

**37th WEDC International Conference, Hanoi, Vietnam, 2014**

**SUSTAINABLE WATER AND SANITATION SERVICES  
FOR ALL IN A FAST CHANGING WORLD**

## **Relying on markets to address human rights: sanitation supply chain analysis in low-density settings**

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**REFEREED PAPER**

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*Market-based approaches to improving sanitation coverage have increased in recent years, however the equity implications of these approaches, particularly in the face of the recently established human right to sanitation in 2010, requires a closer examination of the costs of sanitation products and services in remote, rural locations. This paper presents results from a recent study examining the sanitation supply-chain in the province of Dien Bien in north-west Vietnam, a low-density rural setting with high rates of poverty. It was found that current toilet coverage is lower in areas of high poverty, and that these areas also experience the highest costs of sanitation products due to the impact of distance and transport costs. We conclude that market-based approaches require nuanced application and that other forms of support or significant market intervention are likely required to ensure equitable outcomes in remote rural contexts.*

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### **Introduction**

This paper presents results from a recent study examining the sanitation supply-chain in the province of Dien Bien, in north-west Vietnam. In recent years a focus on how the market can deliver sanitation products and services has become an integral part of the programming of many non-governmental organisations (NGOs) and other agencies. In the diffusion of this approach, namely ‘sanitation marketing’, attention has not always been paid to the differing contexts in which the approach is applied, and the implications of this for potential success, effectiveness and equity outcomes (Gero et al., 2013). This paper focuses on low-density rural settings with high rates of poverty, and in particular looks at the impact of distance and transport cost. We examine costs along the supply chain to consider whether the market is able to deliver such services at affordable prices to people living in poverty. This is important in the context of sanitation as a human right, which obliges governments to support an enabling environment for such people to satisfy their sanitation needs, including durable, long-lasting latrines likely to require products acquired through supply-chains.

### **Methods**

This study was undertaken in the province of Dien Bien, Vietnam, with a focus on the district of Muong Ang, an area of significant poverty and strong ethnic diversity (see Figure 1). Muong Ang was chosen as the study area as it included both areas serviced by roads, as well as remote locations that are difficult to reach due to poor quality roads and the dispersed nature of settlements. The research mapped the supply chain, including outputs and the physical flow of commodities along the chain (Kaplinsky and Morris, 2000). This included a sample frame of suppliers, producers, transporters, retailers, installers (masons) and consumers, and including related businesses (e.g. brick makers). Fieldwork was conducted in January 2014, involving semi-structured interviews with key actors along the supply chain, as well as a sample of households who

had recently purchased sanitation products and services. Interviewees included: two hardware shop owners in Muong Ang town, worker at a local brick factory, two transport providers in Muong Ang, five masons in three different communes, local authorities, health station staff, Vietnam Women’s Union representatives in three communes and household members in three communes.



**Figure 1. Study area of Muong Ang District, Dien Bien Province, Vietnam**

Source: Google Maps

Economic analysis and spatial analysis using geographic information system (GIS) were used to examine the supply chain. Both quantitative and qualitative data were collected, with key qualitative information including the skills and capacity, employment of women, level of entrepreneurship, access to credit and key supply-chain governance considerations. Information about costs of products and labour were also collected from each supply chain actor. The products for which costs were collected included: cement, steel, toilet pans and roof tiles. Three main toilet types were used to examine how distance and transport costs affected the cost of sanitation products in remote areas. These three toilet types are approved by Ministry of Health Vietnam were the double vault latrine, pit latrine and pour-flush latrine with a septic tank. The design and related materials quantities followed in this study were those proposed by the Ministry.

## Findings

### Costs along the supply chain

Materials used to construct latrines included locally manufactured products (e.g. cement, sand, gravel, brick) as well as components brought in from external locations (e.g. toilet pan, steel and iron, roof tile and plastic pipe). It was found that the supply chain for most materials was optimised in that low profit margins were accepted by supply shops in Muong Ang. The business owners reported rapid turnover of relevant materials (cement, steel etc.) since these are commonly used construction materials. Cement was produced locally in Dien Bien Phu, the provincial capital, which was relatively close to Muong Ang (approximately 50km). One supply shop reported a turnover of 400 tonnes per month of cement and daily deliveries, making a 7% profit for small purchases and 5% profit for larger purchases. Toilet pans were generally purchased from companies in the region surrounding Hanoi, and were sold with a 16% profit margin. One of the most significant costs for locations outside the district centre was transport, as discussed further below.

