEL 1	IDR1.6m (USD 113)	IDR2.1m (USD 147)
MODEL 2	IDR5.8m (USD 407)	IDR7.6m (USD 534)
MODEL 3	IDR7.6m (USD 534)	IDR10.5m (USD 737)

COSTS IN DIFFERENT LOCATIONS

Variation in cost in different locations is caused by transportation and supply-chain costs which affect materials such as cement, reinforcing iron, pipe and zinc. Variation in cost was also caused by major differences in the accessibility and price of locally sourced materials including sand, bricks, gravel, rock and locally manufactured concrete bricks. In fact the latter variations can outweigh the differences in costs related to transport for externally sourced materials. For example in TTU the overall variation in cost of cement as part of the toilet is up to IDR 340,000 whereas the variation in the cost of sand as part of the toilet is up to IDR 660,000.

In TTU, costs varied considerably (Figure 7) and the location with the highest overall cost for a Model 3 toilet is Miomafo Tengah, where materials cost IDR 5 million, resulting from high prices for sand, gravel and brick. Within subdistricts, a variation amongst the three surveyed villages was also found. For instance in the subdistrict of Noemuti, the cost to build a toilet including labour is IDR 5 million in the village of Fatumuti (on the main road and closer to the district capital of Kefamenanu) where as in the village of Popnam, it is IDR 5.5 million, due to higher transport and materials costs.

In MT the lowest cost for toilets was in the district capital of Borong. Variations in cost relative to the subdistrict capital of Borong showed that the average cost throughout the district was 134% of Borong's cost for Model 3, 130% for Model 2, and 123% for Model 1 (Figure 8). The highest relative cost was found to be in Poco Ranaka Timur, where Model 3 toilet was 185% as compared with Borong. This was due to the high price of locally sourced materials (sand, gravel, rock and concrete bricks) rather than being associated with the supply chain for externally sourced materials (e.g. cement). Elar Selatan had the highest transportation costs of materials sourced through a supply-chain (e.g. cement) via materials shops. The transportation costs from Borong to one of the surveyed villages in Elar Selatan was IDR 950,000 and this made up 16% of the cost of building a Model 3 toilet in this village. The relatively low costs of sand, gravel and rock in the subdistrict of Elar Selatan mean that the overall cost of building a toilet in this subdistrict was 139% of that in Borong.

FIGURE 7 MATERIALS COST FOR MODEL 3 TOILET IN SUBDISTRICTS OF TTU

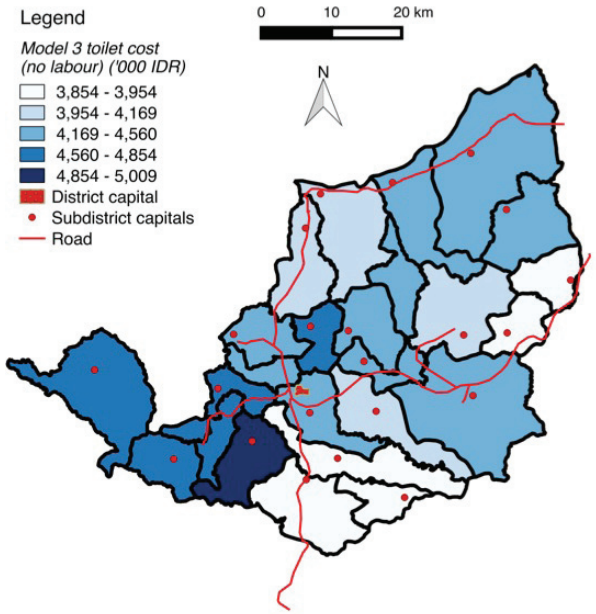
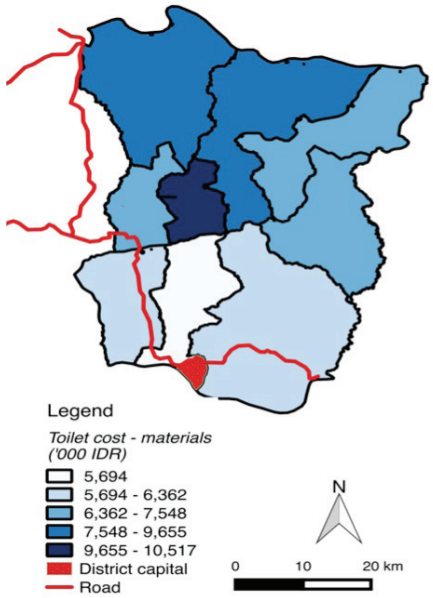


