Breaking the culture of non-payment: A qualitative analysis of utility intervention Project Sarbulandi in Karachi Electric, Pakistan

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Abstract

Access to reliable electricity is crucial for removing barriers to economic opportunities and improving well-being; however, the fiscal challenges facing the electricity sector in many low- and middle-income countries threaten the quality of electricity service provision, hindering economic growth. In such settings, low bill payment and high non-technical losses (i.e., theft) hinder cost recovery and limit funding available for investment in infrastructure improvements. In this paper, we consider a multipronged intervention implemented by Karachi Electric, the utility serving the city of Karachi, Pakistan, under a project designed to reduce losses and improve cost recovery. To achieve these targets, the project increased budgets for the utility's underperforming areas and delegated decision-making authority to the general managers of those areas. The budget increases funded infrastructure upgrades, staff incentives, and expansion of customer engagement. Given that

the success of such an initiative depends on the behavior of both the utility employees and its customers, this study sought to understand how both groups perceived the implementation and impacts of the project. To do so, we performed detailed interviews of utility managers and implemented focus groups comprised of the utility's residential customers. We find that managers and customers experienced these efforts differently, with the latter being less aware of the outreach activities and considerably more focused on infrastructural changes than the former. Finally, the timing of the project overlapped with the COVID-19 pandemic and managers believed that such interventions helped mitigate the impact of the pandemic.

Keywords: electric utilities, Pakistan, cost recovery, service quality, COVID-19, customer trust

1. Introduction

Economic prosperity and development are hindered if a country is unable to meet the increased demands on its infrastructure. Access to reliable electricity, in particular, is crucial for removing barriers to job growth and lowering the cost of doing business. However, in many low- and middle-income countries, fiscal challenges pervade the electricity sector and threaten to dampen economic growth (Trimble et al., 2016; Zhang, 2019).

Electricity shortfalls and subsequent load shedding have become a serious problem in Pakistan. A major source of these shortfalls is non-technical losses, which are estimated to cost utilities worldwide $25 billion per year (Depuru et al., 2011).[1] In response, in late 2019, Karachi Electric (KE), Pakistan's only private and vertically integrated utility provider, implemented Project Sarbulandi (henceforth, "the project"); a multipronged intervention that incorporates infrastructure improvements, staff incentives and community engagement activities.

Initial quantitative findings from this research team suggest that since the initiation of the project, losses decreased, and revenues increased, but then in February 2020, the first cases of COVID-19 were identified in Karachi. Shortly afterwards, Karachi was put on lockdown from March 22 until May 9, during which time in-person operations were impacted and there were severe local economic effects. While COVID-19 affected all of KE operations, data suggest

[1] Furthermore, losses disproportionately affect utilities in low- and middle-income countries. According to calculations based on IEA data (OECD/IEA, 2018), T&D losses account for 18% and 16% of total output in low and middle-income countries respectively, which is approximately 3 times the rate for high-income countries.

that IBCs that had implemented the project saw improvements after the COVID-19 lockdown more quickly than other IBCs (See Table 1).

Table 1: Average IBC Losses and Revenue Recovery, by Sarbulandi Phase 1 and 2[2]

	Pre- Sarbulandi		Post- Sarbulandi	
	Nov 2018-Feb 2019	Mar 2019-Oct 2019	Nov 2019-Feb 2020	Mar 2020- Oct 2020
Panel A: Losses				
Phase 1	0.17	0.30	0.14	0.28
Phase 2	0.19	0.33	0.18	0.39
Panel B: Revenue Recovery				
Phase 1	0.88	0.85	1.02	0.75
Phase 2	0.76	0.76	0.80	0.70

Motivated by these results, in this paper we leverage Project Sarbulandi as a unique case study for analyzing the strengths and weaknesses of programs utilizing a mix of technical and non-technical interventions in the energy sector. We provide background information about the utility's operations, the challenges it faces and the conceptualization of the project. We then utilize qualitative data analysis techniques to answer three questions: 1) What was the approach utilized by the project, as it was envisaged and implemented by those on the ground? 2) What impacts do its architects and administrators believe the project has had and whether they believe it allowed them to mitigate the effects of the COVID-19 pandemic? 3) Do the perceptions of those implementing the project line-up with the experiences of their customers? To answer the first two questions, we leverage data from interviews with the general managers ("managers") of the six sub-divisions that implemented the project, while for the last question we report findings from focus groups with customers in areas where the project was implemented.