### Key factors affecting the supply chain

Qualitative information about the supply chain revealed the importance of relationships on how the supply chain operated. This was especially important with respect to transport providers, who displayed a

high level of discretion about their profit margin and negotiated different rates for different clients. For example, one transport provider noted that to transport materials to Xuan Lao (a commune in Muong Ang), it “costs over 1M (Vietnamese Dong) to get there but depends on negotiation with the customer. This means how well you know the person. It is a bargaining process.” Relationships between shop owners and customers also had a strong influence on a customer’s access to credit – the better the relationship between the two, the more credit and longer repayment terms offered. Business owners reported that they offered credit to a large proportion of their customers. Repayment terms were loose, and it was generally expected that debts be repaid before the lunar new year each year. However supply shops reported a heavy burden of seeking payments each year from their customers, and one shop reported reducing their offer of credit over time due to this burden.

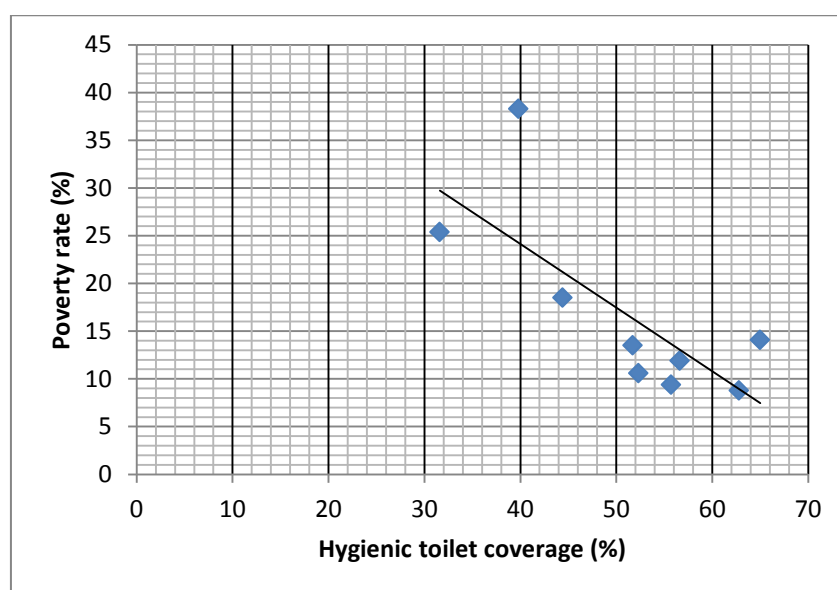
The number of transport providers has increased in Muong Ang over recent years, with one provider estimating that 100 local trucks service the area. Despite the increase in competition, truck drivers were still able to make considerable profit per trip, although their margins and total profits did appear to be decreasing with the growing number of transport businesses in the area. Profit margins for transport providers delivering construction materials were between 53 – 69%. This was considerably higher than the margins reported by other actors in the supply chain. Logistical challenges in transporting materials were also present in the supply chain, as transport providers and other interviewees noted the difficulty in delivering materials beyond the commune (or sometimes village) centre, which often requires transportation by motorbike.

Additional issues also affect the operation of the supply chain. Demand for latrines is generally low, particularly for some ethnic groups. Other factors include roles played by government staff, availability of skills to build quality toilets and varied availability of loans from the social policy bank, which are not within the scope of this paper but contribute to the complex situation of latrine demand and affordability.

### Mapping of key parameters

Two main analyses were undertaken to examine equity with respect to access to sanitation products and services. Firstly, poverty and hygienic toilet coverage were reviewed (see Table 1), and a negative correlation detected (see Figure 2). This finding demonstrated that higher incidence of poverty was associated with lower coverage of hygienic latrines. One slight outlier was the commune of Bung Lao, and this result is explained by the location of this commune along the main road, with easy access to materials.

Commune	Population	Number of households	Poverty rate (%)	Hygienic toilet coverage (%)
Muong Ang town	5282	1725	7.9	-
Ang Cang	6675	1357	51.7	13.5
Ang To	5338	1082	44.4	18.5
Ang Nua	3442	771	31.6	25.4
Bung Lao	5372	1152	39.8	38.3
Xuan Lao	4821	928	56.6	11.9
Muong Lan	3972	773	62.8	8.8
Nam Lich	2791	510	65	14.1
Muong Dang	3472	714	52.3	10.6
Ngoi Cay	3092	614	55.7	9.4