FIGURE 8 MATERIALS COST FOR MODEL 3 TOILET SUBDISTRICTS OF MT



> VARIATION IN COST WAS ALSO CAUSED BY MAJOR DIFFERENCES IN THE ACCESSIBILITY AND PRICE OF LOCALLY SOURCED MATERIALS.

SUPPLY CHAINS FOR EXTERNALLY SOURCED MATERIALS

Two main supply chains were examined, namely cement and toilet pans. Zinc and reinforcing iron are also obtained through similar supply chains.

Cement: For TTU, cement was traced from South Kalimantan and Sulawesi to Kupang (where there is also a local producer), and sold by distributors with profit margins of 5-10%. The subsequent profit margin for retailers at either district or subdistrict level is small, 3-5% and 2-4% respectively, which is tolerated due to the high product turnover. Given the low profit margin however, there is little room for developing economies of scale in the price of cement to reduce the cost of constructing

a toilet. The last leg of the journey from a subdistrict supplier to a village was of variable cost depending on the distance and road conditions. For instance in parts of Biboki Anleu, in the northern part of TTU, the cost of cement at the village level reached IDR 57,000/sack, as compared with 49,500/sack in the district capital of Kefamenanu, an increase of 15%. Cement costs in TTU are shown in Figure 9.

There are no cement producers in MT or on Flores Island and hence cement is sourced from Surabaya, Makassar or Kupang. Cement is sold for IDR 50,000/sack in Borong. Depending on the location of the buyer within MT, transportation cost to bring the cement is usually between IDR 2,500/sack to IDR 10,000/sack, though in the furthest survey village there is an additional cost of more than IDR 15,000/sack (more than 30% higher cost than in Borong) (see Figure 10).

FIGURE 9 CEMENT COSTS IN TTU

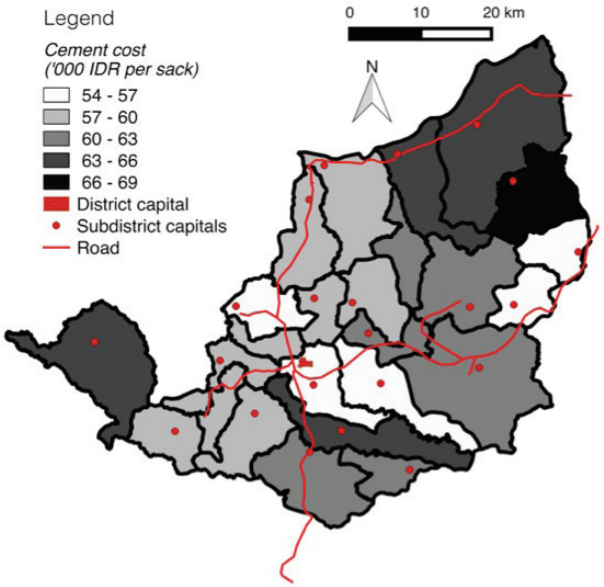
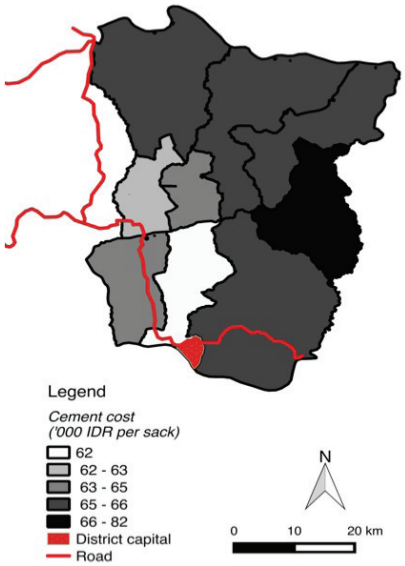


