

Electricity theft as a relational issue: a comparative look at Zanzibar, Tanzania, and the Sunderban Islands, India

1 Introduction

The disturbing evidence is that losses (and theft) appear to be increasing in an era of readily available technological means (metering, for instance) to lower non-technical losses.

Smith, 2004, p. 2071 (original brackets)

Electricity theft is a growing problem worldwide. The situation in many African and South Asian countries such as India is particularly worrisome (Depuru, Wang & Devabhaktuni, 2011; Smith, 2004). Estimates indicate that in India, yearly losses due to electricity theft are over 1% of the country's GDP (Depuru et al., 2011; Tongia, 2003, p. 6; Singh, 2006, p. 1007). With 20–25 % of revenues disappearing, the viability and survivability of the electricity systems are at stake.¹ Lost income must be covered, thus resulting in a deterioration of the quality of the energy systems, a slower electrification rate and higher tariffs for those who do pay, or in the case of governmental subsidies, a reduction in funding for other public services. This latter effect often harms the poorest segment of the population the most, as they tend to be the first ones not connected when there is a low degree of electrification (Karekezi & Kimani, 2002).

Smith (2004) describes four different varieties of theft, all of which are relevant in the present discussion. Firstly, fraud denotes cases in which consumers deliberately try to deceive the utility, such as tampering with the meter. Secondly, there is stealing, that is, illegal lines and connections that bypass a meter so that consumption remains unregistered. The third type of theft, often not recognised as such, is when customers systematically do not pay their arrears over a long period of time. Fourthly, there are billing irregularities.² Conventional, top-down approaches to the problem tend to centre on either technical innovations such as smarter meters; managerial methods, for example, inspection, control and audits; or system changes, typically through privatisation of public energy companies (Antmann, 2009; Smith, 2004; Tewari & Shah, 2003). However, experience shows that, taken alone, neither of these

¹ This estimate has been arrived at by partly drawing on Joseph (2010, p. 507) who demonstrates that in India the reported average transmission and distribution (T&D) losses, including theft, was 35% in 2005, although Singh (2006, p. 2482) indicates that the Indian T&D losses may be substantially higher, in some cases nearly 50%. Moreover, based on empirical examples, Smith (2004, p. 2070) provides a general method for estimating theft. He shows that inefficient systems are likely to have 10-15% losses due to technical/physical factors, whereas the remaining losses can be considered as being caused by theft. If one uses the modest estimation that total Indian T&D losses are 35%, then theft may constitute 20-25% of the generated power (minus system use and electricity allocated without charge, see Smith 2004, p. 2068).

² Billing irregularities denote situations when utility employees may be bribed to arrange for lower bills to be issued than for the power actually used, or staff may trick customers into paying more than they owe and pocket the difference compared to the amount of electricity consumed. Billing irregularities are related to the problem of corruption, which is defined as “the offering, giving, soliciting or acceptance of an inducement or reward that may influence the actions taken by any authority, its members or officers” (Gulati & Rao, 2007, p. 116). Corruption is not dealt with in the present discussion.

methods provides blue-print solutions to the problem. Broader and more contextually sensitive approaches are called for (Antmann, 2009; Fjeldstad, 2004; Gulati & Rao, 2007; Smith, 2004; see also Brent & Rogers, 2010).

The present discussion offers a grounded approach to the problem of theft by asking what the phenomenon looks like from the customers' point of view. What moralities and judgements are involved when people make unauthorised connections or avoid servicing their debts? The underlying approach to technology draws on actor-network theory (Akrich, 1994; Bijker & Law, 1994) and the notion of "distributed agency", which Garud and Karnøe have used for highlighting that agency is "distributed across people and artefacts and across time and space" (2005, p. 89, see also Wilhite, 2008). By looking specifically at customers, the presumption in the present discussion is that they are not passive recipients of electricity services, but instead continuously interact with technologies such as meters and social actors within the electricity system such as money collectors and meter readers. The utility at large constitutes the customer's counterpart in the system. Although surrounding social relationships, such as peers and the extended family, and associated technologies (e.g. appliances, buildings) are also likely to affect people's moralities and behaviour as customers, I primarily focus on the customer-utility relationship as this is constituted within specific systems of provision.

Every electricity system has its own unique qualities that deserve investigation in order to understand and meet the problem of theft (Smith, 2004). Nevertheless, in terms of electricity's physical characteristics and the system's principles for managing the customer-utility relationship, such systems share certain traits. Unlike rice, sugar and most other goods, electricity is not exchanged for money in face to face meetings between buyer and seller. When somebody has obtained a connection, electrons automatically flow through the lines according to the consumer's appliance usage, though the current itself remains invisible (Lindén, Carlsson-Kanyama & Eriksson, 2006). To ensure that supplier and customer fulfil their respective part of the contract, a regulatory, institutional, technical and financial arrangement is set up. An electricity meter is often centrally positioned here to help shape and mediate the (ideally) symmetrical relationship between customer and supplier (Akrich, 1994, p. 217). Printed contracts, consumption registration cards, tariffs and invoices also constitute common means for regulating and maintaining the customer-utility relation. Moreover, for the system to work as intended customers must be informed about the arrangement and how they are supposed to perform. Last, but not least, customers and utility staff are involved with each other in person, such as at the time of the meter reading, payment and disconnection, as well as indirectly, for example when the utility is mentioned in the media. In total, a range of material and social factors shape and mediate the customer-utility relationship. The quality and configuration of these factors and relationships will notably vary on a contextual basis. As I will demonstrate, the type of provision system and socio-cultural setting contribute to shaping the customer-utility relationship and people's moralities and concerns when undertaking their responsibilities as customers.