**Figure 2. Poverty and toilet coverage by commune for Muong Ang District** (Source: CPM and CRES)

Secondly, the impact of distance and transport costs was analysed with respect to the three key toilet types. Transportation costs to commune centres resulted in total costs 117% to 224% of the cost of latrine materials in Muong Ang town (see Table 2), depending on the location and toilet type. In particular, costs in two communes demonstrated major increases (as represented by the dark grey colour in Figure 3, which illustrates costs for pit latrines at commune centres). Areas with higher costs of latrines also corresponded to areas of higher poverty (as may be seen in Figure 4), as poverty rates range from less than 8% in Muong Ang Town, up to 65% in one of the remote communes. Beyond the costs to bring materials to the commune centre, further transportation costs to remote villages increased costs to up to 290% of the cost in Muong Ang town. The time required to transport materials by motorbike was estimated to be up to 3 days of repeated trips by motorbike for a pit latrine (see Figure 5) an impractical 9-12 days for a double vault latrine and even more for a septic tank. One mason interviewee provided an example of this difficulty: “*Last year, I received 3 orders in Nam Lich for septic tank latrine. But it was too far to transport the materials so I had to refuse these customers. The only way to bring material to that household is by motorbike. In most towns you can carry 100 bricks – [but the] maximum you can carry to that village is 30 bricks*”.

Commune	Double vault latrine	Pit latrine	Pour-flush with septic tank
Muong Ang	2,233,125 VND (US\$105)	888,500 VND (US\$42)	5,117,125 VND (US\$241)
Nam Lich	2,983,125 VND (US\$140)	1,388,500 VND (US\$65)	6,017,125 VND (US\$282)
Muong Lan	3,433,125 VND (US\$161)	1,688,500 VND (US\$79)	6,717,125 VND (US\$316)
Muong Dang	3,326,875 VND (US\$156)	1,617,667 VND (US\$76)	5,981,708 VND (US\$281)
Ngoi Cay	3,920,625 VND (US\$184)	2,013,500 VND (US\$95)	6,879,625 VND (US\$323)
Ang Cang	2,513,125 VND (US\$118)	1,148,500 VND (US\$54)	5,447,125 VND (US\$256)
Xuan Lao	3,883,125 VND (US\$183)	1,988,500 VND (US\$93)	7,097,125 VND (US\$334)

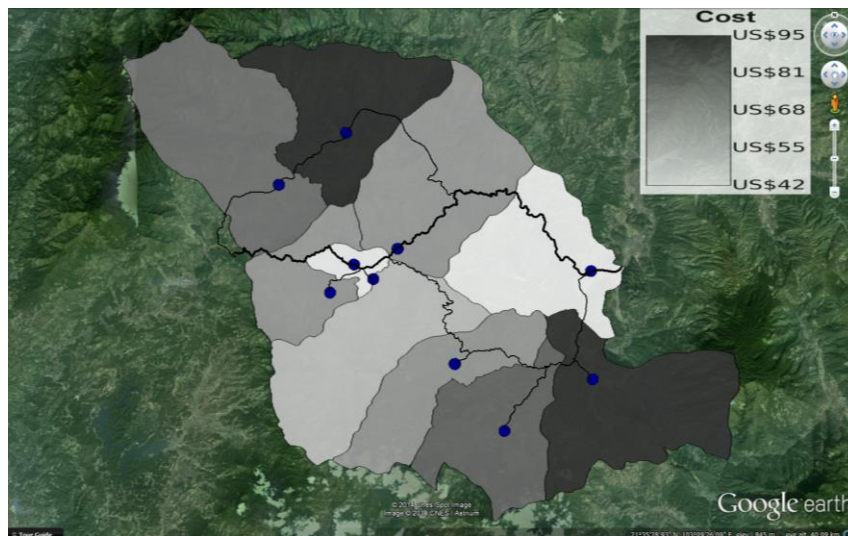


Figure 3. Pit latrine costs (including transport) to commune centres in Muong Ang (Source: ISF)

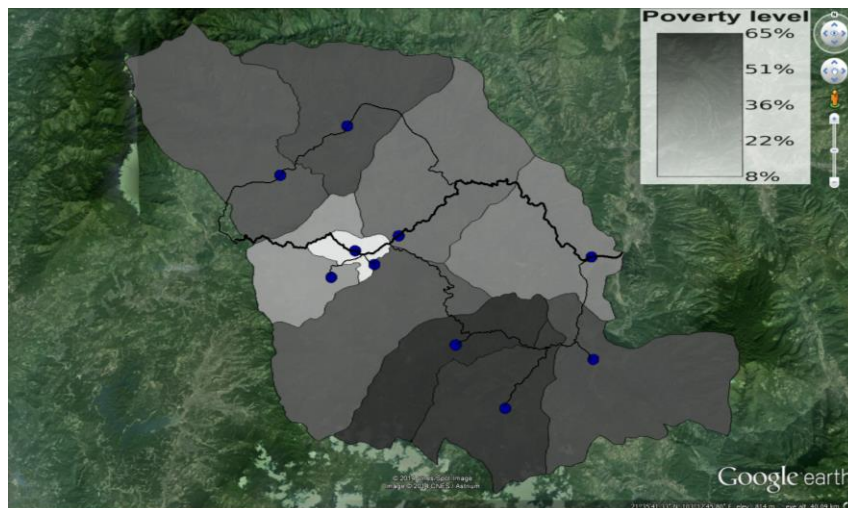


Figure 4. Poverty rates by commune in Muong Ang District. (Source: CRES)