FIGURE 10 CEMENT COSTS IN MT



Cement transportation from factory in Kupang

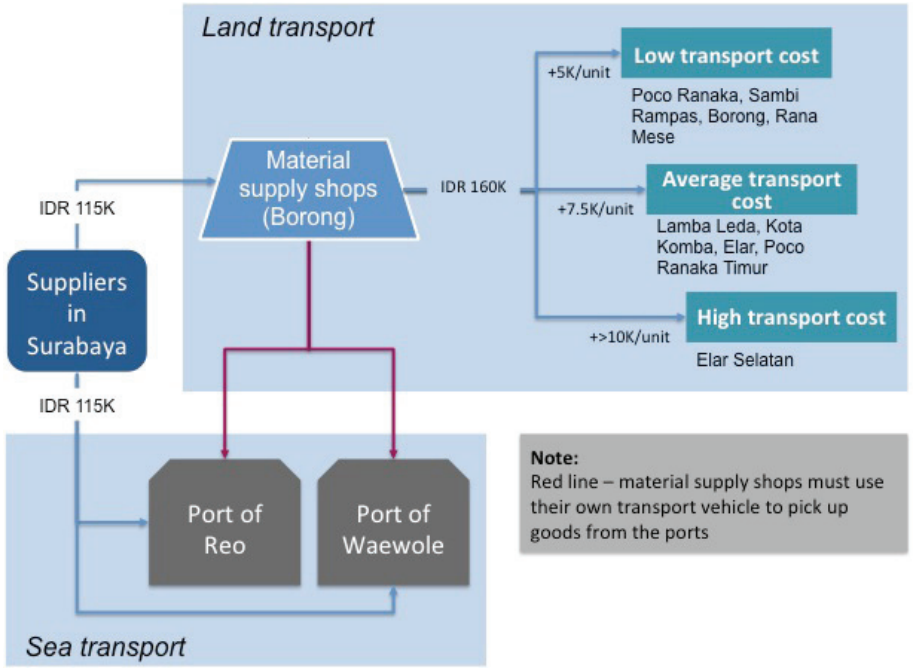
Cement being transported by truck

Supply shop in Kefamenanu, TTU

Toilet pans: Toilet pans are generally manufactured in Java Island, and transported and distributed through Surabaya. Local production of toilet pans in TTU has also been initiated through support from Plan Indonesia (generally sold for IDR50,000). Cheaper brands sold by manufacturer near Surabaya at a cost of IDR 80,000 per unit. Distributors in Surabaya mark these up by IDR 5,000 per unit, and from here they are transported to Kupang or to Kefamenanu. In Kefamenanu, a profit margin of 10-23% is added, with a selling price of IDR 130,000. Subdistrict shops, generally reported that they purchase toilet pans in Kupang rather than Kefamenanu to increase their profit margin. The final cost of the toilet pan in different villages varies from IDR 125,000 up to IDR 300,000 depending on the location.

In MT toilet pans are brought in from Surabaya via land expedition (overland on the islands and door-to-door), or otherwise via sea expedition and supply shops retrieve the items from a port in Reo in the adjacent district in the north or the island (see Figure 11). The toilet pans are bought from Surabaya for IDR 115,000 and the price increases to IDR 160,000 in Borong. Profit margin is larger than for cement (1.39 relative to Surabaya versus 1.16 ratio for cement). Transport costs is an additional IDR 10,000 depending on location of the village.

