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Improving Community Health through Marketing Exchanges: A Participatory Action Research Study on Water, Sanitation, and Hygiene in Three Melanesian Countries

Keywords: PAR; sanitation marketing; Pacific; Fiji; Solomon Islands; Vanuatu; social capital; well-being

Highlights:

- Wholly marketizing WaSH services is common, but may narrow health outcomes
- Conceptually, marketing exchange can occur in a broader set of four archetypes
- Our evidence shows informal settlements meet WaSH needs by combining the archetypes
- Aspirations to improve health, finance, and relationships motivate exchanges
- Fostering health through improved WaSH requires all four archetypes of exchange

Abstract

Diseases related to poor water, sanitation and hygiene (WaSH) are major causes of mortality and morbidity. While pursuing marketing approaches to WaSH to improve health outcomes is often narrowly associated with monetary exchange, marketing theory recognises four broad marketing exchange archetypes: market-based, non-market-based, command-based and culturally determined. This diversity reflects the need for parameters broader than monetary exchange when fostering improved WaSH. This study applied a participatory action research process to investigate how impoverished communities in Melanesian urban and peri-urban informal settlements attempt to meet their WaSH needs through marketing exchange. Exchanges of all four archetypes were present, often in combination. Motivations for participating in the marketing exchanges were based on social relationships alongside WaSH needs, health aspirations and financial circumstances. By leveraging

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these motivations and existing, self-determined marketing exchanges, WaSH practitioners may be able to foster WaSH markets consistent with local context and capabilities, in turn improving community physical, mental and social health.

1. Introduction

1.1. Global WaSH issues and approaches

The World Health Organization (WHO)/UNICEF Joint Monitoring Programme (2015) estimates that 32% of the world's population does not use a safe sanitation facility, and 9% a safe water source. Diseases related to unsafe water, sanitation and hygiene (WaSH) products and services are major causes of mortality and morbidity (Prüss-Ustün et al., 2014). Also, lack of safe WaSH services affects children's nutrition and stunts growth, sometimes leading to cognitive impairments (Dangour et al., 2013; Spears, Ghosh, & Cumming, 2013). Therefore, advancing public health in developing countries through improved WaSH is of global urgency.

In seeking progress, WaSH practitioners across the globe facilitate interventions to provide improved products and services and encourage preferred WaSH behaviours. Such approaches have included Participatory Hygiene and Sanitation Transformation (PHAST, Sawyer, Simpson-Hebert, & Wood, 1998), Community Health Community Health Clubs (CHCs, see Waterkeyn, 2010) and Community-Led Total Led Total Sanitation (CLTS, see Kar & Chambers, 2008). Many of these approaches focus on stimulating demand for WaSH products and services by motivating changes to personal behaviours (Evans et al., 2014). In recent years, interest has emerged regarding the practice of sanitation marketing as a WaSH intervention that fosters entrepreneurial initiative among willing participants in local communities, establishes a sanitation supply chain, and encourages willing buyers and sellers to engage in value exchange. Five major reasons for WaSH practitioners to engage in sanitation marketing have been identified (Jenkins & Scott, 2010, p. 12):

1. “Marketing ensures that people can get what they want at a price they are willing to pay.
2. Marketing is financially sustainable, subsidy programs are not.
3. Marketing is cost-effective and can be taken to scale.
4. Direct provision of hardware is not enough; through market purchase, sanitation goes to those who are more likely to understand its purpose and will value, use, and maintain it.
5. The market already exists but may need targeted support to better serve the sanitation demand.”

In the WaSH community of practice, however, sanitation marketing has often been narrowly interpreted as monetary exchange that is based on prices determined competitively or by negotiation. In contrast, marketing theory advocates that marketing exchange does not always have to involve a monetary transaction, or for that matter, be conducted by a dyadic set of exchange partners, such as a buyer and a seller (Bagozzi, 1975). Instead, the marketing literature construes exchange more broadly as a voluntary trade of things of value (Kotler, 1972), including those that are undertaken on the basis of social currencies (e.g., caring for one’s friends when they are ill), or through philanthropic avenues (e.g., donating to a homeless person).

Marketing research also recognises many different types of exchange partners and their motivations (Laczniak & Murphy, 2012). This definition of marketing exchange, or simply exchange, suggests that programs that foster sanitation marketing, and indeed WaSH marketing more broadly, could involve a myriad of exchange partners interacting through monetary and non-monetary transactions to enhance health, through both improved WaSH products, services and behaviours and an increase in social capital derived from the exchange itself (Mohnen, Groenewegen, Völker, & Flap, 2011; Yip et al., 2007). Furthermore, researchers have criticised the marketization approach for its potential to inflict damage if it becomes the defining feature of human activity (Conway & Heynen, 2006). Thus a useful inquiry is whether broadening WaSH marketing programs to encompass all types of exchange may produce better health outcomes for the communities with which practitioners engage.

1.2. Marketing exchange

Building on social exchange theories, marketing classifies exchanges into four archetypes: market-based, non-market-based, command-based and culturally determined. In market-based exchange, a buyer and a seller voluntarily deal in products and services on the basis of a pricing mechanism established by competitive markets or negotiation (Bagozzi, 1975). In non-market-based exchange, a supplier provides a product or service to help in some circumstance of disadvantage (e.g., charity) and receives no payment in return (Kotler, 1972). In command-based exchange, an institutional authority (e.g., a government utility) is regulated in how it makes available products and services by a provision rather than profit motive (Layton, 2007). In culturally determined exchange, a provider and recipient exchange value in ways sanctioned by local traditions and social norms (Belk, 2010). The archetypes are not mutually exclusive, and exchanges are often intricate combinations of the different types because they are put together to help meet a community's WaSH needs. Figure 1 demonstrates some examples of exchanges that occur to meet WaSH needs, and highlights that many of them cannot be classified as a single type of exchange. This hybrid nature of exchanges reflects the need for broader parameters than monetary values when fostering markets in areas of limited resources. Therefore, applying this exchange perspective can assist in identifying economic, social, and health considerations useful in the design of WaSH interventions (Poortinga, 2006; Sridharan, Barrington, & Saunders, 2015).