[2] Losses are measured as (Units Sent Out - Units Billed)/(Units Sent Out) and Revenue Recovery is measured as (Net Credit/Gross Billing). Phase 1 IBCs are Korangi, Landhi, Liaqatabad, Nazimabad, Orangi II and Surjani I. Phase 2 IBCs are Baldia, Gadap, Lyari II, Malir, Organi I and Surhani II.

1.1 Background and local context

We focus on Karachi Electric (KE), which serves Karachi, Pakistan, a sprawling mega city of over 20 million people. KE's distribution business is organized into 30 local offices known as Integrated Business Centers (IBCs), which are responsible for electricity distribution, billing, and collection in the areas they serve. KE has a large and diverse customer base ranging from those located in prosperous residential, commercial, and industrial areas to those in informal settlements. Karachi's high settlement density and high percentage of informal settlements result in significant non-technical losses, largely caused by illegal wire hooking (*kundas*) onto the nearby service cables.

Since 2009, the company's management has focused on reducing losses through the allocation of outages (load shedding) according to past losses, infrastructure improvement programs, metering, and customer facilitation initiatives. As a result, the average transmission, and distribution (T&D) losses, which arise due to technical inefficiency, unmetered consumption, and theft, declined from 35.9% to 19.1% and revenue recovery improved from 88.6% to 92.6% from 2009 to 2019. Over the same period 70% of the city was made load-shed free (Karachi Electric, 2019).

The losses suffered by KE are comparable to those experienced by the rest of the country; national average T&D losses were 18% in 2018-19, with certain distribution companies reporting losses upwards of 30% (NEPRA, 2019). Like other utilities, KE faces challenges with both technical and non-technical losses. Non-technical losses include electricity theft (which typically occurs through meter tampering and illegal connections to bypass meters), bill non-payment, and billing irregularities, often involving a customer bribing a utility employee to report a lower consumption than that reported by the meter (Smith, 2004).

These losses are a problem for multiple reasons. Low bill payment and high theft mean the electricity distribution company has low cost recovery and less money to invest in infrastructure maintenance, modernization, and technical upgrades. Underinvestment in infrastructure can lead to poor quality electricity services including outages and voltage fluctuations. Moreover, the unpredictable additional load may induce brownouts and blackouts during periods of peak consumption (Depuru et al., 2011).

Low-quality electricity services are believed to decrease the economic benefits from connections to the electrical grid (Pargal and Ghosh Banerjee, 2014; Zhang, 2019). Consumers that pay for their electricity consumption, bear the

greatest cost of these high non-technical losses in the form of higher electricity tariffs to cover losses, while enduring poor quality services (Yakubu et al., 2018).

Electricity theft and bill non-payment may be reduced by various interventions, including technical or engineering methods that include modernizing metering systems and power lines, managerial methods such as inspections and customer engagement, and system changes including deregulation and privatization (Smith, 2004). A growing yet limited body of evidence exists on the impacts of such intervention. Recent studies document efforts to reduce losses through various technologies, such as smart meters (Ahmad, 2017; Depuru et al., 2011) and prepaid meters (Jack and Smith, 2020; Mwaura, 2012).

Others note a limited role for technology-only interventions in loss reduction. There is a call for a better understanding of the role of a broader suite of interventions – including non-technological interventions -- in reducing electricity non-technical losses (Bhatt and Singh, 2020; Smith, 2004; Winther, 2012). Yet, beyond recent evidence on reward and reprimand strategies to reduce losses (Ali et al., 2021), little evidence exists on efforts to reduce non-technological losses that do not rely on technical changes. Project Sarbulandi employs a mix of technical and non-technical interventions, making it a unique case study.

In July 2019, KE central management began planning to implement Phase 1 of the project, under which six high-loss IBCs were selected. The managers of the selected IBCs were directed to form a four-person team to prepare, present and defend a detailed operational and financial plan for reducing losses and improving recoveries. IBCs could customize their multipronged strategies by assigning priorities to various technical, managerial, and customer-facing interventions.