FIGURE 11 SUPPLY CHAIN FOR TOILET PANS IN MT



LOCALLY SOURCED MATERIALS

Major variations were found in the prices of locally sourced materials. Given that these are major cost components when building a toilet, the overall cost of a toilet is significantly influenced by variations in such prices. Variations in cost of locally produced materials in TTU were as follows: sand varies from IDR 40,000-200,000/m^3; bricks vary from IDR 450,000 - 900,000/m^3, concrete bricks vary from IDR 375000-750,000/m^3, rock varies from IDR 50,000- 150,000/m^3, gravel varies from IDR 50,000-250,000/m^3. Bamboo can vary 25-fold and wood 5-fold.

In MT, similar variations were found as follows: sand varies from IDR 100,000-300,000/m^3; gravel varies from IDR 70,000-400,000/m^3 and rock varies from IDR 100,000-300,000/m^3. Bamboo can vary 7-fold and wood 3-fold. In MT the government has introduced a fee for removal of sand, gravel and rock which affects prices for these items.

TTU

Variations in cost of locally produced materials:

SAND/M^3
IDR 40,000-200,000 (USD 2.8–14)

BRICKS/M^3
IDR 450,000-900,000 (USD 31–63)

CONCRETE BRICKS/M^3
IDR 375,000-750,000 (USD 26–52)

ROCK/M^3
IDR 50,000-150,000 (USD 3.5–10.5)

GRAVEL/M^3
IDR 50,000-250,000 (USD 3.5–17.5)

BAMBOO
25-FOLD

WOOD
5-FOLD

MT

Variations in cost of locally produced materials:

SAND/M^3
IDR 100,000-300,000 (USD 7–21)

GRAVEL/M^3
IDR 70,000-400,000 (USD 5–28)

ROCK/M^3
IDR 100,000-300,000 (USD 7–21)

BAMBOO
7-FOLD

WOOD
3-FOLD

TRANSPORT COSTS AND TRANSPORT BUSINESS

Transportation of toilet materials to villages: In TTU when a household constructs a toilet, they generally transport materials from the store themselves, with only 4% of the households reporting that the materials were delivered by the store to their home. The majority of the households (78%) paid to travel to go and buy materials (IDR 10,000 to IDR 70,000). The most common transportation means to bring materials to villages was pick-up (60% of cases), followed by truck (27%). The condition of the roads of approximately half of the surveyed villages was reported to be poor or very poor. Surveyed village locations were up to 35 miles travel from their subdistrict capital (for example Maurisu Selatan in Bikomi Selatan), and were an average distance of 8 miles from the subdistrict capital. Transport costs in a pick-up from subdistrict supply shops to village locations were generally between IDR100,000 and IDR 300,000 across TTU, and were IDR 350,000 for Maurisu Selatan. In the latter case, this transportation cost comprised 9% of the total cost of materials in that location.

From all households interviewed in MT, more than half (57%) must pay for transportation services. Nearly half (48%) of materials bought must be delivered using trucks and 19% use pick-ups. In addition, the large majority (89%) of respondents said that they must arrange their own transport to bring the materials to their villages. In MT the cheapest transport from a materials shop to surveyed subdistrict was IDR 173,000 (Poco Ranaka) and highest was IDR 753,000 (Elar Selatan). The very high transport cost in Elar Selatan is due to geographical challenges where it could took 9 or more hours to travel from Elar Selatan's subdistrict capital to Borong.

Transport sector: In TTU within the transport sector, high levels of competition exist at provincial and district level and serve to maintain lower prices. Subdistrict transport businesses however reported on their monopoly status in their geographic location. The transportation business is known to be a profitable one. It was reported to be more profitable (10% profit) than owning a shop (1-2% profit) by a truck owner in Kefamenanu, and a driver reported that he could earn more than double the amount of an alternative job he had renting tables and chairs.

The transportation business in MT is very competitive with around 30-50 transport providers, thanks to the availability of new and cheaper cars. Within the district and sub-districts, generally otocalls or trucks are owned by an individual who focuses in serving a small share of the market (1-2 routes). There are no transport companies who own several transport units serving several routes. Therefore, for a given route there is no price variation. Prices haven't changed significantly in the last 5 years, even when fuel price increased in 2010. Consequently, some transport owners said that they decided to move away from transportation services.

