1. Introduction: utilities at the base of the pyramid

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Omaira and Yesenia are neighbors in a Latin American shantytown. They are best friends, and dwell in hillside shacks reached by steep, uneven steps. Together with two partners, they signed up for a microfinance loan to buy equipment for their informal economy workshop: a computer and printer to stamp labels on their home-made clothes and coffee filters. Often the computer turns off because of a power surge. Once, a short-circuit caused a small fire in Yesenia's home. When it rains, their informal electricity connection often fails, they have to ask Wilmer – the neighborhood handyman – to reconnect wires to the nearby lamppost for a \$10 fee. It is necessary for these two women to spend time at home as water service comes twice a week, and must be gathered in buckets by standing in line at a nearby pump. Both Omaira and Yesenia complain of the fetid smell outside when garbage piles up, as it is seldom collected.

This story is a snapshot of the drama of insufficient access to basic services suffered by the urban poor in Latin America. In other parts of the world, the poor endure even worse conditions as children play alongside human excrement, or electricity is not available even from illegal connections. Access to utilities is key for achieving economic growth and improving the lives of citizens worldwide. Polluted water is a major source of infectious disease, particularly diarrheal illnesses that are a major cause of infant mortality in many parts of the world (WHO, 2009a). As in the case of Omaira and Yesenia, obtaining clean water for household use consumes the scarce resources of the poor, particularly the time and energies of women and girls tasked with the chore of fetching water from communal sources (World Bank, 2004). Lack of electricity limits study and household activity after dark and contributes to deforestation and indoor pollution – with the attendant respiratory disease – by forcing recourse to alternative energy sources such as kerosene and charcoal (WHO, 2009b). Recent research has shown that access to telecommunications can have significant positive impacts on poverty, by increasing access to prices and other information that increase the bargaining power of the poor, while

mobile telephony is helping bridge the 'digital gap' and giving the poor increased access to financial services (*The Economist*, 2009).

This book examines new business models for servicing the 4 billion people comprising the 'base of the pyramid' (BOP). Since this term was coined by C.K. Prahalad and Stuart Hart in 1999,¹ the idea that business models can mobilize social change by engaging profitably with the poor in the marketplace has caught the imagination of academics and practitioners alike. Companies today are seeking innovative models that can ensure both access by the poor and financial sustainability. This book identifies 'what is needed' for developing market initiatives bringing water, electricity, telecommunications and natural gas to underserved populations. It offers insights on the roles markets may play in attacking poverty, by highlighting how wealth creation can be effectively combined with social change. It is aimed at advancing knowledge on business at the BOP as well as influencing the development of new business models and management practices.

WHY UTILITIES?

Utilities are typically defined as products that share two characteristics: they meet basic needs – water, energy, hygiene, communications; and in densely populated areas, the most efficient technologies for utility supply are based on dedicated physical networks – mainly cables and pipes (Spiller, 1996). These characteristics have important consequences that set utilities apart from other products. First, because utilities meet basic needs, their market includes, at least potentially, the entire universe of households and establishments in a given area. Households and establishments, whether private or otherwise, require water for human consumption and other uses; they generate waste which can be discharged through sewers; they use energy for lighting, temperature control, mechanical needs and other applications; and they exchange information with other households and establishments. In turn, such massive consumption makes utilities highly visible. More specifically, deficiencies in access to utilities – whether regarding cost or quality of service – are often perceived by large numbers of persons at the same time, and can have significant social, political and economic effects. Second, the need for dedicated physical networks as means to reach consumers makes competition among alternative suppliers inefficient. Competing suppliers would have to build parallel networks, which in general results in higher unit costs than a monopoly supplier can achieve.² However, since a monopoly supplier can exploit its position to extract inefficiently high prices from

consumers, utility prices must be regulated for the sake of economic efficiency. Hence, unlike most other products, utilities are generally subject to price regulation.