Figure 1: Examples of WaSH exchanges. The text outside of the circle defines the four archetypes of exchanges and the inner text gives examples of WaSH exchanges that are often observed in developing countries.

1.3. WaSH in Melanesia

The Melanesian region includes the island nations of Fiji, Papua New Guinea, the Solomon Islands and Vanuatu (Jones, 2005). The region experiences high diarrheal disease rates (77–98%) and Disability-Adjusted Life Years (1.5–16 DALYs per 1000 population), largely attributed to poor WaSH conditions (WHO, 2009a, 2009b, 2009c, 2009d). Many programs have been implemented in Melanesia with the aim of improving WaSH. These include the introduction of pro-poor water tariffs, behaviour change promotion campaigns, and the donation of WaSH products and services (WHO Regional Office for the Western Pacific, UNICEF, The Pacific Community Water and Sanitation Programme, & UN Habitat, 2016). Despite these efforts, WaSH improvement in the region has been limited. Further, as the region suffers from fragmentation in policy development, inadequate planning and communication between government and civil society organisations (CSOs), and overall severe constraints of human and financial resources (WHO Regional Office for the Western Pacific et al., 2016), this situation does not look likely to change soon.

1.4. WaSH in Melanesian informal settlements

Urban migration for employment and education has substantially increased city populations in Melanesian countries. In particular, the limited affordability of urban housing, combined with the complex and often conflict-prone land tenure system, has led to a proliferation of informal settlements (Schrecongost & Wong, 2015). These communities are generally urban or on the urban fringes, have insecure land tenure, are unplanned (by the relevant government agency), receive low incomes and lack basic infrastructure (Water and Sanitation Program, 2015). Because these settlements are often on the boundaries of city council and provincial administrations, they tend to 'fall between the cracks' of urban and rural policies, and thus have fewer opportunities to access formal WaSH services than official urban and peri-urban areas (Schrecongost & Wong, 2015). As a result, water-related diseases are common (Schrecongost & Wong, 2015). Further, as inhabitants of

informal settlements interact with the population at large throughout their daily lives, residents of formalised settlements are at risk of WaSH disease transmission.

1.5. Market-based WaSH in Melanesia

Despite the proliferation of market-based approaches to WaSH elsewhere in the world (International Bank for Reconstruction and Development, International Development Association, & World Bank, 2013; Trémolet, 2012), WaSH practitioners in Melanesia are only now beginning to subject these approaches to trial. Traditional Melanesian socioeconomic and political structures (e.g., *Wantok* and *Kerekere*) are believed to be a barrier to market-based exchanges. *Wantok*, common in Papua New Guinea, Solomon Islands and Vanuatu, is a term used to describe regional identities, relationships between people and the custom of exchange relationships (Nanau, 2011). *Kerekere* is a Fijian concept referring to the "custom of giving without expectation of repayment, a mark of generosity" (Choucair, 2009, p. 22). Both practices have an embedded redistributive and reciprocal ethic (Monsell-Davis, 1993), which may be considered to be inconsistent with the transactional nature of marketized exchanges.

Scholars have long known that the tendency to pool capital and labour within a social network is important in maintaining group identity and relationships in Melanesia (e.g., Mauss, 2011, originally published in French in 1925). Through this type of behaviour, communities build social capital (Iyer, Kitson, & Toh, 2005), which can be viewed as arising from "tight bonds of trust and solidarity" (Putnam, 2000, p. 22). While such bonds or social ties could constrain individual desire and ability to engage in profit-making enterprise (Farrelly & Vudiniabola, 2013), they may also support other types of exchange beyond market-based. In other words, if WaSH or health policy and interventions sought to leverage rather than ignore or overcome these social structures, they could be very effective in improving the WaSH situation and still generate substantial economic value.

In this study, we examined WaSH exchange in informal settlements in the urban and peri-urban areas of Suva, Fiji; Honiara, Solomon Islands; and Port Vila, Vanuatu. We investigated how these impoverished communities attempt to meet their WaSH needs through multiple forms of exchange and examined their motivations for engaging in them. Informal settlements in these countries tend to be culturally and religiously heterogeneous, comprising first- or second-generation settlers who have relocated to the city for education and employment opportunities (Schaub-Jones, 2010). Recent settlers in particular may be accustomed to exchanges influenced by the traditional socioeconomic and political structures such as *Wantok* and *Kerekere*, but newly exposed to modern market-based exchange, particularly the formal rules and regulations in relation to the purchase of products and services. In such an instance, a useful undertaking would be to explore how the two experiences might interact and lead to a new pattern of exchange (Jenkins & Scott, 2007; Kennedy-Walker, Amezaga, & Paterson, 2015; Tsinda, Abbott, & Chenoweth, 2015). Such exploration could improve understanding of how future WaSH exchanges could be better supported by governments, CSOs and communities themselves, eventually leading to an improvement in WaSH and thus community physical, mental and social health.

2. Method

This study is part of a larger research project to understand the complex nature of demand for WaSH in Melanesian informal settlements and foster sustainable and self-determined WaSH improvements in these settlements. The study has involved five phases conducted over three years:

1. Communities, enabling actors (e.g., government agencies, CSOs, water utilities, multilateral organisations, private sector firms) and the research team understand the WaSH situation in informal settlements;
2. Communities, enabling actors and the research team collaboratively plan WaSH actions;

3. Communities and enabling actors self-organise to facilitate action;
4. Communities, enabling actors and the research team collaboratively undertake WaSH action;
5. Communities, enabling actors and the research team conduct participatory monitoring and evaluation.

We applied a participatory action research (PAR) approach, where the researchers and those being researched work together to define a problem, design a solution, and implement change (Reason & Bradbury, 2001). In the PAR perspective, research participants are not objects or subjects but collaborators. The PAR methodology is pluralistic. That is, although the practices conducted within it are varied and not prescribed, they all hold the same principles of participative research: to emancipate populations and improve their well-being through methods of reflection upon their own situations, knowledge and capabilities, and use these to take meaningful action (Chambers, 2008; Fals-Borda & Rahman, 1991). The PAR approach views the practical WaSH problems of the studied communities as the starting point of investigation, and assumes that potential solutions reside in local wisdom (Ozanne & Saatcioglu, 2008).