MATERIALS SUPPLY SHOPS

Materials supply shops are important players in the value chain, and hence understanding how they operate, and if and how they can provide discounts or credit to customers is important when considering how to increase affordability of sanitation products in rural areas.

MATERIALS SHOPS IN TTU	
Size, revenue and formal legal status	Shops in the district capital and subdistricts were all registered, with revenue of between IDR 10 million to IDR 50 million/month, and anywhere from 1-4 employees (in subdistricts) to 5-17 employees (in the district capital).
Credit and discounts for customers	In both district and subdistricts of TTU, there was evidence that trusted customers would be allowed to delay their payment for a short time (eg 2-4 weeks) for some proportion of the payment (e.g. 20%) of up to a few million Rupees. Discounts could offered to customers who buy in bulk, though the quantity required varied- one shop suggested for 50 sacks of cement, whilst another suggested for 100-200 sacks of cement.
Choosing suppliers	District shops generally choose suppliers in Surabaya rather than Kupang to reduce their costs. Subdistrict shops chose suppliers on the basis of informal relationships and partnerships.
Competition	There was significant competition in the district capital, and much less so in the subdistricts, which generally had a monopoly for their geographical area. Subdistrict shops reported challenges in addressing competition with district shops however (in Kefamenanu and Atambua) as the latter were able to provide cheaper prices that were attractive to customers.
Transport	District shops all own vehicles (around 1-3 large trucks and 2-3 smaller trucks) for their own deliveries (not rented out for other purposes), and in the subdistricts, shops also usually owned 2-3 trucks. For some subdistrict shops the transportation was included in the accounting for the overall business, and for one of these, the cost of transportation was included in the materials price. In another case transportation was treated as a separate business entity from the shop, and the trucks were rented out. Shops reported that vehicles generally return home empty after making deliveries and road access depended on the weather and location.
Participation in partnerships	Shops had experienced large contracts to provide construction materials for buildings, however none of the shops had experience of a partnership with masons or sanitation entrepreneurs.

MATERIALS SHOPS IN MT	
Size, revenue and formal legal status	All shops were also formally registered, and had gross revenue from IDR 10 million up to more than IDR 150 million per month, 2-11 full-time employees.
Credit and discounts for customers	Shops were generally reluctant to provide credit to customers, with exception of loyal or close customers. Some shops provide a 5-10% discount to bulk purchase (value more than IDR 10 million).
Choosing suppliers	There was no dominant method of choosing suppliers, for instance it could be a price differential or contact with a sales agent.
Competition	The number of materials supply shops is around 6-7, with most located in Borong, the district capital. Competition is by price and also provision of service (e.g. having a car to deliver).
Transport	All shops have at least 1 pickup with capacity of 1-1.5 ton (one shop has a truck with capacity of $3m^3$) and pickups delivering items to customer is usually return empty.
Participation in partnerships	There was no evidence of partnership between materials supply shops with other companies/masons.

ACCESS TO CREDIT FOR ENTERPRISES

In both TTU and MT there is ready access to bank BRI loans (1-1.25%/month repayment) and to cooperatives with higher rates (2.1%/moth but longer repayment rates. In TTU it was reported that DSMET were attempting to make access to credit more accessible through easing the need for guarantees, and also trying to offer cheap loans (0.7%/month) through LPDB (Lembaga Pengelola Dana Bergulir) a credit provider organisation.

GOVERNMENT AND POLICY ENVIRONMENT

Government's role is mainly related to promotion of healthy sanitation, which is under the auspices of Department of Health (DoH). District governments currently play no direct role with respect to the supply chain of sanitation materials. On the one hand this is understandable as the supply chain of sanitation materials is market based. However, support from government could help optimise the supply chain, support sanitation entrepreneurs, and reduce costs for the poor.