Providing utilities to the large poor populations in developing countries is a major challenge for the private sector. The construction or upgrading of utility networks entails heavy investments that cannot be easily recovered through sales to low-income consumers. In addition, privately owned suppliers face the challenges of clientelistic legacies in many countries, in which utility services were provided free or at highly subsidized prices under public ownership, and of ongoing regulation of utility prices, which create pressures and opportunities to hold prices artificially low for political gain or for the benefit of well-organized interests. Private utility supply is thus often enmeshed with social and political demands and constrained by concerns about profitability. Yet meeting the needs of the poor is not simply a growth opportunity for private utility companies, but a strategic imperative. The social and political aspects of utility supply imply that failure to meet the needs of the poor can threaten a company's entire investment in any one developing country.

On the other hand, there are few alternatives to private involvement in utility supply. Public ownership failed to provide service to the poor in most developing countries because of corruption, inefficiency and lack of financial resources exacerbated by heavy price subsidization. Accelerated urbanization in developing countries is creating the need for major investment in utility supply, but few governments are willing or capable to muster the required financial resources.

The emerging 'BOP paradigm' was first formulated in 1999 (Prahalad and Hart, 1999). It claims that new business models can allow companies to meet profitably the needs of the poor in developing countries. Yet most of the research conducted so far has concerned consumer goods.³ Are the canonical elements of BOP business models – as identified so far – applicable to the case of utilities? Can utility services be profitably supplied to low-income consumers at regulated rates? In which ways do factors such as the environment, technology, the rise of civil society and sustainability affect answers to the previous questions?

This book seeks to examine new utility business models servicing BOP communities around the world, and generating economic value as well as social change. Our goal is to improve academic research on BOP, on the one hand, and expand the range of possibilities for meeting key service requirements, on the other. The specific conditions of utility supply previously described introduce the public interest and public policy in this type of activity in a very direct way that has so far not been addressed in most of the BOP literature. BOP models may need significant adjustment to

accommodate the often politicized nature of low-income markets. At the same time, the BOP literature suggests the potential for organizational and technological innovations to overcome the constraints of dominant business logics. For example, access to telecommunications for the poor has been revolutionized by initiatives such as Grameen Phone, combining the ability of cellular technology to break the stranglehold of physical networks, with the organizational capabilities derived from Grameen Bank's microcredit experience (see, for example, Seelos and Mair, 2007).

KEY ISSUES

The intersection of the particularities of utility supply with the conditions prevailing at the BOP suggests several issues that practitioners and scholars must consider. To begin with, it is worth delving deeper into the degree to which utilities differ from consumer goods. How far does the 'tyranny of the network' set utilities apart from other sectors when it comes to providing service at the BOP? What elements of 'generic' BOP strategies, as elaborated since 1999, can be applied to utilities as well? Which ones are not applicable? To the extent that significant adaptations are needed, what are those adaptations? How do they modify and enrich what we know so far about doing business at the BOP?

A related question, concerning also the differences between utilities and other sectors, is to what extent is the BOP 'strategic' for utility suppliers, as we claim above. Are utilities also unique because of their widespread impact and visibility? Other products, for example foodstuffs (including bottled water), are also widely consumed, yet they seemingly attract less controversy than water supply, for instance. Why this difference? Perhaps the explanation lies in the lack of competition in utilities and thus, once again, the 'tyranny of the network,' rather than utilities being 'essential needs'. Consumers may be particularly sensitive to supply conditions when they lack alternative suppliers. But a more indirect mechanism may be at work, where regulation itself is the direct cause of the political visibility of utilities. Regulation may open the door to political opportunism by actors that find in regulatory policy a convenient way to attract low-income voters by pressuring companies to lower prices or to extend service. Identifying the source of political risk, like identifying technological constraints, is important because it can help decision makers understand how existing BOP frameworks must be adapted for utilities, and it can bring new insights for researchers concerning BOP frameworks and business models. For instance, the study of the BOP has so far paid little attention to political risk (Rufin, 2006), but political risk may actually be

an important issue at the BOP because of concerns – perceived or real – about exploitation of the poor.⁴