Detailed in Section 3, the project provided resources for a range of intervention types – human capacity building, technical solutions, and community outreach – all of which have the potential to achieve the objectives of reducing T&D losses and improving cost recovery. The multiple intervention approach, mixed with increased funding and autonomy, aimed to break the cycle of high losses and poor-quality electricity services. Additionally, given the first phase of the project began implementation shortly before the COVID-19 pandemic, the timing allow us to study whether such interventions could mitigate the effect of negative exogenous shocks.

In what follows, we try to understand how those implementing the program perceived its effects, and more importantly, how they perceive its impacts on the ground. Since the managers of the IBCs were given significant autonomy in implementing the project, we explore what they believe were the outcomes of various initiatives, and what were the mechanisms through which these impacts took effect. Finally, based on data from our focus group discussions with the customers, we compare the managers' perceptions with those they serve.

2. Methodology

2.1 Data Collection

To answer our research questions, we interviewed managers of all six IBCs that had already begun implementation of Project Sarbulandi and two IBCs that had yet to begin implementation (Table 2). Questions covered the perceived impacts of each intervention, implementation challenges, and issues surrounding electricity theft and bill payment. The interviews with 2 IBCs in Phase 2 enabled us to also ask questions about the perception of the project's impacts as they compare to an IBC that had not yet implemented it. Interviews took place between 20th October and 17th December 2020.

Furthermore, in Fall 2021, we conducted four focus groups with the utility's residential customers – two with female respondents and the other with male respondents – to better understand their perspective on the project and the utility's efforts to reduce losses. In total, 24 customers from high loss areas participated in the focus groups. Focus group enumerators asked questions on topics such as the quality of electricity service, billing and payment issues, *kunda* practices and other ways of meter tampering, as well as perceptions about the utility programs in their communities.

Table 2: General Managers Interviewed

Interview Code	Project Sarbulandi Phase
INT1	**Phase 1**
INT2	**Phase 1**
INT3	**Phase 1**
INT4	**Phase 1**
INT5	**Phase 1**
INT6	**Phase 1**
INT7	**Phase 2**
INT8	**Phase 2**

2.2 Analytical Approach

Although the research asked specific questions of the interview data, we did not apply a top-down analytical framework, opting instead to allow the interview subjects to speak for themselves. This necessarily means that the findings are a reflection not of external reality, but the perceptions of the informants (Andrews, 2012; Berger and Luckmann, 1990; Eriksson and Kovalainen, 2016). However, as initial quantitative findings suggest that these IBCs did experience an increase in bill payments and a decrease in losses during the implementation of the project (see Table 1), this paper explores the mechanisms by which the project may be achieving these results and the managers' and customers' experience of potential impacts. We hope that the results from this qualitative work will help guide the collection and analysis of quantitative research, allowing further examination of the causality and impacts of the project.

Manager interviews and focus groups discussions were transcribed and translated from Urdu into English. Manager transcripts were coded with the aid of the qualitative data analysis software NVIVO, looking for IBC characteristics, key actors, key interventions, the impact of COVID-19, and key themes. Focus group discussions were summarized and used as another means to corroborate the narratives in the manager transcripts. Throughout the data analysis process, the authors of this paper have sense checked results with the rest of the Pakistan-based team to ensure that our findings do not ignore key aspects of the context (Keso et al., 2009).

In addition to thematic coding, the codes for key interventions and the impact of COVID-19 were referenced to answer the key questions in section 2. Answers to those questions were broken down by the activities that took place, how the intervention worked, what managers believed was the impact of the intervention and finally, how (and whether) customers perceived these changes.