The aims of the paper are, firstly, to show how the phenomenon of electricity theft may be understood and addressed in a more people-centred and relational way. Secondly, in following Stern (1999), there is an underlying ambition to reveal how insights into customers' ways of thinking and acting, as well as their resources and objects at hand for doing so, may be used for producing desirable and sustainable shifts in the general formation and operation

of electricity systems.³ I will draw on empirical findings from two different socio-cultural settings (rural Zanzibar, Tanzania and the Sunderban Islands, West Bengal, India). The two contexts have quite distinct provisional systems; in rural Zanzibar there is a centralised grid, whereas the system in the Sunderbans is decentralised. Space will not allow for a thorough comparison of both cases, and the Zanzibar material will carry more weight than the data from the Sunderbans. Even so, by offering a joint discussion of two examples of customer–utility relationships and the moralities and practices involved regarding theft, I seek to point to a variety of factors, including technical ones, which may come into play when such associations and practices are formed.

Section 2 accounts for the method used. Section 3 and 4 present and discuss the material from Zanzibar including the customer–utility relationship and how people judge various types of connections. Section 5 briefly outlines the Sunderban context with particular focus on customers’ degree of compliance at various points in time. Section 6 contrasts the customer–supplier relationship in the two selected places, discusses the issue of trust, and provides some policy recommendations. Section 7 concludes. It will be argued that although contextually constituted, the core customer–provider relationship, and the people and objects involved in the mediation of this relationship, generally form a crucial aspect of electricity systems. Consequently, attempts to modify such systems would benefit from focusing on the ways customers relate to their suppliers and vice versa.

2 Method

The material from rural Zanzibar, Tanzania,⁴ is based on a total of 16 months of ethnographic fieldwork and visits stretching over a time span of 15 years (between 1991 and 2006). The overall purpose of this work was to investigate the social impact of rural electrification. The methods used included participant observation, interviews and an extended household survey in Uroa village where I resided for 10 months in 2000–2001. The survey covered 114 of 480 (23%) households in the village and was primarily conducted by the researcher in the form of structured interviews with both male and female members of each household.⁵ Technical and economical data were obtained from the electricity company, ZECO, which is owned by the Zanzibari government.⁶ I also accompanied meter readers to approximately 500 homes in various villages to measure people’s electricity consumption.

³ By sustainable shifts I mean to indicate that electricity is closely linked with wider questions of poverty, equity, gender equality and the environment, in addition to the immediate economic aspects. Space does not allow for an elaboration of this notion and its relation to electricity, but has been treated elsewhere (Winther, 2008).

⁴ Zanzibar is a semi-autonomous polity within the union of Tanzania.

⁵ The households were strategically selected in order to obtain a representative geographical spread that included both electrified and non-electrified domiciles. Each interview session lasted from one to two hours and centred on topics such as energy use, access to information and standard socio-economic indicators such as education and income, as well as people’s everyday rhythm and opinions about the good life, etc. The issue of theft was a sensitive one, and although I was an independent researcher, some people seemed to associate me with the utility company and the Norwegian electrification project. Because I was concerned about gaining people’s confidence, I avoided touching on the issue of theft with people I did not know well, whereas close affiliates trusted that I would not report information about individuals to the utility. On one occasion, I asked utility staff about the number of connections in Uroa, thus causing a senior officer to suggest that they could make a house-to-house investigation to detect all, including illegal, connections. I kindly declined the offer since I did not want to be the cause of any problems to my acquaintances. This illustrates a challenge related to studying theft from a bottom-up perspective.

⁶ Zanzibar Electricity Corporation.

The material from the Sunderban Islands derives from an ongoing international, interdisciplinary study on socio-technical transitions that looks at the barriers and opportunities for providing shifts from fossil fuels to renewable energy systems (solar PV) in rural areas.⁷ As part of the research team, my responsibility is to look at the energy systems from the customers' perspective. During a three-week field study in the Sagar and Moushuni islands in the Sunderbans in February 2010, I conducted interviews with the help of translators with seven operators at power plants, five customer representatives and 23 households (men and women). I also draw on other team members' material from meetings and interviews. Moreover, together with some members of the team I interviewed and obtained customer data from staff in WBREDA, the West Bengal Renewable Energy Development Agency. Lastly, in June 2010, the team conducted an extensive household survey in four villages on Sagar and Moushuni islands on topics such as energy use, how people relate to their supplier, and other related issues (interviews performed by assistants). The survey covered 200 families (including families both with and without a connection) and 70 people representing local leaders, commercial actors, staff at schools and health centres. I was in charge of analysing the survey material by the use of SPSS. The main findings from this research will be published elsewhere.

3 Electricity in rural Zanzibar

From the mid-1980s, electricity became available in rural areas in Zanzibar through the expansion of a centralised grid. The power to Unguja, which is Zanzibar's largest island, is imported through a submarine cable from the Tanzanian mainland. Despite high installation costs, which represent 4-6 months worth of income for an ordinary fisherman, 20% of households in Unguja have a connection to the grid today. In Uroa, which is the village under study, more than half the 480 families have become connected since the introduction of electricity (Winther, 2008, p. 224). Such access to modern services brings social prestige to a husband and his family (men tend to be the homeowners, hence becoming electricity customers). If he also obtains a television set he will be perceived as a good, modern family provider in this Muslim setting. Without question, he and his wife are expected to open up the house to their neighbours and their extended family to offer viewing time in the evenings. This also has the effect that they have less time for intimacy with each other than previously was the case. In Zanzibar, there is a strong norm for sharing goods within one's extended social network, which also includes the consumption of electricity services. Conversely, the monthly paying of the bill (about \$2) is the responsibility of the individual customer. I met many men in an already strained financial situation who struggled to find this extra money. On average, households in the village are five months behind in their payment, but most of them (finally) manage to settle their arrears.