The monopoly status of utility companies also affects them in other ways. One such effect is the impact on corporate culture, and especially on attitudes towards customers within the company (Gómez et al., 2006). With a monopoly status, utility companies have traditionally had an engineering orientation rather than a customer orientation. The focus of company managers has been on the deployment of equipment and technology to optimize operations rather than understanding and meeting customer needs. Changing such a focus can be expected to be particularly challenging when it comes to BOP customers. BOP customers pose additional difficulties to serve: they have limited and irregular incomes, live in hard-to-reach areas and in precarious conditions, and may in many cases be used to pilfering utilities. Utility companies thus face a complex task of educating their workforce, changing organizational culture and even changing fundamental internal processes in order to engage the BOP effectively. Understanding the extent and nature of these tasks is another key issue for research on utilities at the BOP.

The transformation of ‘mental maps’ is not limited to utility companies, however. It may also be necessary for their BOP customers, too. As mentioned, BOP customers are often used to consuming utilities without paying, or at least without paying utility companies. In some cases, this is due to prevalence of fraud and theft in the informal areas where the poor live (Smith, 2004); in other cases, BOP communities may have received free utilities under public supply arrangements. In either case, there can be a presumption that utilities are a right for which one should not pay, or at least a service that the government should provide for free to all citizens, just like public safety or basic education. Utility companies thus face a higher hurdle at the BOP than other types of suppliers: they have to make a convincing proposition to BOP consumers that the companies’ services are worth paying for. The question is, how is this best done? Is there a difference between situations where utilities are seen as rights (which is often the case with regard to potable water supply) and situations where customers have simply come to expect free supply? How are claims of utilities as rights related to the political risks mentioned above?

We thus come back to politics when it comes to utilities at the BOP. This suggests that practitioners and scholars may need to invest in understanding politics and regulation (an extension of politics) more carefully than the BOP literature has done so far (which is not to say much). First, we should know how the cost of utility supply is apportioned, particularly for BOP consumers: is the cost recovered entirely from customers, or is some portion of it borne by taxpayers? How much of the burden falls on the

BOP under each case? In many developing countries, there are substantial cross-subsidies from large or better-off consumers to smaller or poorer ones, but taxes are regressive because of the complexity of income and corporate taxation. In these situations, the paradox is that placing the financial burden of utility supply for the BOP on the government may actually leave the BOP worse off than having the BOP pay, at least partially, for utilities: BOP consumers could end up bearing a higher burden via indirect taxation than if they paid cross-subsidized rates.

More generally, since utilities are usually subject to price regulation, we need to understand how regulation works. Who sets utility prices? What procedure is followed? Understanding regulation can also provide a big pay-off because company initiatives to work at the BOP may require regulatory approval, as in the case of prepayment meters (see Chapter 5 on the Buenos Aires case and Chapter 9 on the Caracas case). The key issue here is to look beyond the formal arrangements prescribed in the law to understand regulation in practice. In many developing countries, so-called 'independent' regulatory commissions may in fact be controlled by the government through a variety of means – appointment of commissions' members, control over the commissions' budgets, recourse to non-independent courts or even outright legislative changes, let alone refusals to enforce regulatory decisions. Where governments or elected politicians have influence over regulatory decisions, it may be particularly difficult for companies to raise prices or to charge for services previously provided for free; in fact, utilities are often important elements of clientelistic bargains, where politicians provide free or subsidized utilities to BOP communities in exchange for votes (Foster, 2002). The importance of utilities for meeting basic needs makes them valuable to BOP voters, who may thus be quite willing to trade their votes for lower utility prices. Where this is the case, politicians may be reluctant to give up control over regulatory decisions. What can utility companies do to alter such bargains? Finally, politics also enters into utility supply for the BOP through ideological battles about the desirability of private supply, particularly when undertaken by foreign companies. As the well-known controversies over water supply in Cochabamba (Bolivia) and Tucumán (Argentina) attest, the impact of private utility supply on the BOP is at the forefront of international debates about globalization and capitalism, with anti-globalization activists and governments inherently opposed to private supply in sectors such as water. We need to know more about the forces arrayed in these controversies and the responses that can be developed against accusations of exploitation of the poor.