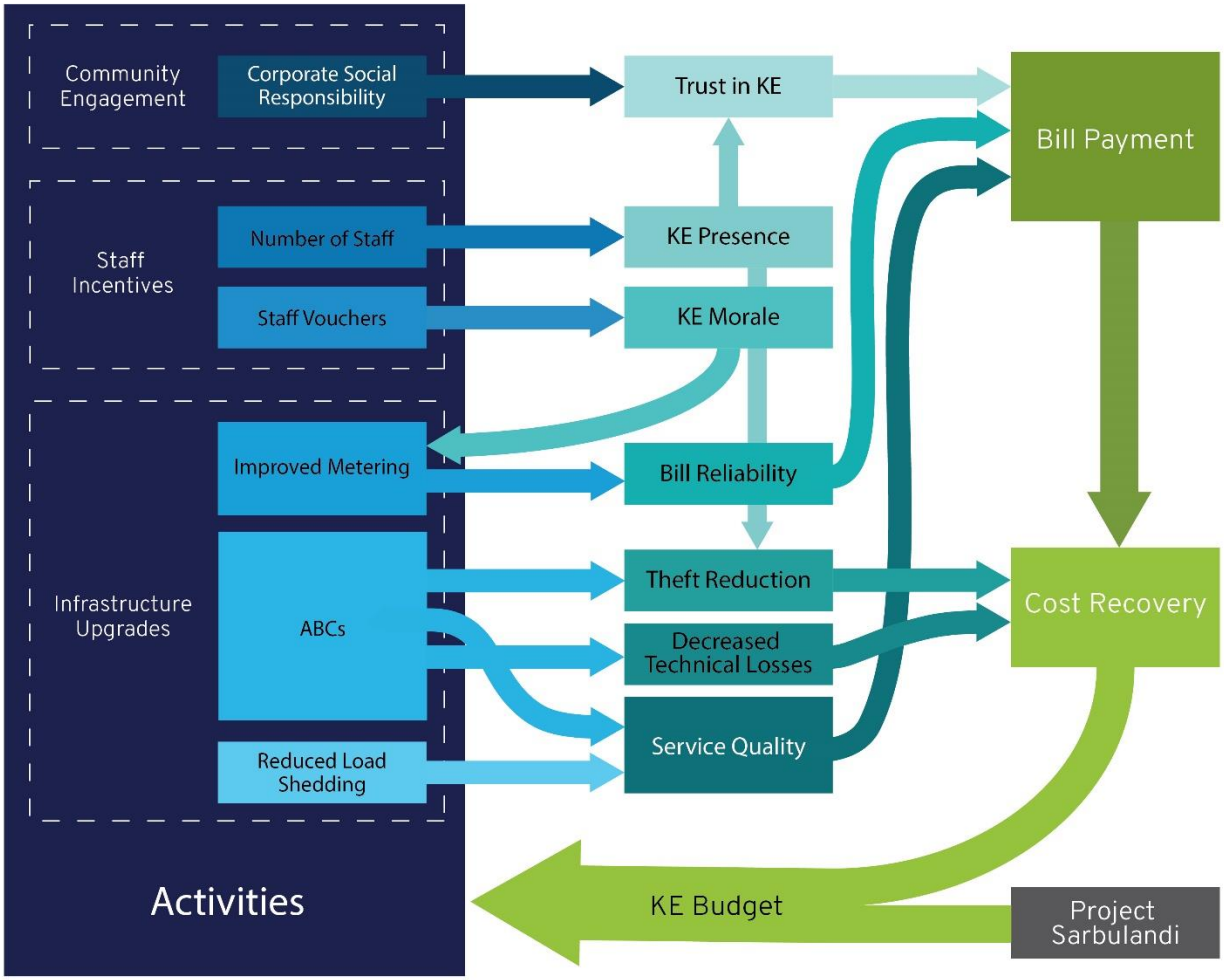
3. Results - Impacts of Project Sarbulandi

Recall that the project is not a single intervention, but instead a set of targets, a bottom-up decision-making structure, and increased resources. We detail first how managers envision these interventions work together, and then report their perception of their impact, both pre and post the COVID pandemic. Finally, we analyze how customers experienced these initiatives.

3.1 Infrastructure, Customers & Staff: Creating an Ecosystem of Interventions

In general, managers utilized their increased resources on three types of interventions: infrastructure improvements, customer engagement and staff incentives. Our analysis shows that managers perceive these multiple intervention types as symbiotically working together. As seen in Figure 1, managers believe that infrastructure interventions reduce theft, improve service and billing quality, and, in turn, increase consumer trust in and support for KE. Staff incentives (e.g., vouchers for groceries) increase morale, but they also speed up the rollout of these projects, as staff competes to reach targets, such as the number of meters installed. Meanwhile, customer engagement initiatives such as medical camps, education, and outreach help to strengthen KE's support while also ensuring that consumers know who to contact if they have a problem, which helps to improve bill payment. These interventions function together to improve service quality and cost recovery and may help break KE out of the adverse infrastructure trap (McRae, 2015).