In TTU attention has been given to sanitation over recent years, particularly through the support of Plan Indonesia working with DoH staff at district and subdistrict levels. There has been limited coordination between departments to support the supply chain, and ad hoc spending of government budget to support materials for toilets has occurred rather than systematic support of the supply chain. Ad hoc support in the form of materials provided directly to small numbers of households can reduce both demand (as households decide they will 'wait' until they too are provided for) and also reduce the viability of the supply chain (if purchase of materials is focused at district level and by-passes subdistrict shops) and hence should be given attention. Recent changes to the definitions of a healthy toilet has affected monitoring of toilets and may serve to increase the focus on building durable rather than make-shift latrines. Lastly, sanitation entrepreneurs have not received support through DSMET however could collectively apply in the future for support to develop their businesses.

In MT sanitation was not a priority until recently when Plan commenced supportting the implementation of STBM. The department of industry, trade, cooperatives, and SMEs (Disperindagkop & UKM) have allocated funding for training of sanitation entrepreneurs in their 5-year budget plan proposal, which is subject to approval by the legislative, targeting 30 trainees per year for 3 years (2015-2018). The budget commitment is IDR 250 million (2015), IDR 260 million (2016), IDR 265 million (2017), and IDR 270 million (2018). Plan and the District Department of industry, trade, cooperatives, and SMEs have been doing advocacy work with the legislative and it's hoped this will result in the approval of the budget plan for sanitation marketing activities.

> In the case of locally sourced items, it was found that price variations in these items were significant and could outweigh the variations in cost of externally sourced items, particularly in the case of TTU.

> There was evidence that in areas of high poverty, the costs of durable toilets are high.

SUMMARY OF KEY FINDINGS

To fulfil the objective of improving the availability and affordability of products and services to build toilets, particularly in areas of higher poverty, there are a range of actions which can be considered. Some key points concerning the findings of this study that should inform development of such strategies are as follows.

1 Toilet costs are made up of costs of externally sourced items (subject to increases in costs along the supply chain and transport costs) and locally sourced items (subject to local variations). In the case of externally sourced items (cement, toilet pans, reinforcing iron and zinc sheets) there is little opportunity to optimise the supply chain. Cement which comprises 21-28% of the cost of a durable toilet, offers little profit margin already to actors in the supply chain. Although the toilet pan costs could be reduced (and indeed are through locally supported production in TTU), they comprise a very small proportion of the overall toilet cost. In the case of locally sourced items (sand, gravel, rock, bricks etc.), it was found that price variations in these items were significant and could outweigh the variations in cost of externally sourced items, particularly in the case of TTU.

2 There was evidence that in areas of high poverty, the costs of durable toilets are high. For instance the three subdistricts of TTU with highest poverty also had the highest costs, and the subdistrict in MT with highest poverty rate had toilet costs of 139% compared with the cost in the district capital of Borong. Therefore there may be a case to target locations with high poverty rates and high costs of toilet provisions. Transport costs are highly variable depending on the location, and incidences of monopoly in the transport sector was found, where there is only one service provider available who can therefore set their prices without competition. There may be room to reduce transport costs through development of business models that include transport. This study did not specifically investigate areas without road access, however global data points to the typically low sanitation coverage (for example in Laos access to sanitation in rural locations without road access if 23% as opposed to 51 % in rural locations with road access) (JMP, 2012).

3 Sanitation products are not made available in a consolidated package to households in that there were almost no sales of toilet packages (with or without installation) in either TTU or MT. In addition, labour is a significant cost component in both TTU and MT, and presents an opportunity to consider how such costs might be subsidised or reduced. Finally, the cost of the upper structure of the toilet is significant, and represents a major opportunity to reduce costs and materials use.

Local concrete brick production

STRATEGIES TO IMPROVE AFFORDABILITY OF TOILETS IN NTT

Based on these key findings, the following strategies could be considered by government and other development agencies to improve affordability and accessibility of rural households to sanitation products and services.

Seek opportunities to reduce costs of locally sourced materials: Further investigation into the costs of locally sourced materials and reasons behind large variations in their cost may reveal strategies to reduce costs. As a minimum, if collective purchasing of materials can be arranged then costs for these materials (and related transport costs) may be able to be reduced.