A final set of issues that deserve to be highlighted here are those concerning the appropriate business models for utilities at the BOP. Since

1999, the BOP literature has developed a variety of elements that appear to be necessary to achieve the combination of profit and poverty alleviation: establishing partnerships with governments, NGOs and community organizations; co-inventing products and processes with BOP populations and partners; and acquiring a deep knowledge of BOP environments. A discussion of these elements lies outside the scope of this introduction. But their development suggests a fundamental question: to what extent are they applicable to utilities? Can utility companies make a profit if they incorporate these elements to their BOP strategies? To the extent that these elements have been developed in the context of other products and sectors, as previously mentioned, this question takes us back to the transferability of lessons from the extant BOP literature to utilities. But in addition to this general question, there are additional matters that must be addressed in order to create viable business models.

The first element of a business model is revenue generation. What is the appropriate pricing point and structure for utilities? Under price regulation these issues are, of course, in the hands of regulators, not of the companies. But companies can propose new ideas to regulators, particularly when convincingly formulated in the interest of BOP consumers. The traditional approach to pricing utilities for low-income consumers has been the use of cross-subsidies: customers with higher consumption levels, or classified (by territory or other means) as higher-income, pay prices above cost, which subsidize supply to BOP customers. Establishing criteria for cross-subsidization may be difficult, however; and in developing countries, where the total consumption by the poor may amply exceed that of the non-poor, cross-subsidization may lead to large differences in utility prices between the two groups, encouraging the non-poor to resort to fraud or other means to avoid paying the higher prices. At the same time, charging prices to BOP consumers that fully recover the cost of supplying them, as regulatory orthodoxy would have it, is sure to encourage theft and fraud, as well as invite political attacks, particularly when one considers that, because of economies of scale in utility supply, unit costs of supply for the BOP may actually exceed those of other consumers. Price structure, however, is not the only major issue concerning revenue generation. Utilities have traditionally billed on monthly or bimonthly cycles to reduce administrative costs, but for the poor, with irregular incomes and lack of access to financial services, monthly bills require unrealistic levels of cash accumulation. Innovative utility companies are searching for shorter cycles at a reasonable cost. Examples include prepayment meters (following the huge success of prepayment for cellphones), weekly payments collected by local shopkeepers and based on estimated or remote measures of consumption, or hiring of local agents for frequent measurement, billing

and collection. Several of these innovations are discussed in the chapters that follow, and others are sure to come as experimentation continues in this respect.

An emerging alternative to reliance on external or cross-subsidies for BOP consumers is leveraging utilities as platforms for a variety of products, in effect turning the 'tyranny of the network' on its head. As Francisco Mejía discusses in Chapter 2, several highly successful experiences by utility companies and, once again, developments in the highly competitive cellphone industry, show that the high fixed investments in both physical infrastructure and organization needed to deliver utilities to consumers on a retail basis actually constitute excellent platforms for the delivery of other products at low incremental cost. Positive margins in these product lines can then provide additional return on the fixed investments and thus solve the pricing conundrum. In a way, this approach is not too different from well-known strategies such as loss leadership and maximization of revenue from by-products in other sectors. In fact, at the birth of the utility industry, natural gas companies relied on the provision of lighting, and electric utilities on running urban transport networks, to make ends meet. During the 1990s, the concept of 'multi-utility' companies became fashionable, based on the possibility of economies of scope among utilities: for example, a multi-utility company could send a single bill for water, gas, electricity, cable TV and Internet access. In practice, this concept did not work well, perhaps because regulatory risks were also compounded, or because other utility services were perceived as 'more of the same' and did not increase willingness to pay as much as selling significantly different products such as appliances. Accordingly, the idea of utilities as platforms is based on delivery of non-utility products, which are thus less subject to regulation. The experiences discussed in Chapter 2 show that we can expect much from innovations based on the platform concept.