As our research sites, we selected two informal settlements in each country. Each settlement had a community-identified desire to improve the WaSH situation. The characteristics of each informal settlement are detailed in Table 1.

Table 1: Characteristics of informal settlements (exact population cannot be reported as these settlements are often not enumerated in national censes, and are in a constant state of flux owing to migration. i-Taukei = indigenous Fijians).

We initially engaged the settlements by approaching community leaders, in line with community engagement protocols in the region. We emphasised that the PAR principles of the project required an inclusive sample of participants from the settlement, particularly with regard gender, ethnicity, religion and household income, but equally that those same principles encouraged

participation by 'any interested' community member. These leaders then met with other community representatives through formal as well as informal networks (e.g., council meetings, church services, going door-to-door) to stimulate interest in the project. Through word of mouth, those representatives in turn recruited interested participants to an initial rapport-building session (see Supplementary Information 1). In this session, which featured both local and foreign researchers, we outlined the project objectives, explained the data collection methods, and invited the attendees to participate over three years. We investigated existing WaSH exchanges in the six communities during Phases 1 and 2 of the project (see Supplementary Information for all relevant research activity guides) and queried participants as to why they choose to use various exchanges to fulfil their WaSH needs.

2.1. Data collection

We compiled diverse forms of data that collectively served as a robust record of WaSH-related experiences in the communities:

- Photographs of WaSH infrastructure;
- Drawings, maps, and lists created by research participants;
- Audio and video recordings of research activities;
- Researchers' daily field notes and post-fieldwork summaries.

Aside from the field notes, our data represent a researcher–participant joint production where both parties were actively engaged with each other in a dynamic research process (Peñaloza & Cayla, 2007). This collaborative data compiling also held emancipatory potential for our research participants.

2.2. Research activities

The community leaders and other representatives recruited participants to take part in an initial workshop (Supplementary Information 2), using the same method as for the rapport-building session. After introducing the research team, we asked participants to arrange themselves into small groups of mixed gender (usually three to four groups of two to seven individuals). These groups guided researchers on transect walks during which they explained the current WaSH situation and its impacts on community health, illustrating with stories of past significant events. During the walk, other community members sometimes joined the groups to offer their own insights. On returning to the workshop venue, each group was asked to map the areas they had visited on large sheets of paper and list their group's WaSH issues and priorities. Each group then presented its map, issues and priorities to the larger group.

We then invited the workshop participants to also take part in gendered focus groups (Supplementary Information 3), either immediately following the workshop or at a later date. The research team facilitated these discussions, exploring gendered WaSH roles and WaSH-related experiences in the opinions of both men and women.

In Fiji, households were then invited to participate in a household-level systems mapping activity (Supplementary Information 4) through a referral sampling strategy. The chairman, chief or landowner identified the first few households. Subsequently, people from those households, after completing the activity, were asked to identify other households in the settlement who they considered likely to participate. We continued with the activity based on several referrals until we reached the boundary of the settlement. In Solomon Islands and Vanuatu settlements, households are normally physically grouped by family and then further by church affiliation or ethnicity, with households of lower incomes sometimes located in particular areas. Owing to the greater physical segregation between ethnic and denominational groups in Vanuatu and Solomon Islands compared to Fiji, we determined that a referral strategy would not be successful. Instead, we selected

households from an aerial photograph of the communities, basing the sample in part on how many interviews could be reasonably conducted by the local researchers in a two-day period.

In each household, we used an open-ended interview to ask participants about their background (Turner, 2010). Later we moved on to the participants' overall WaSH situation and asked them to select a WaSH device (e.g. tap, shower, toilet, pipe, washing machine) that they considered important to them. We then asked them to draw the device's material, economic and social inputs and outputs and link these inputs and outputs to further inputs and outputs, until their WaSH system was accurately represented. This activity produced a mapping of the diverse exchanges that were taking place in relation to their chosen WaSH device, linking their household to other people and materials in the local system (citation to authors' other work removed to preserve anonymity).

2.3. Data analysis

The data were input to NVivo v10 (QSR International) and coded deductively using the four archetypes of WaSH exchanges. The researchers then reviewed the coded text and images to understand how these WaSH exchanges work and to infer motivational themes for engaging in them. Examples in the data were coded as to which theme(s) were the most relevant motivators to engage in each WaSH exchange.

2.4. Research approvals

This text has been removed to protect the authors' anonymity.

3. Results

Approximately 20 participants took part in each initial workshop (except Fiji 1, where attendance was low) and the focus group discussions (except Vanuatu 1, where attendance was high) (Table 2). The number of participants in initial workshops likely under-represents the number of people involved, as other community members were consulted during transect walks. The number of households that participated in systems mapping was limited by the geographic boundaries of the settlement (Fiji) and the number of households that could be interviewed in a two-day period (Solomon Islands and Vanuatu).

Table 2: The number of participants that took part in each activity in each settlement (approximations are given for activities where attendance was not formally recorded). *For the household systems mapping the number of participants reflects the number of households that participated, not the number of individuals.

Study participants identified diverse exchange mechanisms to acquire WaSH products and services (Table 3, classified by archetype). Some of these exchanges are combinations of different types – for example, collecting toilet parts from the rubbish dump has characteristics of both a non-market-based and a culturally determined exchange. Interestingly, the preference for which types of exchange to engage in to acquire a product, such as drinking water, often varied between households within the same settlement.

Table 3: WaSH exchanges observed in study communities.

We describe here four examples of WaSH needs being met by an individual, household or community group with the reasons given for their choice of exchange (names changed to preserve anonymity):

1. A church group from Solomon Islands 2 is building a new guest house and has decided to install a septic tank to improve convenience and health for visitors. John is a member of the church and uses his masonry skills to generate income. He offers to build the tank at a lower fee than that charged by private companies in the area. His knowledge of the local market prices and his competitive instinct to price his services at a discount ensure that the income he receives from the exchange is based on real market prices, making it a market-based exchange. However, several parameters of the discounting, such as its timing, negotiability, and perceived authenticity, as well as his anticipated prospect of enhanced social standing within the church group, are all shaped by the community's norms and traditions. Therefore, these aspects make the exchange as much culturally determined as market-based (Figure 2).