Beyond the concrete task of acquiring cash, the registration of individual customers constitutes a break with former practices. As named individuals, they are engaging in a legally regulated and binding financial relationship with an external party for the first time. Due to the post-payment system, it is also their first experience with the phenomenon of debt beyond private arrangements. That the partner in question is a state enterprise adds a further element to this new customer–enterprise relationship. In addition, as I will show, customers have an incomplete knowledge of how the system works.

⁷ The short title of the project is 'Solar Transitions – The India-Kenya Project'. The project is financed by the Norwegian Research Council, Project no 0138/V IO.

The bills are issued in English, a language which is only spoken by about 5% of the people in the village. Many customers, if they can even read at all, do not understand the text and terms (e.g., “debit”, “credit”, “VAT”). The only information given in Swahili, which is the common language, are the threats of what will happen to customers who fail to pay (fines and jail). This lack of accessible information and explanations exemplifies the supplier’s inadequate focus on customer service.⁸ People do not complain about the English language in the bills, which speaks of their humble role vis-à-vis the state company. This was also reflected when they came in person to pay their bills at an office in the village to the well-dressed, watch wearing clerks from Zanzibar Town. Sometimes being too uninformed to know how to ask the questions they should, they instead humbly looked down and paid the due amount.⁹

Misunderstandings take place. In some cases people had left their homes empty for some months, thinking that they would not be charged for this period, although they were. Similarly, the minimum billing system, which has later been abandoned,¹⁰ produced confusion and anxiety among customers.¹¹ I met several customers, who tried to use less electricity every month, not realizing that the tiny quantity they used was less than 10% of what they were already paying for. They expressed disbelief when they saw that the amount due had increased.

This metering and accounting system has constructed a form of ‘ignorance’ among many customers (cf. Hobart, 1993), who seem to partially accept this aspect of being electricity customers without questioning the lack of information and explanations. However, when they try to save on electricity one month and observe the rising charges the following month, they deduce that something is wrong either with the meter or they think that the company is cheating them. ZECO staff is occasionally subjected to accusations of theft in the Zanzibari media which also fuels the local discourse on this issue.

Juma, who was one of my more informed acquaintances and also speaks English, questioned the company’s trustworthiness. He was particularly concerned with what he saw as irregular reading and billing procedures.¹²

Juma: The readings are not proper. The method of reading, you know. Sometimes they stay for two months and the bill has not come yet. Then the third month they ask you to pay such a [big] amount of money. If you claim the amount is high, they start to ask you what you have. If you say freezer, they say OK, that’s why. If I ask how many units I have used, they cannot give the true answer.

⁸ When I on occasion asked utility staff why they did not include full information in Swahili on the bills, they said the languages had been decided by French specialists at the time when the accounting system was introduced. They said that changing the layout in the aftermath would require changes in the software, which they perceived to be difficult. This demonstrates a technological ‘lock in’.

⁹ Some did not even know if they were to pay or if the company owed them money because of over-payments in the past.

¹⁰ In the aftermath of my main fieldwork in 2001, I advised the utility company to avoid using the minimum billing system because many customers did not understand it. In 2004 it was abandoned.

¹¹ A customer was supposed to pay a fixed price as long as monthly consumption did not exceed 50 units. This would appear to be a rather straight-forward system if the dates for the meter reading matched the 30 day reference on which the system is based. In practice, the meters are read at intervals ranging from 20 to 50 days. Correspondingly, the minimum charges are calculated according to the length of the period. The amount may be one dollar one month and three dollars the next. Many people were not aware of this cause in the variation in their charges.

¹² Interview with “Juma”, Unguja, Zanzibar, May 2001.

Tanja: Why not?

J: They rob it ... “Have you got any bill?” they ask. “No, I have not.” “Did you pay last month?” “Yes!” Then they say: “Pay the same amount this month.” (We laugh).

T: Really?

J: Yes, that is what happens most of the time. For three months, I was without a bill and paid the same amount. “The computer has done this and that”, they say. These people [ZECO staff] who come here cheat, I can say.

T: Why? How do they do it if you receive receipts?

J: You see, receipts are different here [compared to] Zanzibar Town (here he picks up a pile of handwritten receipts and signals through mimics and gestures how little faith he has in them).

Juma has little faith in the handwritten receipts, whose amounts he regards as being set in a random manner. He is obviously also suspicious as to where the money ends up. In ZECO’s main office, receipts are issued through computers that also give the number of consumed units and the new balance. Trusting the accuracy of such receipts more, Juma therefore prefers to go to town to pay. He is a rather wealthy shop-keeper, and being a relatively knowledgeable customer, he is also aware of how to take advantage of the system. For example, he has registered the building where he keeps the shop as a domestic residence in order to qualify for the lowest type of tariff. The meter reader, who is a local man employed by the utility, could have reported this to the accountant staff, but probably avoids doing so because the two are relatives.