On the cost side of the business model, given the paramount importance of the cost of the physical network, the major issue is: what is the potential for reduction of this cost? Other costs can be reduced through subcontracting services, particularly to BOP businesses and community organizations or individuals that may be able to perform a variety of services at lower cost. For instance, bill payment can be handled by local merchants, who constitute a readily available commercial network linking BOP communities and the broader economy. More generally, re-engineering of business processes may open up many opportunities to reduce costs, particularly in connection with the design of utility products to meet the needs of the BOP. This is a valuable avenue for practitioners and researchers to pursue. But where radical innovation can have a profound effect on utilities at the

BOP is in reducing the cost of the physical network. The experience of telecommunications shows what can happen if the ‘tyranny of the network’ can be broken. Although cellphone networks still involve investment in geographically dispersed physical plant – mainly transmission towers – the radically lower level of investment involved relative to landline networks has indeed eliminated natural monopoly in local telephony. Could this happen with other utilities? It is certainly possible to envisage a similar breakthrough in electricity, for instance, if solar and battery technology became so inexpensive, reliable and environmentally friendly that they could replace electricity distribution networks; low-cost water filtration technology could achieve a similar outcome for water supply, by allowing reuse of domestic water consumption. While we still seem to be far away from these possibilities, at least for utilities in urban settings where high densities make for lower relative costs of physical networks, their potential is only beginning to be explored. The tentative first steps on this path are already under way in Brazil, where AES Eletropaulo is replacing electric showerhead water heaters – common in Brazil, but very energy-intensive – with low-cost rooftop water tanks heated by the sun to help residents of the Paraisópolis slum reduce their electricity bills (Chapter 10).

APPROACH AND STRUCTURE

The book brings together the work of a group of researchers and practitioners working on utilities and the BOP in both academic and non-academic settings. The presentation of a number of papers on utilities and the poor at a Harvard Business School conference (December 2005) on ‘Global Poverty: Business Solutions and Approaches’ revealed a growing interest among academics and practitioners from different parts of the world in this issue, and with it, the generation of an increasing number of case studies and research papers. The strength of this interest was further ascertained at the conference on ‘Research at the Base of the Pyramid’ held at the William Davidson Institute of the University of Michigan in May 2006. Taking advantage of this interest, and mindful of the potentially significant implications for research in a number of fields, the contributors to this volume presented (with one exception) their recent research at a one-day workshop at the University of San Diego, California, on 2 May 2008. Their presentations, hopefully improved through discussions during the workshop and subsequent feedback from us, constitute the basis for the chapters that follow.

The core aim of the book is the advancement of academic research, while influencing practice. An explicit aim is to move beyond the analysis

of specific cases to develop more robust generalizations, with potentially significant implications in a number of academic fields – particularly international business, business strategy, alliance management and business–society relations. This should be of interest to both academics pursuing applied research and practitioners engaged in supply, financing and management market initiatives with low-income sectors. More specifically, the chapters that follow offer valuable insights to a variety of readers: scholars working on the BOP, but also those working on relevant related areas such as alliances between business and non-profit organizations, corporate social responsibility and BOP market development, utilities and poverty alleviation, organizational change and innovation, and the implications of slums and urban development in developing countries, among others; the financial community, including microfinance, venture capital and multilateral financial institutions; international utility companies and other firms seeking to expand in emerging markets; non-governmental organizations and applied research institutions focused on international development; and, last but not least, multilateral and national development agencies. In addition, the book will be useful as a text on a variety of courses: at business schools, on courses in international business strategy, innovation and the social impact of business and corporate social responsibility, especially in view of the strong and growing interest in social issues at business schools around the world; at schools of public policy, on courses in poverty alleviation or social policy; and in international development programs dealing with the private sector and poverty.