Figure 2: WaSH exchange between John and a Church in Solomon Islands 2. The arrow represents an exchange.

2. Paul, from Fiji 2, has a connection to the water utility and pays the utility quarterly. The utility is privatised (market-based exchange) but also regulated (command-based exchange). Paul sells water from his connection to other members of the community at a profit. Paul knows that some households in the community cannot afford a connection and has identified these households as a business opportunity as well as a way to contribute to his family's and the community's well-being. Because he enters into a bilateral agreement with willing buyers on the basis of prevailing prices set by the private utility, the exchange takes on a market-based character (even if he were to not make a profit from it). But equally, since several other parameters of this arrangement are derived from community norms (e.g., the penalties for non-payment, agreed timings of water withdrawal), the arrangement also has features of culturally determined exchange (Figure 3).

Figure 3: WaSH exchanges between Paul, who is a resident of Fiji 2, his neighbours and the water utility. The arrows represent exchanges.

3. Joan, from Solomon Islands 1, sells water to her neighbour, Mary. Joan does not make a profit from Mary as she only charges for the volume of water Mary collects, based on a negotiation between the two parties (culturally determined/market-based exchange). Joan receives the water that she sells Mary through a connection to the privately owned, government-regulated water utility. She pays monthly for the volume of water she uses. The utility is privatised (market-based exchange) but also regulated (command-based exchange). Joan's water connection and water storage tank were donations by a local politician that materialised in exchange for her willingness to vote for him (non-market-based exchange) (Figure 4).

Figure 4: WaSH exchanges between Joan, who is a resident of Solomon Islands 1, and Mary, a fellow resident of Solomon Islands 1, their local politician, and the water utility. The arrows represent exchanges.

4. Susan, a resident of Vanuatu 1, works for the local bottled water company, which provides her with 38L of free water each week (a culturally determined/non-market-based exchange) that her family uses for drinking. Susan does not receive enough water for all of her needs, so she also has a connection to the water utility that she pays on a quarterly basis. The utility is private (market-based exchange) but also regulated (command-based exchange). Susan uses this water for non-drinking purposes such as cooking because she believes that water quality for cooking is important for health. However, Susan believes that water quality is not as important for washing and bathing as it is for cooking, so chooses not to spend money on utility water for those uses. Instead, for washing and bathing, Susan's family collects

rainwater in a tank that members of her household built with assistance from the neighbours (culturally determined exchange) (Figure 5).

Figure 5: WaSH exchanges between Susan's household in Vanuatu 1 and her neighbours, the water utility and the bottled water company. The arrows represent exchanges.

Using the PAR approach for this study allowed us to probe these participants to explain their motivations for engaging in exchanges. These motivations were distilled into four main themes: social custom, empathetic economics, financial management and product or service quality (Table 4, for the examples given in Figures 2–5).

Table 4: Thematic reasons given by participants for engaging in exchanges

4. Discussion

Despite suggestions that market-based exchange for WaSH improvement may not be applicable within Melanesian culture, we find that this type of exchange occurs in the informal settlements of all three countries studied (Table 3), albeit often combined with other modes of exchange (Table 3 and Figures 2–5). Thus, we contend that rather than continue the rhetoric of a dichotomy of communal versus market modes of economic interactions, a more useful approach is to recognize the fluidity with which 'hybrid' exchange modes are produced and reproduced in Melanesian informal settlements (Farrelly & Vudiniabola, 2013; Misra, 2014; Saffu, 2003). As many people in Melanesia migrate to the cities, they may come to accept market-based exchange methods even if previously their exchanges in rural settings were dominantly communal. Theories of migrant acculturation can explain this type of change (see Rudmin, 2003 for a comprehensive review). However, where such theories often look upon the consumer culture of the city as

'dominant' and migrants' acculturation into it as 'dominated' (Üstüner & Holt, 2007), our results indicate a different pattern reflecting a more 'negotiated' acculturation. Participants' responses indicate that with urbanisation and cultural mixing, they have learned to hybridise their 'traditional' exchanges with the market-based exchanges prevalent in urban society (Connell, 2010; Feeny, McDonald, Miller-Dawkins, Donahue, & Posso, 2013) so as to optimise their own well-being to cope with the pressures of migration and life within informal settlements.

4.1. Social custom

> "Locals promote *solesolevaki* (Fijian cultural practice)… all settlers are here due to livelihood-based reasons... a number of issues exist…but those that are here will need to improve their moral value of assisting the community…we need to work together." (Male, Fiji 1)

This viewpoint is a typical refrain in our data. Participants often referred to their rural cultural traditions of communal practices and building social capital, and expressed a desire to create an urban version of those traditions. Plausibly, roots in traditional culture do spawn a shared cognition while residents live in the urban or peri-urban informal settlement context – a cognition that contains norms of cooperation and sanctions if violated (Adhikari & Goldey, 2010). Such shared cognition provides the conceptual mechanism to meet and exchange things of value beyond the confines of formal exchange settings (e.g., markets, stores). Each such exchange done this way refreshes and strengthens social ties. In fact, when social capital is leveraged to enable exchange of WaSH products and services, it leads to an increase in hygienic practices (Bakshi, Mallick, & Ulubaşoğlu, 2015) and self-reported health (Poortinga, 2006). Furthermore, much of the social custom revealed through our research involves practices of sharing common WaSH resources between households, which can reduce emotional distress in poverty settings (Wutich & Ragsdale, 2008).