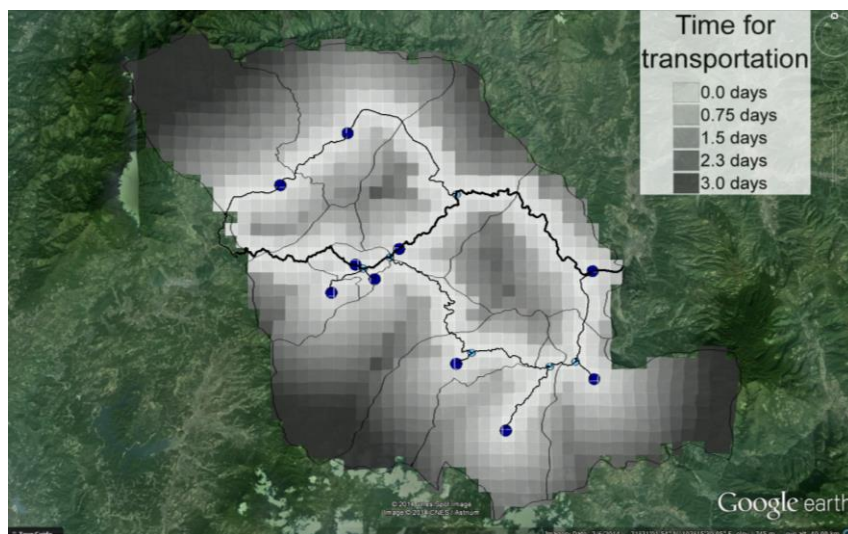


Figure 5. Time for transportation of materials for pit latrines beyond commune centres in Muong Ang District. (Source: ISF)

## Discussion and conclusion

Through a study of Muong Ang District in north-west Vietnam, it was revealed that areas with higher poverty also exhibit lower sanitation coverage, and that the costs of sanitation products and services in more remote, poor areas are also higher due to transportation costs and exacerbated by the high profit margins of transport providers. In addition, the logistical challenge of transporting relevant materials beyond locations serviced by roads arose as a key barrier by masons servicing remote areas and households.

Whilst cost is not the only factor affecting access to sanitation, these findings raise questions about equitable approaches to addressing sanitation. They point to the potential need for public sector interventions to address this market failure, given the human right to sanitation, and given the public as well as private benefits of improved sanitation. The district of Muong Ang described in this paper is relatively accessible as compared with other areas of the province of Dien Bien, since the main road between Hanoi and Dien Bien passes through this district. The cost of materials in more remote district capital towns in the province is higher than Muong Ang (up to 65% higher for cement and 94% higher for toilet pans), and costs to transport materials to communes beyond these district centres are also higher.

The findings of this research raises questions about the current standardised latrine types approved by the Ministry of Health and the potential for design innovation, as the quantity and cost of the materials used in these approved latrine designs is high. In particular there may be other designs of the pit latrine and double vault latrine, both suitable for rural areas, that require much lower quantities of materials purchased through supply chains. It is understood that Ministry of Health are currently developing lower-cost models of latrine, however there is also a need for significant support to research and development into product design to develop attractive, light-weight yet durable latrine slabs (for instance using other materials such as durable plastic) that could overcome the current cost and logistical issues faced in remote rural areas.

In addition to addressing toilet design issues, potential solutions to address market failure (but in keeping with an overall philosophy that households should contribute to latrine costs and have control over choice of latrine type, and that existing supply-chains have a role to play) include: incentives for private sector actors to competitively service remote areas, such as a tax incentive; organised bulk purchasing and transport facilitated by village or commune leaders as part of sanitation campaigns; diversifying existing non-sanitation supply chains by combining transportation of latrine materials with transportation of other materials; or vouchers administered to remote, rural households living in poverty.

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## Acknowledgements

The authors would like to extend thanks to the Australian aid program for funding this research through the Australian Development Research Awards Scheme. The Centre for Preventive Medicine in Dien Bien is also thanked for their cooperation and contribution to this research. Research participants in Muong Ang District are thanked for their time and contributions.

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