The time of connection is important to the formation of the relationship between the customer and the company. Customers are supposed to state their future uses of electricity so that the person installing the equipment can dimension the capacity of the fuse, switch and meter. With the intention of reducing installation costs and future energy charges,¹³ customers sometimes give a lower level of expected demand than what they actually plan to use in practice. In turn, poor dimensioning may cause problems with respect to installations, including the meter’s capacity to record the exact consumption. A woman I met had avoided informing the electricity company worker that in addition to the lights and a radio, she planned to purchase a freezer. She quietly told me that her meter was probably recording far too many units (in Swahili: *yuniti*), but she did not dare to ask the meter reader for advice. Instead she silently continued to pay what seemed to be monthly charges that were far too high.¹⁴

In this case, the electric meter did not fulfil its designed capacity to impose a symmetrical effect on the customer–utility relationship (cf. Akrich, 1994, p. 217). The reason for its breakdown as a tool for controlling the moral behaviour of both parties was probably the woman’s initial deception of how she intended to use electricity,¹⁵ although the meter could

¹³ The assumptions people make here are partially wrong. The installation fee depends on the dimensions of the system, but since consumption is metered, the use of a freezer (whether secretly or not) will be registered and charged.

¹⁴ When I later asked the meter reader if this woman’s meter could be working correctly (her registered consumption was far higher than in other, comparable homes), he said he had suspected that something was wrong with it for some time. He said he would soon have it changed and checked at the office in town.

¹⁵ I wish to acknowledge an anonymous reader for suggesting this interpretation.

also have had a defect from the start. Overuse led to inaccurate recording of consumption, and, probably due to her initial secrecy and a fear of sanctions, she kept quiet about her suspicions about the erroneous metering. For his part, the meter reader may purposely have hesitated to replace the erroneous meter as a way of punishing the customer for her initial deceit, although this strictly remains speculation.

These glimpses into the situation reveal the significance of objects such as bills and meters, and how these may come into play when the customer–utility relationship is formed and maintained. Both parties may manipulate the objects so that they no longer constitute neutral elements in the system. Still, to the majority of uninformed customers, including the woman with the spinning meter, these objects are more accurately conceived of as material representations of the utility itself. This is partly so because customers, due to their lack of knowledge, have less opportunity than utility staff to check that devices and written documents are “performing” as they are supposed to. Instead of registering their own consumption and examining their bills to learn whether these are correct, most customers rely on the utility’s recordings and calculations as to how much they have used and how much they owe the company. Their confidence in the objects rests with their confidence in the utility. Moreover, the regulations say that meters are the property of the state controlled utility, and the extent of this ownership was demonstrated at the times when consumption was registered. The meter is normally located in the living room¹⁶ which is highly private space, and the officer has the right to enter the house in a way that breaks with the usual manner in which people visit each other’s homes, to check the device at any time and without giving notice in advance. Now if a meter reader who supports the governmental party in Zanzibar, CCM,¹⁷ observes signs of critique against the government on these occasions (e.g. seeing posters of opposition candidates or overhearing conversations), he will report it to the authorities.¹⁸ Thus rather than being a neutral element in the customer–utility relationship, the meter could here be considered as a representation of the utility and also of a state exercising political control over its citizens (elaborated in Winther, 2008, p. 109-111; Winther, 2011).

Customers in Zanzibar worry that the meter registers too many units, that the meter readings and bills are inaccurate, and that money disappears into the system. As a whole, the company is preoccupied with customers sticking to the regulations, although the judgements and actions of individual staff, such as those who install the equipment, register consumption and collect the money also count toward the manner and extent to which people behave as customers. Knowledgeable customers are the ones who most clearly articulate their distrust in the company and its staff. Ordinary customers also often suspect that the company is cheating, but their uninformed and subordinate position appears to have a muting effect on potential complaints. However, despite their fear of sanctions and losing a service in which they have

¹⁶ Utility regulations in Zanzibar do not oblige customers to keep the meters inside the house. When I asked people why they kept them in the living room, many would refer to their fear of the meters being stolen if placed outside. Although meters are utility property, customers must pay for them. Thus cost aspects might account for why people kept meters inside. This practice was also the common solution suggested by the utility in the early phase. During fieldwork, however, I observed that a few relatively wealthy families, who were about to construct new and relatively large houses, included a separate, rainproof shelter outside the entrance, intended for the meter (see Winther, 2008, p. 139).

¹⁷ Chama Cha Mapinduzi (Revolutionary Party).

¹⁸ In the villages, there is a general threat of sanctions (including imprisoning) from the authorities against individuals who utter critical voices against the government. As a result, critique is normally muted or only shared in private spaces. To electricity customers of the critical kind, knowing that the meter reader may enter the house at any time of the day makes a difference in that they become more exposed to the danger of being reported.

invested five months’ of income to obtain, they also sometimes engage in making unauthorised arrangements.

4 Zanzibari customer ethics along a scale

Current regulations in Zanzibar say that each connected house should have a separate main switch, fuse, and meter. In practice, however, utility staff have accepted some deviations from this rule. Until recently, husbands with several, neighbouring wives were entitled to connect several buildings to each other. Given the high installation costs, people realised that husbands with more than one wife have a considerable challenge in providing all of them with electricity, as treating wives equally is considered to be an important cultural ideal. Officers told me that this practice had recently been abandoned for safety reasons due to the risk of short circuits and fires. Even so, people in the village continue to consider it reasonable to make these connections between co-wives which fall into the local category known as “Current Direct” (in Swahili: *Umeme Direkt* or *Umeme Komba*, to be elaborated below).

Another culturally informed arrangement accepted by the company takes place during the time of funerals and weddings. Here, temporary three-day connections are considered reasonable by utility staff and villagers alike. Consumption may be measured (thus a charge) or not. On such occasions, light is considered a necessity at night in order to enhance the ongoing preparation of food for the many guests, and electricity is also used for music. Apart from these situations, today’s utility staff would condemn people’s creative means of using electricity and actively seek to detect them. The local moralities and ethics involved can be considered on a scale from prescribed behaviour on the one extreme (Box 1) to plain “stealing” (in Swahili: *-iba*) on the other (Box 4).