4.2. Empathetic economics

Economic activities like on-selling water or selling WaSH products (e.g., water, soap) in small community shops often derived from an underlying motivation of empathy. Many cases reflected an aspect of being good to one's neighbours by providing WaSH infrastructure and services that would improve their health, particularly demonstrated in this quote from Paul, whose example we discussed earlier:

> "I thought $10 that these 10 families pay each month will pay off my water bills. I want to improve my own family's well-being and also help the other family which is why I suggested $10 so that it will be fair for everyone." (Paul, Fiji 2)

This mixture of market-based exchange with an understanding and concern for the well-being of others is consistent with emerging research findings that in subsistence settings of commerce, local market actors explicitly acknowledge and navigate a marketplace that is indistinguishable from the social milieu (Venugopal & Viswanathan, 2015). Subsistence market actors often demonstrate high levels of awareness of the circumstances and needs of co-located others (Viswanathan, Sridharan, Ritchie, Venugopal, & Jung, 2012). This type of empathy can also enable the formation of social capital (Preece, 2004). This social capital can improve health not just in and of itself as just mentioned (Poortinga, 2006), but also through the WaSH products and services that people are able to access and use (Bisung & Elliott, 2014). Thus WaSH exchanges are triggered by the need to generate survival income for oneself (economics) but implemented in a humanistic way through knowing and feeling for the similar circumstances of other community members (empathy).

4.3. Product service or quality

Acquiring fit-for-purpose WaSH products and services is an important motivation for our participants when engaging in exchanges. Household choices of water resources for different uses are typically varied and context-specific (Madanat & Humplick, 1993). The desire for good service or high quality was associated with paying more for water for particular usage situations. In Susan's example discussed earlier, she made choices between different water products based on the fit between the water's quality and its intended use, and in a direction of improving quality for situations that impact health more directly. Participants from all six settlements echoed this practice, and identified that drinking 'cleaner' water, or using 'better' sanitation would improve health. This means that although they may not choose the highest quality WaSH products and services for every activity, they do make choices that they feel will optimise health outcomes. This finding echoes prior research finding health to be an important driver of improving WaSH (Santos, Roberts, Barreto, & Cairncross, 2011), and contradicts views of its minimalist role (e.g. Jenkins & Curtis, 2005).

4.4. Financial management

The choice of exchange to obtain water may not always be dependent on price, as consumers may choose a more expensive option if it enables them to access the resource in a way they are more comfortable with (Cairncross & Kinnear, 1992). This strategy is common in subsistence settings, where coping with uncertainty and risk becomes more prominent than rational utility maximising (Townsend, 1995; Venugopal & Viswanathan, 2015). In the Pacific context, these general subsistence uncertainties are compounded by intermittent shocks from larger environmental occurrences like floods and cyclones (Schrecongost & Wong, 2015). Over some decades, the empirical generalization about subsistence living has been that it is a type of uncertainty-reducing, security-seeking attitude and preference (Calvo, 2008; Morduch, 1994). Our

findings are consistent with this thesis. For example, many households prefer to pay for water as they use it rather than paying a lump sum at the end of the month. However, where water on-sellers (e.g., Paul from the earlier example) make a profit from selling the water, the overall cost of the water to the consumer is sometimes actually more than purchasing from the utility directly.

Consumers realise that they cannot live without water and adopt a strategy that allows them to access the resource in a way that is congruent with how they prefer to manage household finances whilst optimising health. Consumers' focus is on avoiding immediate disaster, such as not having enough water to drink each day, and improving long-term financial security does not seem to be as great a concern. For example, some consumers understand that they could save money by paying for water monthly, but also may lose access to water altogether if they cannot pay the bill, and so choose a more frequent although more expensive scheme, which may include purchasing water from a neighbour.

4.5. Fostering WaSH marketing exchanges to improve health

Our findings suggest that either–or conceptions of personal drivers of WaSH exchanges as purely profit-oriented or communally oriented are likely inaccurate and not useful. By leveraging existing fluid and hybrid exchanges, WaSH practitioners may be able to improve the WaSH situation in a way that is relevant to their context and self-determined by individuals and communities. However, this area has not been well researched. Through our larger project, we are now examining how fostering existing types of WaSH exchanges that encompass social capital can result in improved community health, and we are replicating those exchanges to improve access to other WaSH products and services.

Importantly, although improving WaSH should itself improve physical health outcomes (Bartram, Lewis, Lenton, & Wright, 2005), the way in which individuals engage in exchanges to acquire such products and services may also enhance or detract from well-being. For example, if a

toilet marketing campaign evokes a sense of embarrassment (e.g., with regard to open defecation) to encourage the purchase of a WaSH product, a negative impact on physical, social and mental health may result in the form of lower self-esteem (Albers, Pasman, Rurup, de Vet, & Onwuteaka-Philipsen, 2011). This possibility is one reason consumers may willingly choose to engage in WaSH exchanges that are not directly provided by the market or state. Their well-being may be enhanced by engaging in culturally determined exchanges rather than purely monetary exchanges. Therefore, research investigating the effectiveness of combined WaSH exchanges must holistically investigate the impacts of different types of exchanges on physical, social and mental well-being.

4.6. Limitations

Consistent with PAR, we used a participatory approach for recruiting participants for the rapport-building session, initial workshop and focus group discussions. However, as a result our sample representation was largely determined by how community leaders and representatives engaged in recruitment. In Fiji, we struggled to engage community members of Indo-Fijian ethnicity (Table 1). In Solomon Islands 1, we noted geographical limitations, as most participants were from a particular zone, and in Solomon Islands 2 most participants were part of a single Christian denomination (Table 1). This homogeneity may have occurred because the community leaders focused on recruiting participants within their own church group, which was likely because of already existing strong relationships. When conducting the household systems mapping exercise, by approaching households ourselves we were able to achieve greater representation of the communities, including many participants who had not been involved in the initial workshop and focus group discussions. The resulting diversity gave us further insight into the various WaSH exchanges occurring across religious groups, ethnicities and income levels in the six settlements.

5. Conclusions

Our findings document the prevalence of four archetypes of WaSH exchange in our study communities, including market-based exchange despite concerns that the practice may be incompatible with the communal culture of Melanesia. WaSH initiatives seeking the cooperation of informal settlement communities will perform sub-optimally if they support only a single form of exchange.

Potential exists for the success of WaSH programs targeted at urban and peri-urban informal settlements to improve health when the programs embrace multiple forms of exchange. Furthermore, by investigating the reasons communities give for engaging in these different exchanges, WaSH programs may be better able to foster exchanges that contribute to community aspirations and physical, social and mental health needs.