Support further design development of the upper structure: Given large cost for 'upper' structure there is a need to examine other design options to reduce the costs involved this part of the toilet. It is unnecessary (in terms of providing a hygienic latrine) to have a building made of heavy materials such as bricks, reinforcing iron and cement, however in Indonesia and elsewhere it is understood that this structure is important from a consumer perspective. Ideally, a structure that uses durable locally produced lightweight materials would represent a sustainable option.

Supporting sanitation entrepreneurs to rethink their business model: There is a need to move beyond a focus on the toilet pan, which comprises such a small proportion of the overall cost of building a toilet. In particular, new business models that combine the following elements should be considered:

- focus on 'packages' for consumers that consolidate all the items required (ensuring that multiple 'packages' of different cost and quality are included), both with and without installation
- integration of transport within the business (given that monopoly on transport businesses in subdistricts of TTU and throughout MT increases transport costs)
- development of 'partnerships' with materials suppliers and sellers of locally produced materials to support reduced costs for the entrepreneur and increased bulk purchasing sales for the suppliers

Access to finance for customers: Approaches that can reduce the outlay for households, including rotating funds, credit from sanitation entrepreneurs should be considered.

Association of sanitation entrepreneurs: The value of a collective organisation to support sanitation entrepreneurs has been established through another study (Murta et al., 2015), and represents an opportunity in TTU, and potentially MT, to provide support for entrepreneurs to develop the above described or alternate business models. Funding support may be requested through DSMET, and could be focused on development and implementation of new business models described above. An association can also support sharing of skills, and developing economies of scale for entrepreneurs etc.

Organising communities for collective purchasing: Communities can be encouraged and supported to buy materials as collectives to reduce costs. Both community leaders and government staff can promote this approach, and apply incentives (such as time-bound financial support) to support development of momentum and action.

Smart targeted subsidies: Given the need to support the poor, thought must be given to how to address affordability concerns, whilst avoiding undermining private sector actors (sanitation entrepreneurs and materials supply shops) by providing non-targeted subsidies. In many countries the need to develop 'smart' subsidies has been discussed (and in some cases trialled) to look to overcome this inherent tension. A range of types of subsidies are described in the literature, with varying advantages and disadvantages. Design of a 'smart subsidy' involves considering issues in the local context in choice of subsidy, and 'designing-in' mitigating strategies for any disadvantages. Some subsidies that involve partnerships or contracts with supply shops and require several steps in their development to ensure equitable participation of supply chain actors and ensure agreements are transparent and upheld. In some other country contexts methods to 'accredit' certain suppliers have been adopted, involving suppliers agreeing to criteria around product quality, amenability to bulk delivery, price guarantees and guarantees to only provide services to eligible households.

Given the high labour costs in TTU and MT for building toilets, one potential target for a subsidy could be the labour component. Such a subsidy could be funded through government funds, but implemented by another organisation (e.g. a non-governmental organisation) and could involve a variety of models, from directly employing masons to build toilets in a cost-sharing arrangement with poor households, to vouchers provided to households to support labour costs. One advantage of a focus on subsiding labour costs might also be the chance to allow oversight of the technical quality of toilets build, such that payments are only made for constructions of sufficient quality (including the underground section which is most critical for protecting environmental health).

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This summary draws on the following report: Willetts, J., Susamto, A.A., Sanjaya, M.R., Murta, J. and Carrard, N. (2015) *Sanitation value-chain in Nusa Tenggara Timur Indonesia,* Enterprise in WASH – Research Report 1, Institute for Sustainable Futures, University of Technology Sydney

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ENTERPRISE IN WASH

'Enterprise in WASH' is a joint research project led by the Institute for Sustainable Futures (ISF) at the University of Technology Sydney, which investigates the role of private and social enterprises in the delivery of water, sanitation and hygiene (WASH) services for the poor. For other Enterprise in WASH publications, see www.enterpriseinwash.info

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