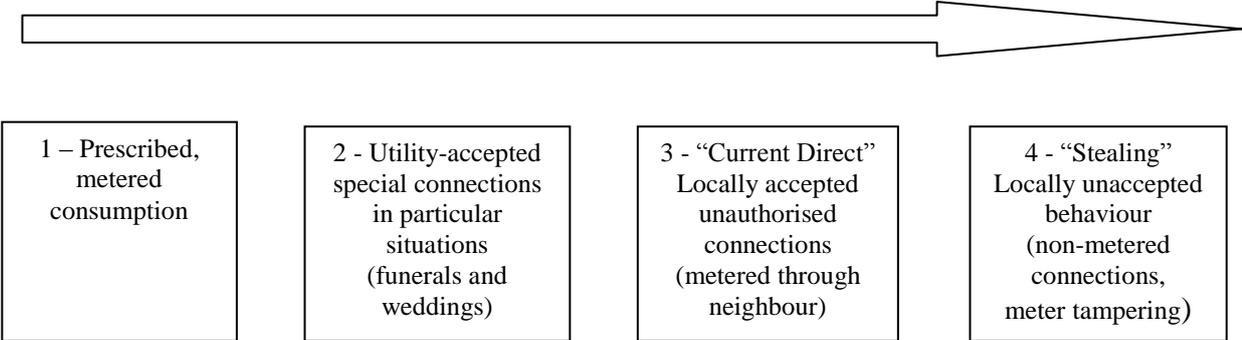


Figure 1 A scale showing how people in rural Zanzibar judge various types of connections.

Among the unauthorised types of connections (Boxes 3 and 4), the locally accepted arrangement of *Current Direct* is the most common.¹⁹ This implies that a house is connected to a neighbouring house registered as a customer, and their joint consumption is measured through the customer’s meter. To enhance discretion, the digging in the ground for the cable is sometimes done at night. During the rainy season, the marks on the ground will have vanished by the following day, thus hindering the new connection from being detected. A

¹⁹ I would estimate that in 2001, 5%–10% of the 480 houses in Uroa had this kind of “direct” connection to a neighbour’s meter. At that time, 33% (159) were registered as customers.

non-registered consumer will take care not to switch her lights on too early in the evening, so as not to become visible to the meter reader should he pass by in the neighbourhood. The customer who offers such a connection is put under social pressure for doing so. As a man who had been laying cable to a neighbouring house told me one night: “He is my nephew. I am obliged to help him.” Often, the two connected neighbours would both contribute to paying the bill.

Thus, as long as consumption continues to go through a meter, this arrangement is normally accepted by observers. However, people would also consider the status of the receiver of such favours when judging at specific arrangements. A poor, single mother would tend to receive moral support when being connected in this way, while a rich man would not expect sympathy from his social surroundings if he was using electricity without having a separate meter. This shows the significance of the contextual dimension in people’s judgments.

A person who deliberately manipulates the meter, as I observed on one occasion, or who connects himself to the grid without a meter, will be locally condemned and accused of “stealing” (Box 4), as one man who committed such a theft openly explained to me. As exemplified by the shop-keeper mentioned above, the most privileged individuals tend to be the ones who commit plain stealing since the wealthy often possess more knowledge about how the system works. Their higher level of consumption (more at stake) and their social and political power (less afraid of sanctions) may also account for why they are more likely to exploit the system compared to ordinary people.

To sum, we see that culturally informed “needs” (co-wives, weddings/funerals) affect what Zanzibaris, partly in agreement with utility staff, consider as legitimate purposes for electricity use. People also judge each other, and such judgements contribute to shaping the social norms for appropriate behaviour. Here, the criteria for evaluation that came into view have a clear, social profile, which may be linked to the Zanzibari egalitarian ideology (Winther, 2008). Wealthier people tend to be condemned harder for committing a given (formal) offence compared to poorer people. Wealthier individuals are also more likely to actually commit proper theft. This demonstrates the general point that people’s limited material resources does not alone account for their unauthorised uses of electricity. The poorest segment of the population either has no electricity, or they have a “direct” line to a neighbour’s meter or they are formally registered customers who are striving to comply with the rules.

Finally, when privileged/knowledgeable individuals strongly express their suspicions that the company is cheating, their accusations may very well be correct. Their lack of trust could in turn motivate such customers to commit theft with the embedded logic: “if they cheat me, I will also cheat them”. However, one should also consider the possibility that their accusations against the utility may have a particular audience, that is, the general public in the village. By nurturing a local discourse on the company’s lack of accountability, they might expect to get support for their own irregular practices and thus prevent observers from reporting these.

5 A look at an Indian, decentralised system

In an ongoing study in the Sunderban Islands in the state of West Bengal, India, one gets an indication of some of the potential and challenges related to decentralised systems as compared to the centralised system just explored in Zanzibar. The customer–supplier

relationship and theft continue to be the focus of interest. In the Sunderban Islands the state owned utility WBREDA started setting up small, solar photovoltaic plants in 1996 (from 25kWp to 120 kWp) including battery banks and systems for provision through mini-grids (Ulsrud et al., 2011). Rural households and shops were to receive electricity for five hours daily starting at sunset. In lieu of electric meters, flat tariffs were set. Each customer agreed to a given number of light points and outlets at the time of connection.²⁰ The maximum connection fee (\$35) corresponds to approximately one-tenth of that in Zanzibar (\$300), whereas the level of the monthly payment is similar (\$2-3). WBREDA delegated local customer groups called beneficiary committees (BCs) to supervise villagers' electricity consumption. The role of the BCs was also to create awareness about electricity's benefits in the initial phase and to motivate people to pay for connections and consumption (Ulsrud et al., 2011). These groups, whose members are local customers of electricity, have also been consulted by WBREDA in the matter of setting and adjusting tariffs. For collection of payment on Sagar Island, this is done by representatives of the Co-operative²¹ (ibid.), who regularly go to the power plants to collect the money from customers. On other islands, the collection is organised in slightly different ways, depending on the institutional arrangement for the respective power plant, but also here through locally based individuals.²²