Figure 1: Mechanisms described in managers' interviews



3.2 Project Sarbulandi and manager impressions of its impacts

As mentioned above, managers engaged in three types of interventions: infrastructure upgrades, customer engagement, and staff incentives. In general, managers found that infrastructure interventions not only reduced losses and improved bill collection, but also helped improve KE's rapport with its customers and changed the nature of electricity theft.

The most frequently mentioned infrastructural change was upgrading service lines to Aerial Bundled Cables (ABC), followed by the installation of new meters. ABCs were first utilized in 2015, but, their rollout was expanded under the project (INT5), because: (i) it made attaching illegal connections more difficult and (ii) the coating on the ABCs

reduced the risk of getting electrified (INT2). Similarly new meters were reportedly harder to tamper with, and managers believed that they would also yield a higher quality of service (INT1, INT4).

These interventions were augmented with an increased effort to expand the number of formal connections to the electrical grid. This was achieved both by expanding infrastructure to informal settlements (INT4) and lowering the number of documents required for a new connection (INT3). In addition, installment plans were provided to new and existing customers for purchasing new meters (INT4).

Managers report that these interventions substantially impacted both KE's financial situation (INT5) and chipped away at the "culture" of non-payment in their areas. Table 3 summarizes the types of impacts and the number of IBC interviews, where we also cite the type of every impact.

Table 3: Summary of intervention impacts

Intervention Type	Impact	Number of IBCs Cited
Infrastructure	**Improving Billing**	**3**
	Improving Bill Collection	**2**
	Improving Support	**3**
	Improving financials	**3**
	Changing Patterns of Theft	**4**
Staff Incentives	**Improving Morale**	**4**
	Improving KE end results	**1**
Customer Engagement	**Improved Customer Education**	**3**
	Improved support for KE	**3**
	Improved accessibility of KE	**3**

Due to new infrastructure and increased "vigilance" activities, managers believe the use of illegal connections has decreased (INT2, INT5, INT6). They further believe that these changes helped increase both service quality and customer trust in KE (INT2, INT5, INT6). They claim this was due to their intentional attempt to show people the results of their program initiatives. Managers reported temporarily changing load shedding policy, reducing load shedding in areas where infrastructure upgradation had just taken place. INT1 felt the results of ABC installation "should be visible to the consumers since day 1" and so took "special approvals" to reduce load shedding on feeders with recent ABC installations.

Managers also did this for certain communities and departments (e.g., government water pumping stations, hospitals, social service centers (INT2), and industrial consumers (INT5)) to build customer trust in KE.

Managers believe that the reduction in load shedding has been "directly proportional to our financials" – namely, the higher the quality of service, the better KE has been able to recoup costs (INT1). These changes have sometimes been quite drastic – INT3 reports a decrease in losses from over 50% to 15% and an increase in cost recovery from 30% to over 90% with the installation of ABCs and new meters.

However, there remain some challenges to cost recovery. While line losses from illegal connections have reduced, consumers that wanted to avoid paying for electricity may have shifted to meter tampering (INT2, INT3, INT5). In some cases, the realization that *kundas* were not effective with ABC wiring, led to resistance in the form of physical confrontations with and criticism of KE staff who were involved in infrastructure upgradation (INT1, INT3, INT5).

The second pillar of the project's interventions was customer engagement, which managers reported undertaking in multiple forms, most frequently describing Corporate Social Responsibility (CSR) projects that, at least in INT1, were run specifically by the IBC's CSR team. CSR projects included, medical camps (INT1, INT4, INT5), eye camps (INT1, INT4, INT5), gifts (INT1) and sports or events for children (INT4, INT5).

According to managers, these events were largely intended to strengthen KE's profile and public relations. One manager described purposefully timing the events so that they ran two days before bills were due (INT3). Managers also reported working with community leaders and appointing a "focal person" from the community to improve communication between customers and KE. Elsewhere, support from the head of the neighborhood mosque was important, in part because mosques could be used to spread the word about important KE updates, as well as the message that stealing electricity is wrong (INT1, INT5). Other community spaces have also been used for customer education, like notices in street intersections (INT2) and shops (INT1).