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1 Table 1

Informal settlement	Approximate population	Ethnic composition	Religious groupings	Predominant group involved in research activities
Fiji 1	4000	Multiple Fijian island ethnic groups (i-Taukei and other) Indo-Fijian	Multiple Christian denominations Hindu	i-Taukei ethnic group of multiple Christian denominations
Fiji 2	400	Multiple Fijian island ethnic groups (i-Taukei and other) Indo-Fijian	Multiple Christian denominations Hindu	i-Taukei ethnic group of multiple Christian denominations Single Indo-Fijian, Hindu participant in some activities
Solomon Islands 1	5000	Multiple Solomon Islands ethnic groups	Multiple Christian denominations	Zone 1 (geographic area) inhabitants, several ethnic groups of multiple Christian denominations
Solomon Islands 2	3000	Multiple Solomon Islands ethnic groups	Multiple Christian denominations	Several ethnic groups of multiple Christian denominations, but mostly members of South Seas Evangelical Church
Vanuatu 1	300	Multiple Ni-Vanuatu ethnic groups	Multiple Christian denominations	Several ethnic groups of multiple Christian denominations
Vanuatu 2	1000	Multiple /Ni-Vanuatu ethnic groups	Multiple Christian denominations	Several ethnic groups of multiple Christian denominations

2

3 Table 2

Informal settlement	Initial workshop	Focus group discussions	Household systems mapping*
Fiji 1	5	~20	23
Fiji 2	25	~20	19
Solomon Islands 1	~20	~20	21
Solomon Islands 2	22	22	15
Vanuatu 1	19	37	28
Vanuatu 2	~25	23	19

4

5

1 Table 3

	Exchange archetype			
Description of WaSH exchange	**Market-based**	**Non-market-based**	**Command-based**	**Culturally determined**
Purchase of water from privatised (govt-regulated) utility	Y		Y	
Purchase of water from public utility			Y	
Purchase of water from tanker truck	Y			
Donation of tanks/wells/bores by local politicians, CSOs		Y		Y
Selling of water from one household to another	Y			Y
Purchase of bottled water from local businesses	Y			
Donation of bottled water by local businesses to employees				Y
Sharing of water points (e.g., standpipes, springs, wells)				Y
Rainwater collection; infrastructure parts collected from rubbish dump				Y
Sharing of toilets between households				Y
Open defecation				Y
Purchase of toilet or septic parts and/or construction of toilets and septic tanks by local businesses	Y			
Purchase of toilet or septic parts and/or construction of toilets and septic tanks by local businesses – with a reduced fee for parts/labour	Y	Y		Y
Pumping of septic tanks and drums by local business	Y			
Abandoning full septic drums and building new toilet	Y			Y
Toilet parts collected from rubbish dump				Y
Purchase of menstrual hygiene products from local business	Y			
Production of menstrual hygiene products using materials purchased from local business	Y			Y
Municipal rubbish collection			Y	
Burning of rubbish				Y
Disposal of rubbish and used menstrual hygiene products around settlement / in waterways				Y
Purchase of soap from private business	Y			
Sharing of soap between households				Y

2

3

1 Table 4

Informal settlement	Participant/s	Parties involved in exchange	Reason/s for exchange
Solomon Islands 2	John	John and church	Social custom Empathetic economics
Fiji 2	Paul	Paul and neighbours	Social custom Empathetic economics
		Paul and water utility	Financial management Product or service quality
Solomon Islands 1	Mary Joan	Joan and Mary	Social custom Financial management
		Joan and local politician	Financial management
		Joan and water utility	Product or service quality
Vanuatu 2	Susan	Susan's household and neighbours	Social custom Financial management
		Susan's household and water utility	Financial management Product or service quality
		Susan's household and bottled water company	Social custom Financial management Product or service quality

2

Fig. 1.