This institutional set-up, with an emphasis on local involvement in the control of customers, appears to have worked well for about a decade. The rate of collected revenues was high (Chakrabarti & Chakrabarti, 2002), with reports in a given village of as much as 100% (Shrank, 2008). A World Bank publication highlights the success of the Sunderban case: "Theft is almost nonexistent and defaults very few, thanks to enormous peer pressure and self-monitoring by the user group." (Gulati & Rao, 2007, p. 129). This description matches the positive evaluations of the situation in the past that our research team obtained from WBREDA themselves and was also confirmed by our researcher partners in TERI²³ who have been involved in the process of implementing the PV plants (see also Ulsrud et al., 2011).

The task of the user groups, to see that their co-villagers did not exceed the agreed limits of consumption, became problematic at some point, though. In February 2010 our research team observed several ways in which customers were able to extract more current from the system than prescribed, such as connecting devices with three outlets to one light point, charging batteries or installing additional light points in one's house. The user groups were also said to take part in this practice.

²⁰ Typically one may choose between a three point (max 70W, connection fee \$23) and a five point tariff (max 120W, connection fee \$35), which are defined in a specific way for each plant/village and which typically include three energy saving lights, one table fan and one black and white television set. The customer also pays a flat monthly rate according to the type of tariff they have (\$1.8 or \$3).

²¹ The full name of the Co-operative is Sagardwip Rural Energy Development Co-operative Society. Initially, the Co-operative, whose members are the electricity consumers in Sagar, was intended to play a central role also in the management and operation of the power plants, but the role of the Co-operative in reality became more limited (Ulsrud et al., 2011). The Co-operative's Governing Body consists of representatives of local governments (Gram Panchayats) and also individuals representing the block level (a higher administrative level). According to one of their members, the Governing Body has stayed in regular contact with the BCs attached to the various power plants in Sagar over the years. With the recent arrival of the main grid to Sagar, some of their representatives expressed optimism with regard to the prospect of getting the opportunity to sell solar PV electricity to the network (personal comm. Huseby, see below).

²² On Moushuni Island, the money was collected by a man appointed by the Panchayat and employed by WBREDA, who made monthly rounds to people's homes for this purpose.

²³ The Energy and Resources Institute, Delhi, India.

To account for the decline in customers' degree of compliance in the Sunderbans in this period, both technical and social aspects should be taken into account. The physical quality and condition of many of the battery banks had deteriorated over the years, replacements had been delayed, and there were plans to integrate Sagar into the main grid of West Bengal.²⁴ The (temporary) lack of investments negatively affected the quality of supply, and thereby the customers' willingness to comply with the rules. At the same time, people's demand for electricity's services had boosted over the years. In one of its early phases the system was already saturated; hence, no more customers could be connected. Probably linked to this, people sometimes made a so-called bypass by stretching a line over to a neighbour who was not connected (Ulsrud et al., 2011). Additionally, existing customers' new needs were not met. For example, some customers were said to use 5 electricity points while being registered on the 3 point tariff, partly to allow for the use of television. Also, charging mobile phones was a purpose for electricity not thought of in the initial phase, and although each device consumes a modest amount of energy, most families today have at least one phone. The lack of flexibility in the supply system has contributed to the practice of overconsumption, thereby further reducing the quality of battery performance and supply.

At the time of fieldwork, several plants supplied electricity for shorter periods than the five hours prescribed. Some had had to close down while only a few provided the proper supply required. Interestingly, the issue of overuse was close to absent in people's accounts of why the supply was or had become poor. They tended to blame the quality of batteries and the WBREDA for the company's lack of reinvestments, but were less ready to see a connection between battery/power plant performance and consumption. For example, in the survey, 106 connected households were asked if they could state some causes for the battery problems in the power plants, and only three people mentioned overuse.

It is difficult to establish whether overconsumption in the Sunderbans appeared as a reaction to the declining hours of supply, taking over from the self-monitoring system which was founded on the active engagement of local user groups, or if the practice of overconsumption went hand in hand with a gradual reduction in the quality of the technical performance of batteries, with the two processes mutually producing a reduced quality in supply. At the time of fieldwork, social norms for proper use of electricity did not seem to exist in the Sunderbans. As a result of the supplier's failing to fulfil its part of the contract, customers were also not paying for their service, which was a trend that appears to have started some time before 2007 and which spread to villages where supply was still working as prescribed.²⁵ In one sense one may say that customers who used electricity for free (during the short hours it was available) had temporarily hijacked the power plants. These are run by local operators who are under pressure from the population to continue supply for as long as possible. On the other hand, WBREDA seems to gradually have realised that it was difficult to ask customers for payment given the poor supply. In June 2010, the plants in Sagar and Moushuni stopped supplying electricity.

Admittedly, the situation was extraordinary when our team visited the Sunderbans. Nonetheless, the process leading up to it, including WBREDA staff's willingness to share the

²⁴ In August 2011, the works with the extension of the main grid had reached the harbor in Sagar. There grid will be further expanded in Sagar in 2011 and 2012 (personal comm. Vilde Blix Huseby).