KE staff also worked closely with customers, in part to mitigate the "resistance" demonstrated by consumers that now had to pay for electricity (INT1, INT2, INT3, INT4, INT5, INT6). Sometimes staff would "face backlash and verbal abuse" (INT1). However, managers considered these face-to-face interactions as critical in sharing messages about the

importance of bill payment and connecting the idea of paying for electricity with reduced load shedding (INT1, INT5). Building on this a major component of customer outreach was the IBC on Wheels (IoW) initiative, in which KE staff would travel around the IBC to handle common customer concerns. This was a "one window solution to the consumers where you are catered for new connections, billing complaints, and concerns regarding delayed bills (INT1)." IoW was made possible in all the project IBCs (INT1, INT6). One manager reported this was a particularly good way to reach customers "who have a weak banking network in the locality and where majority of the population is living in *katchi abadis*" (INT1).

As we see in Fig 1, managers believed that customer engagement actions, from CSR projects to door-to-door problem resolution, increased customer trust in KE. Furthermore, by updating the billing process to a smartphone based system also helped increase trust as it provides proof of the meter reading (INT1, INT2, INT3, INT4, INT5, INT6). Managers perceive that these initiatives made customers' attitude towards KE staff friendlier – from handshakes to greeting managers in the street – and they responded to new IBC customer service locations by bringing their questions about bill payment.

The last pillar of the project was an increase in human resources for meter reading and vigilance activities, in combination with the introduction of a staff incentives program in the form of vouchers for grocery purchases. These vouchers were paid out when IBCs reached their monthly targets, and, continuing the theme of autonomy, IBCs differed in how they distributed their vouchers. Some IBCs distributed them widely through their line managers because they considered the success a "team effort" (INT1), while in other IBCs, voucher distribution was linked to team members reaching or surpassing their targets (INT3, INT6).

Managers felt that incentives had a major impact on staff morale and motivation. As the selected IBCs for the project were the lowest-ranked IBCs, they were rarely eligible for incentives (INT1). Before these incentives were put in place, managers felt there was a lack of motivation and high levels of corruption in the KE field staff (INT1, INT5). They believed that the introduction of vouchers "inculcated a sense of healthy competition," provided "motivation," "instant gratification," and "built trust" (INT6, INT5, INT4, INT5), that helped catalyze their other initiatives.

3.3 Managers' perception about the effects of COVID-19

As expected, managers reported that the COVID-19 pandemic had far-reaching consequences for the operations of KE. It directly affected the ability of its customers to pay their bills, and its staff to continue normal operations (Table 4). Most managers agreed that the initiatives undertaken due to the project allowed them to reduce losses, both due to the improved infrastructure and the foundation of goodwill with consumers that prevented customers from 'falling off the wagon.'

All managers noted economic downturn, particularly job losses, as a reason for low recovery rates during the beginning of the pandemic. Some managers estimated that 30% of non-paying customers during COVID-19 were those who lost work (INT5, INT1). This seemed to be a particular issue in areas with a high percentage of daily wage workers (INT3, INT7). At this point, paying power bills became a lower priority for customers, resulting in the pilling up of unpaid bills. (INT4, INT1). However, in one IBC, the manager felt that "COVID kind of did not happen here" (INT2), though there is no evidence in the current quantitative data to suggest that IBC2 had a different experience during COVID-19 than the other IBCs. Therefore, it is likely that other low-medium income areas experienced similar struggles implementing the lockdowns.

Lockdown restrictions imposed direct hurdles on KE operations, with work from home requirements (INT5), positive tests in KE teams (INT4, INT5) and contract workers leaving the city (INT1), all reducing IBC's ability to operate efficiently. The biggest operational impact of COVID-19 was limited meter reading and reduced on-ground vigilance in the first month or so of the lockdown, resulting in KE billing its customers based on the past average readings (INT1, INT3, INT6, INT7). While after the first few months, meter readers were allowed back into the field (INT1, INT3), GMs felt that insufficient staffing reduced their ability to meet the project's timelines and to recover costs (INT5, INT4).