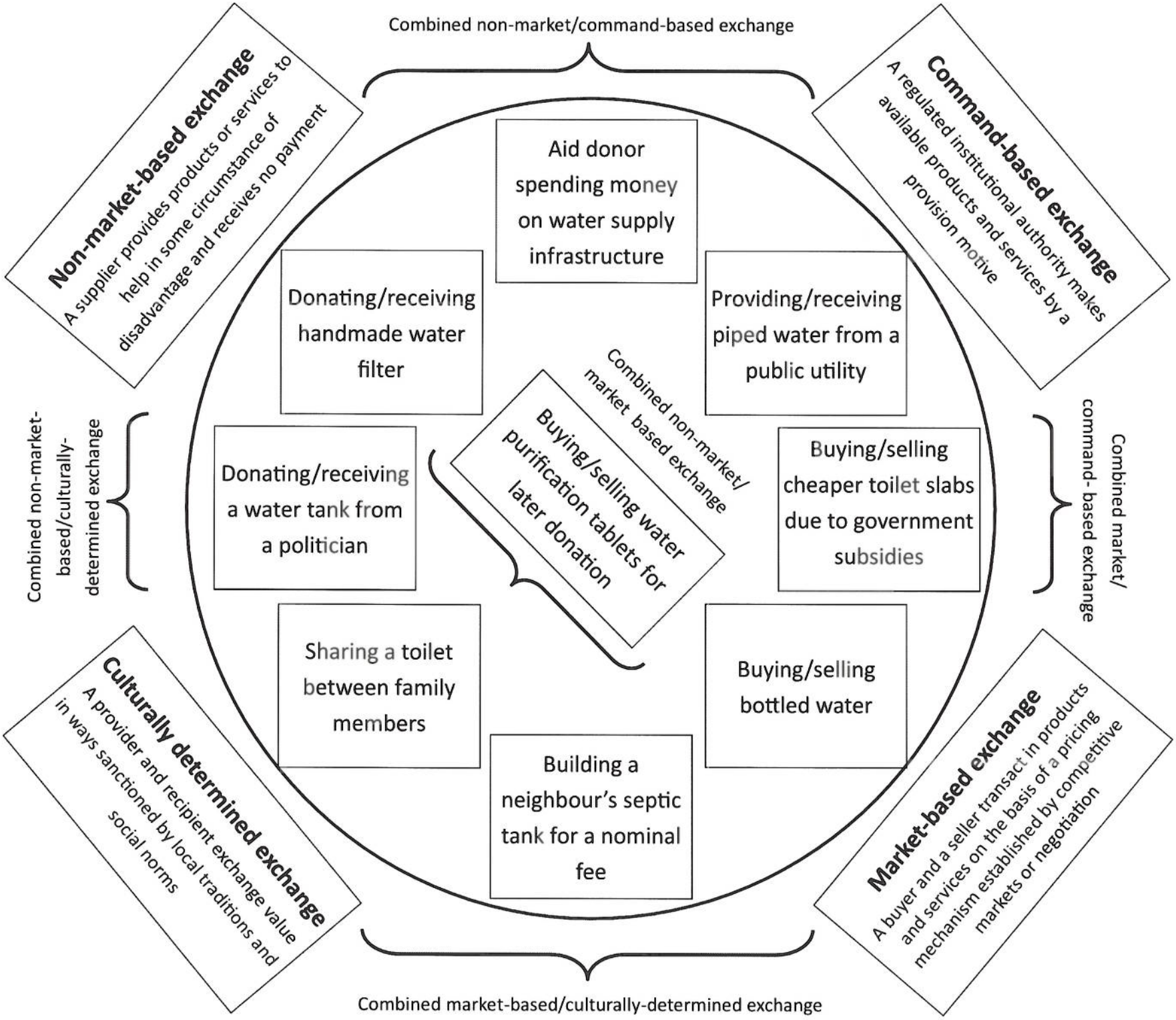

Combined non-market/command-based exchange
Non-market-based exchange
A supplier provides products or services to help in some circumstance of disadvantage and receives no payment
Command-based exchange
A regulated institutional authority makes available products and services by a provision motive
Aid donor spending money on water supply infrastructure
Donating/receiving handmade water filter
Providing/receiving piped water from a public utility
Combined non-market/ market based exchange
Buying/selling water purification tablets for later donation
Combined non-market-based/culturally-determined exchange
Donating/receiving a water tank from a politician
Buying/selling cheaper toilet slabs due to government subsidies
Combined market/ command- based exchange
Sharing a toilet between family members
Buying/selling bottled water
Building a neighbour's septic tank for a nominal fee
Culturally determined exchange
A provider and recipient exchange value in ways sanctioned by local traditions and social norms
Market-based exchange
A buyer and a seller transact in products and services on the basis of a pricing mechanism established by competitive markets or negotiation
Combined market-based/culturally-determined exchange

Fig. 2.


Market/culturally determined
John builds a septic tank for the church in Solomon Islands 2
John
Church, Solomon Islands 2

Fig. 3.

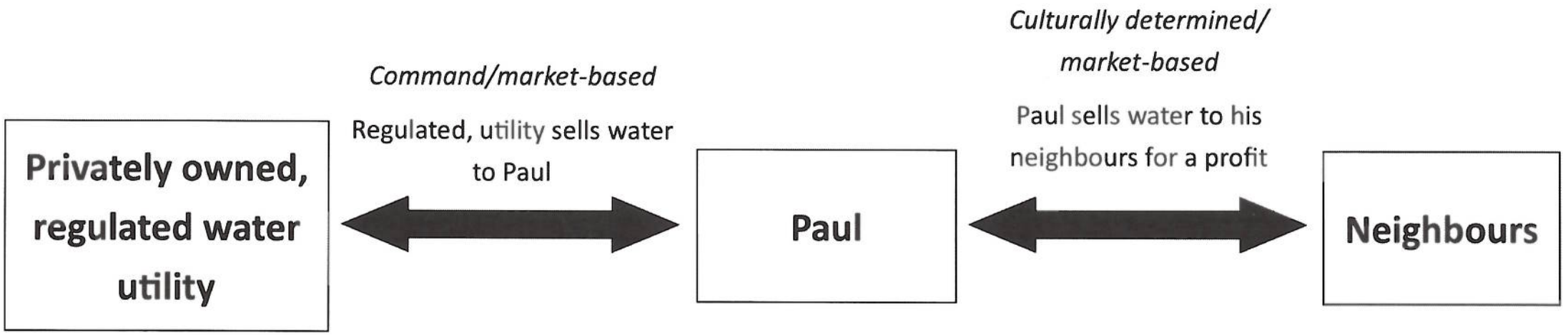

Privately owned, regulated water utility
Command/market-based
Regulated, utility sells water to Paul
Paul
Culturally determined/ market-based
Paul sells water to his neighbours for a profit
Neighbours

Fig. 4.