²⁵ According to documentation received from WBREDA dating back to 2007, by November that year, 56% of the customers connected to 8 power plants in Sagar serviced their bills. After that, the share of paying customers gradually decreased until November 2009, when no payments were made in Sagar. An example of the effect of non-payment spreading to villages with satisfactory supply was Baliara in 2010.

challenges they have met, are valuable for understanding some of the dynamics at work in locally anchored electricity distribution systems of this sort. In the early phase, an accepted, overall, “contract” was made between the overall supplier WBREDA and customer groups (BCs) who themselves took on responsibility for monitoring customer compliance without receiving monetary compensation. BC members admitted to us that their role in controlling and reporting on members within their own social network could sometimes be challenging, but they also stressed the importance of such control. Moreover, we did not receive complaints from other customers when discussing the actions of BC members, which role seemed to be generally acknowledged. Over the years, however, a lack of necessary adjustments of the socio-technical systems appears to have caused the problems. Tariffs were kept identical during the period although customers had new needs. There was a delay in the replacement of worn out technical parts and a lack of expansion of the technical system which made the cleavage between supply and demand grow larger. In sum, despite the general potential for flexibility embedded in solar PV systems (Ulsrud et al., 2011), the lack of adjustments in practice jeopardised the premises for the initial contract between supplier and the customers.

Recently, WBREDA reported to have replaced the battery banks in 11 of the Sunderban power plants (*ibid.*), which is expected to make the plants run smoothly. Also the arrival of the main grid in Sagar will gradually contribute to improving supply in many villages. At the time of writing (October 2011), the efforts to re-start operation are said to be facing certain challenges, but there is good reason to believe that these will be solved.²⁶ Important in this picture is the signal that WBREDA intends to transfer the ownership of the power plants to the local governments (Gram Panchayats) in each village.²⁷ According to staff interviewed by one of our students recently, this shift is expected to produce increased local empowerment and at the same time free WBREDA from the responsibility of operation and monitoring on a long distance from Kolkata (personal comm. with Huseby). In the case of such a transfer of ownership, it seems important that the state agency facilitates a thorough and enduring capacity building process. Included here should be an effort to make customers themselves aware of the central role that compliance plays to a system’s financial viability and its future, potential capacity to meet needs for expansion. One could also emphasise strategies that allow for inclusion also of marginalised households who do not have access to affordable electricity today, for example social tariffs. In locally driven projects of this sort, there is a danger that less privileged groups become excluded.

6 The customer–supplier relationship: a key to sustainable electricity systems

Fjeldstad (2004) argues that relational aspects and the question of trust matter as far as to what extent people comply with the regulations. Based on studies of the South African context, he arrives at three dimensions of trust that affect electricity customers’ compliance: firstly, their trust in the supplier “to use revenues to provide expected services”; secondly,

²⁶ According to one of the Master students (sociology) affiliated with this research projects, Vilde Blix Huseby, University of Oslo, four out of five of the power plants she visited in August 2011 had received battery replacement (two in Moushuni island, and Khashmahal and Natendrapur in Sagar) and one had not (Kamalpur had initially received a battery bank, but this had been moved to another place, according to the operator). Due to various problems in different places (e.g., inverters, controllers, and distribution lines) the power supply was less than 5 hours per day in these villages and not provided to all customers. Customers were also not paying, and in Moushuni this was reported to be due to the absence of the money collector. Huseby conducted field work and interviews in Kolkata (WBREDA office), Sagar, Moushuni and Satjelia islands from 9th August to 2nd September 2011 in relation to her thesis on the organisation of solar energy in the Sunderbans.

²⁷ Communicated to Huseby by WBREDA staff, members of the Co-operative in Sagar, and various BC members and operators at the plants, August-September 2011.

their trust in the same institutions “to establish fair procedures for revenue enforcement and distribution of services”; and thirdly, their “trust in other citizens to pay their share of service charge” (Fjeldstad, 2004, p. 541). We see that both Zanzibaris and Bengalis (at the point in time under discussion) did not have full trust in the supplier, albeit for different reasons. In Zanzibar people suspected that the utility itself was cheating by not spending all revenues on providing services. Monitoring utility staff and holding the company accountable would here be a strategy to improve the level of trust. In the Sunderbans, it was the supplier’s failure to deliver a service that customers paid for which finally jeopardised their trust and lack of compliance. In the Sunderbans, the prime condition for the system to return to a financially sustainable state would thus be to replace old devices (as WBREDA is now about to do), modify tariffs according to the customers’ changing needs, and expanding the capacity of the system to a level which meets people’s demand for electricity.

As to the second point on trust in procedures, to which I would also include trust in material objects, Zanzibaris had limited confidence in meters and the accounting system. This was mainly so because they lacked the competence to monitor that the procedures were being fair. In turn, the lack of transparency made them doubt that there was balance between what they paid for and what they got. A strategy to meet and avoid suspicions would here be to regularly control, calibrate and/or replace dysfunctional meters to improve their physical performance as mediators of a symmetrical customer–utility relationship and, not least, to radically increase customers’ awareness of the metering, accounting and billing system. In the Sunderbans, by contrast, the simplicity of the accounting system (no meter, flat tariff) appears to have provided transparency and trust.²⁸

Regarding the third point on consumers’ trust in each other, it is argued that a customer will tend to not comply if he or she perceives their peers to be doing the same. This thesis has relevance in the Sunderban case, where the practicing of non-payment in poorly supplied areas spread to villages where supply was still as prescribed. The material from Zanzibar offered a broader and more thorough discussion of the role of peer groups, which showed that people’s judgments of others highly affected the local norms for electricity behaviour. In the Sunderbans, norms for compliance appear to have been strong in an early phase; they were irrelevant at the time of fieldwork; and it remains an open question how they will develop in the future.