Table 4: Impact of COVID-19 and the role of Project Sarbulandi

Topic	Impact	Number of IBCs Cited
COVID-19	**Changes in Operations**	**6**
	Changes in Load Shedding	**4**
	Changes in Community Engagement	**2**
	Financial Impact on KE	**8**
Mitigating Effect of Project Sarbulandi	**Mitigating effect**	**4**
	Because of Community Engagement	**2**
	Because of ABCs	**2**

The pandemic also hampered IBCs' ability to apply load shedding strategically. KE took a company-wide decision to make the entire city load shed free during lockdown (INT3, INT4, INT6). During this time, one manager said that theft increased because "people knew that they had a free hand," and, thus, they started to puncture cables to attach new illegal connections (INT4). However, after the lockdown restrictions were eased, IBCs returned to their normal load shedding schedule (INT4).

Finally, lockdown and social distancing rules had direct effects on CSR activities. To address the needs of the community, while also bearing in mind that staff on the ground could be a vector for the disease, staff wore full PPE as they resumed meeting with customers. Managers felt that the resumption of customer outreach was also important as they did not want customers to perceive that KE had abandoned them (INT1). Other managers tried sharing information from vans with loudspeakers (INT2). Similarly, CSR activities like medical camps and sports events, that had initially shut down completely (INT1, INT3), had also resumed but at a lower frequency (INT1, INT3).

Further, managers believed that the government's response to the pandemic caused confusion and increased the rate of defaults. In response to the economic impacts of COVID-19, the Government of Pakistan offered a relief package, which included provisions for electricity access. From April through August, KE staff were not allowed to disconnect the electricity connection of any customer for non-payment (INT1, INT5). Installment plans were also put in place for the repayment of bills to "ease out hardships for customers" (INT1, INT4), and one IBC described waiving consumers' bills for the first three months of lockdown (INT5). Managers felt that all these safeguards led to "confusion" because

customers believed that they did not need to pay their electricity bills at all, whereas in reality the bills were just to be paid in installments over time (INT4, INT6). When KE staff tried to collect payments, local representatives in the community pushed back and said that these consumers were eligible for government relief programs (INT1). These safeguards for consumers have impacted the revenues of the IBCs, with one manager describing it as a monthly "dent" of between 10-13% (INT1).

Like all IBCs, IBCs that were part of Project Sarbulandi experienced high losses initially, but all managers stressed that they were able to return to normal recovery rates quickly. "COVID-19 had a negative impact on our performance but still overall, the positive impact continued" and operations are now back to normal (INT4). Pre-pandemic customer engagement and improved billing were cited as reasons why billing could continue as usual, and consumers understood that KE would be expecting regular payments (INT2, INT5). INT2 also cited that "attitudes towards KE [had] changed" and that people now wanted to pay for electricity.

Managers cited ABC installation as another reason that the project's phase I IBCs fared better than that of phase II IBCs (INT7). Notably, comparing the experiences of both the phases, it appears as though the infrastructure-based interventions worked in tandem with improved customer engagement to change customer attitudes towards payment, which improved cost recovery even in the face of negative shocks like COVID-19. Phase II IBCs continued to face issues of low trust (INT8), as managers had not had the same amount of time to engage with their customers before the pandemic hit.

3.4 Customer perceptions

Customer focus groups provide interesting insights into the impacts of the project and highlight some important discrepancies between manager perceptions and customer experiences. While the focus groups were separated by gender, there was surprising consistency across all of them, so here we report results collectively.

First off, as is perhaps understandable for an internal change in operations, customers were unaware of the project per se, but when prompted cited some differences in KE operations over the period of the project. The most visible

intervention was the upgradation of infrastructure, though interestingly the perception of these changes contrast sharply from those reported by managers.

Across all groups, infrastructure changes such as new meters and ABC wiring came across as the most visible changes implemented in recent years. A general sense also prevailed that these changes led to a reduction in theft as they made the practice of attaching a *kunda* harder, something that is in line with what managers reported. However, customers reported no perceivable decrease in load shedding, consistently listing it as a major issue. Worryingly, customers constantly reported distrusting new meters, with persistent beliefs that new meters overcharge them and run "faster" than the old ones.