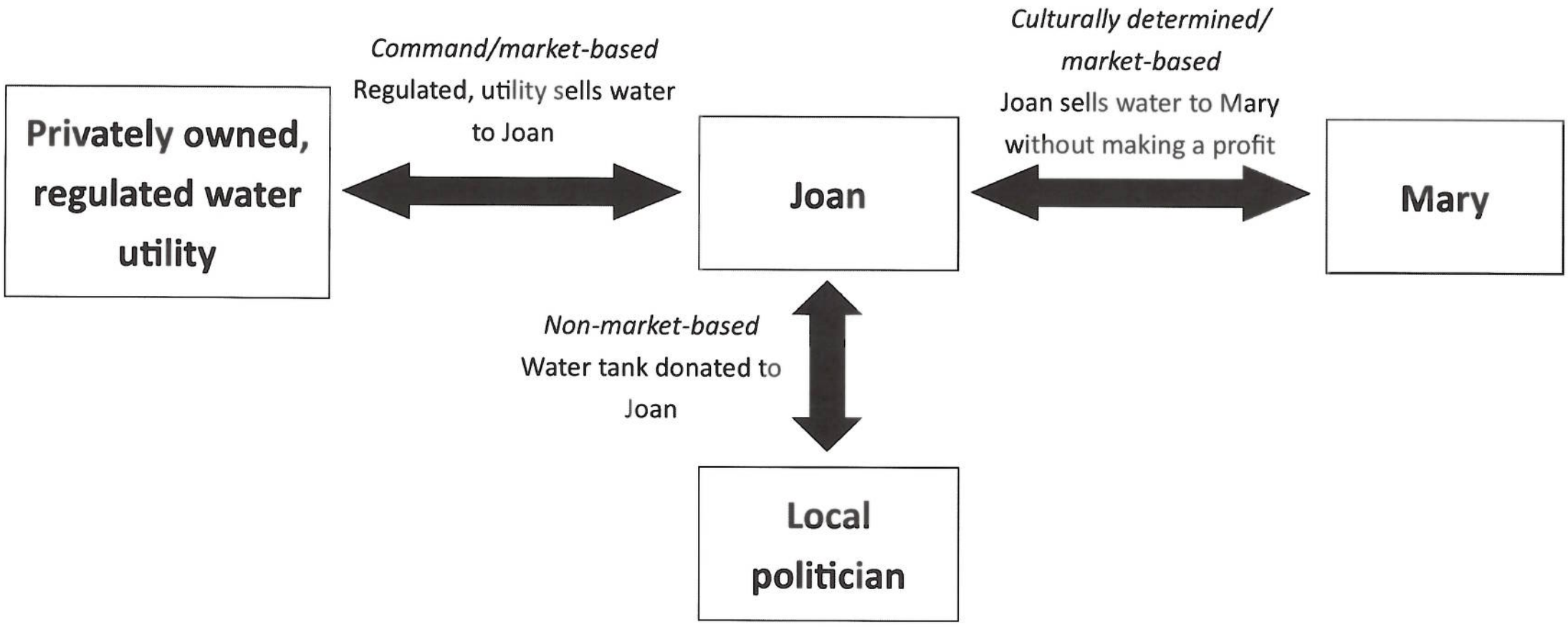
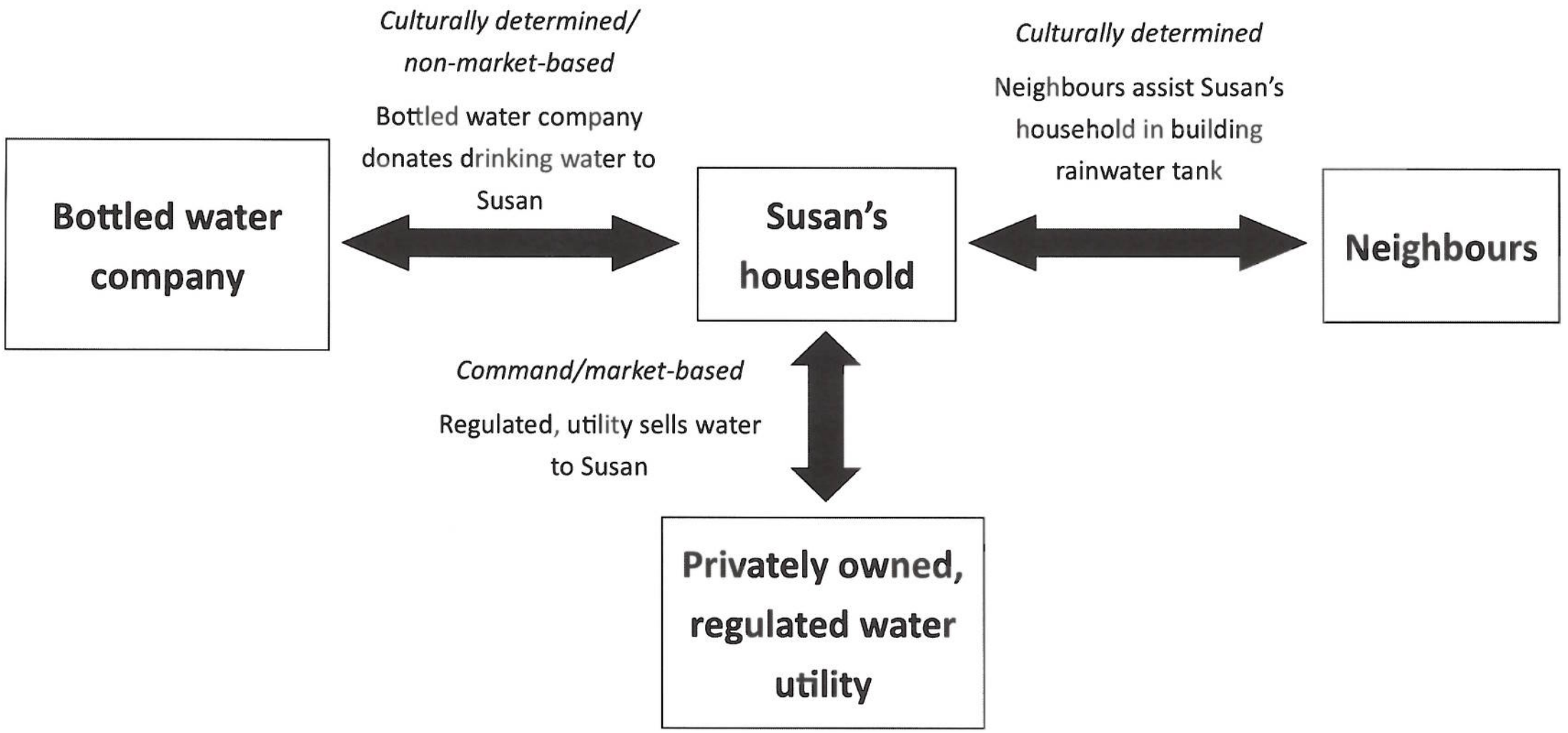

Privately owned, regulated water utility
Command/market-based
Regulated, utility sells water to Joan
Joan
Culturally determined/ market-based
Joan sells water to Mary without making a profit
Mary
Non-market-based
Water tank donated to Joan
Local politician

Fig. 5.


Culturally determined/
non-market-based
Bottled water company donates drinking water to Susan
Culturally determined
Neighbours assist Susan's household in building rainwater tank
Bottled water company
Susan's household
Neighbours
Command/market-based
Regulated, utility sells water to Susan
Privately owned, regulated water utility



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