An important distinction between Zanzibar and the Sunderbans is who “the supplier” is perceived to be. In Zanzibar this is undoubtedly the state owned and controlled utility ZECO, although meter readings are often done by employed co-villagers. In the Sunderbans, the identity of the supplier is less clearly defined due to the division of tasks into i) overall responsibility (WBREDA), ii) contractors, operators and line men at each plant, iii) the Co-operative and local money collectors, and iv) the user groups (BCs) who monitor consumption among peers and report on irregular use. Customers’ degree of trust in all these bodies is relevant to their resulting level of compliance. One may here ask to what extent the distribution of responsibility for money collection and monitoring to the village level is significant to customers’ degree of compliance. In their treatment of the Sunderban case, Gulati and Rao (2007) make an analogy to the sharing of water when suggesting why the local organization of electricity in the Sunderbans was a success: “In the public mind, stealing from [a state owned utility] is no crime, but rather is seen as one way of getting back at a

²⁸ Here too, receipts for payments are written in English, whereas the majority of the population speaks Bengali, thus potentially producing misunderstandings. But with the flat tariff the accounting system appears much easier to understand than what is the case in Zanzibar.

powerful antagonist. This attitude is in sharp contrast to the way the people perceive irrigation water ... Local committees closely watch the sharing of the irrigation water, and any theft of water is perceived as theft from a neighbor, which is taboo” (Gulati & Rao, 2007, p. 129). Water theft may not be a taboo everywhere, but I think this analogy may be useful when planning for local electricity supply. In a given context, one may examine existing systems and norms for sharing scarce resources, such as water, where people also experience the consequences of their own or the group’s compliance or failure to comply.²⁹ Insights in such existing systems and norms are not only likely to be valuable in terms of communication, but may also inform the process of setting up and operating local electricity supply in important ways.

7 Conclusion

People’s degree of compliance is linked with their perceptions of the supplier, their evaluation of co-villagers and their wider concerns in the local context. In addition, potential or realised sanctions affect people’s actions. This is clear from the Zanzibar material where there is a relatively high degree of compliance, and where people fear the consequences of being caught in stealing. Nevertheless, quite a few engage in practices that are not strictly legal, which indicates that top-down and technology focused approaches to combat theft have their limitations. In the Sunderbans, the penalty fee is modest and we never heard people talk about threats of jail. This indicates that at the time when customer compliance was high, this was a direct result of strong local norms for compliance (possibly including a fear of social sanctions), and not a result of people’s fear of formal penalties.

I have pointed to Zanzibar’s lack of insight in how the system actually works. With the bills issued in English, it may seem that the utility deliberately wants to keep people from being informed. The frustration among poor, complying customers is considerable, which raises ethical questions. Non-information is not a viable strategy to enhance sustainable consumption. To improve communication, build trust and maintain the utility’s means of sanctions, I have earlier advised the company to introduce a separation between its control function and that of providing thorough information and customer service.³⁰

The top-down institutional set-up in Zanzibar is linked with the materiality of the centralised system. Compared to this state-led disciplining of customers, partly exercised through the use of electrical meters, the Sunderban model comprises a locally organised system without technical tools to help measuring consumption. From one perspective there seems to be a trade-off between technologically simple systems that require less investment (the Sunderbans) and technically more robust and complex systems that hinder overuse and facilitate growth in electricity consumption and development (Zanzibar). From another perspective, this examination has also shown that technology and a strict regime alone do not prevent theft from taking place (Zanzibar) – and that distributed, non-technical means of

²⁹ A BC member we interviewed mentioned that it would be an advantage for the task of motivating people to pay and comply with regulations if the money collected would go to specific accounts for the respective power plants and not, as they do, be transferred into WBREDA’s general account.

³⁰ After completing my PhD thesis, I was invited to lead an information programme in rural Zanzibar to inform customers in new villages to be electrified about the costs, dangers and benefits of electricity (Winther et al., 2005). During this work, our team put an emphasis in a dialogue with the utility on separating the company’s control function from that of providing information and services.

control might work well as long as the supply remains satisfactory (Sunderban, early phase, a similar effect has also been observed in Bangladesh³¹).

Without having taken a stance in the discussion of centralised versus decentralised electricity systems, I have tried to show how a grounded, socio-technical and relational approach in this field may yield important insights. I have given recommendations as to how one may build more trust into the customer–utility relationship for each of the two types of systems and thus increase customer compliance. The importance of attending to contextual factors and needs for adjustments has also been highlighted.

There is a growing emphasis in the literature on bottom-up approaches to combat corruption which highlight social accountability and participatory methods for how customers can contribute to improving the performance of service providers.³² Conversely, the literature on theft mainly responds to the question of how customers may be disciplined into adhering to regulations. The current treatment of customers, the utility to which they relate, and the objects that mediate this relationship, represents a way of bridging these aspects. Furthermore, I argue that the core customer-provider relationship is a key to understanding how unsustainable energy practices, such as theft, may be avoided. Making customers act in a certain way will always be the goal of the supplier and the political institutions governing it, but the decision on how to act ultimately rests with the customer.

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³¹ In Bangladesh, a participatory approach to controlling electricity customers’ behaviour resulted in non-technical losses becoming half of the amount otherwise found in this country. The initiative included the identification of customer groups whose members were all punished if one member was found guilty of theft. (Gulati & Rao, 2007, p.152-4)

³² E.g., Arroyo & Sirker (2005); Cavill & Sohail (2004); Gulati & Rao (2007).

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