The distrust extends to KE staff, and contrasts to the positive spillovers from these efforts reported by managers. Customers report an increased inflexibility in KE when it comes to billing disputes, indicating both inconsistent beliefs on part of the managers and suggesting that while billing may have become more accurate, customers do not trust or understand the system. Coupled with customers' perception of over-charging and their inability to pay due to lack of resources, this may explain why while losses have gone down (better billing infrastructure), cost recovery remains an issue.

Given the importance placed on customer outreach and awareness by managers, this discrepancy in perceptions is most jarring. None of the participants of our focus groups were aware of any customer engagement activities, despite prompts, suggesting limited scope and impact of these activities. More worryingly, where managers express an increase in accessibility and provision of customer-friendly payment plans, customers in our focus group report that the utility is less amenable to requests for bill concessions and late payment.

In general, customers exhibited a lack of trust in the billing procedure and overall performance of KE, with a general perception that KE overcharged them to make a profit as a private corporation. Some distrust may be attributed to the confusion over the slab-based pricing system, while some claim that KE strategically changes the meter reading and bill dispatch date to increase their bills unjustly. These reports suggest that community engagement and educational interventions under the project were either limited, or at the very least, not as impactful as managers perceive them to be. Worse, the lack of trust in KE led customers to also distrust infrastructure improvements, questioning the efficacy of newer

meters that "keep counting units even when they turn off all appliances." A few also hoped to be able to find new ways to gain informal connections, in light of what they perceived as unfair billing. Similarly, customers did not report any differences caused by COVID-19, in relation to their interactions with KE, reporting that it was business as usual, and KE continued to show no flexibility.

4. Conclusion and Policy Implications

As implemented to date, Project Sarbulandi is a comprehensive reform package that aims to minimize distribution losses and increase revenue recovery from high loss areas. To achieve these objectives, KE's management has provided significant administrative and operational autonomy to the local managers under the project. According to our interviews with GMs, there is a perception that the project has been a success, a view also shared by the IBCs outside of the project. Yet, input from customer focus groups suggests that these internal impressions need to be moderated. The project, according to managers, not only met its major objectives of lowering losses and increasing revenue recovery, but it also enabled IBCs to effectively respond to the pandemic by fostering trust between KE and its customers. While the former may be true owing to enhanced infrastructure, a rise in consumer bills and irregularities in procedures may in fact be causing a decline in customers' trust in KE.

Our analysis highlights two policy implications. First, the interconnectedness of the project interventions is what allows them to be successful. Each of the interventions reinforced the positive impacts of the other, tackling multiple points of weakness simultaneously. The perceived success of the bottom-up approach recognizes the need to tailor interventions to local needs, even in different regions within a single city. Although the IBCs employed many of the same interventions, there were significant differences between the relative importance given to each intervention and in its implementation.

Second, while customer engagement was a major pillar of the project, customers emphasized the need to increase the KE's engagement with them. What the utility's administration may view as "better billing" and customer-friendly procedures, when implemented in the absence of customer trust, may result in more dissatisfaction. For example, a technical improvement in infrastructure may be perceived as an unfair and manipulative mechanism for billing.

All our interviewees also repeatedly brought up the issue of "culture" around bill-paying and "fair price" for electricity, highlighting a broader question for utilities: is electricity a private or public good? This has already been the subject of some debate in the existing literature. Where electricity is viewed as a right, this attitude can lead to high losses and low supply (Burgess et al., 2020). However, our findings show that a culture of non-payment may also be reflective of high barriers to payment, such as inaccessible customer service or backlogged payments.

The lessons learned from this research may apply to many electric utilities in LMICs facing the similar challenge of breaking out of a negative infrastructure trap (Burgess et al., 2020; McRae, 2015). Even though KE is a private utility, public sector utilities may also benefit from taking similar initiatives and activities performed under the project. The only caveat is that customers may perceive activities conducted by a public entity differently than that of a private for-profit firm. While this study has focused on the perceptions of managers and their customers, the differences in their experiences call for future research to test some of the pathways by which different interventions influence customers' behavior and perceptions, and confirm the extent of their effectiveness.

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