Our book differs from other books published on the BOP thus far. *The Next 4 Billion* (Hammond et al., 2007) is a statistical exercise exclusively focused on the estimation of BOP market sizes across countries and major sectors of economic activity. C.K. Prahalad's *The Fortune at the Bottom of the Pyramid* (2005), by far the best-known and most influential work on the BOP paradigm, discusses business models and a number of cases, but does not address utilities specifically. In fact, none of the examples used by Prahalad deal with utility services (most cases are from consumer-goods industries) and few with peri-urban populations. *Business Solutions for the Global Poor* (Rangan et al., 2007) comes closest to the present book. Not only is it an edited book as well, but in fact both of us are contributors to the book, as well as several of the contributors to our book, since we first met many of them at the Harvard Business School conference which led to the *Business Solutions* book. However, where *Business Solutions* addresses a wide variety of sectors, issues, and perspectives, our book is much more focused. Our approach has been, indeed, to build on the research published in *Business Solutions* and take it to a more advanced level for the case of utility services. We thus see *Business Solutions* as a complementary

work rather than a competing one. Finally, *Untapped: Creating Value in Underserved Markets* by John Weiser et al. (2006), explores barriers and challenges in developing market initiatives with underserved consumers, offering solutions and emphasizing the role of partnerships, but it provides very few examples of utilities, and those not fully developed as utilities are not the core of the book.

After this introductory chapter explaining the book's aims and motivations, setting out the key issues addressed by the book as well their context, examining the current state of scholarship and practice on these issues, and describing the book's structure, Francisco Mejía of the Inter-American Development Bank offers in Chapter 2 his answer to the question 'Why do utilities matter for the BOP?' by looking at utilities as platforms for the supply of valuable products to the poor. The next two chapters provide a variety of lessons from the field, drawing particularly on the experience of telecommunications – where the spectacular diffusion of mobile telephony among BOP populations has been balanced by concerns about the 'digital divide'. In Chapter 3, Shawn Mendes discusses the vast array of services that mobile phones are providing for the BOP in the Philippines, and their implications for Africa, where lack of landlines makes cellphones the key telecommunications technology. This contrasts with Gigo Alampay's account in Chapter 4 of the attempts by a variety of actors in the same country to bridge the digital divide in rural areas. Chapter 5 shifts from telecommunications to electricity and from Asia to Latin America, as Miguel Ángel Gardetti considers the degree to which efforts by electricity distributors in Argentina have really reached the BOP.

The central part of the book examines technological and managerial advances that are increasingly transforming the relationship between utilities and BOP communities. In Chapter 6, Ariel Casarín and Luciana Nicollier evaluate the use of prepaid meters in electricity distribution, a technology that has gained considerable attention in view of its vast success in making access to mobile telephony possible for lower-income users. Simone Lawaetz and Connie Smyser analyze in Chapter 7 a variety of innovations in electricity distribution at the BOP that draws on an ongoing multiyear effort by the United States Agency for International Development (USAID). On the financial side, Patricia Veevers-Carter and Cathy Russell of the World Bank describe in Chapter 8 the recent experience of the Bank with the use of an innovative formula, output-based aid (OBA).

Chapters 9 and 10 focus on emerging business models for utilities operating at the BOP, and more specifically on the experiences of a global utility with a deep commitment to the BOP, the AES Corporation. In Chapter 9, Scarlett Álvarez and Francisco Morandi of AES Corporation introduce

BOP-related initiatives in Latin America and Africa, presenting a broad perspective on company efforts to learn from its diverse experiences and to improve, refine and adapt its approach to BOP engagement. This is followed by Ivar Pettersson's presentation of the case of AES Eletropaulo's Loss Reduction Program in Paraisópolis, one of the largest *favelas* (slums) in São Paulo – itself one of the world's largest cities with some 16 million inhabitants. Lastly, Chapter 11 summarizes the main points raised by the contributors in their respective chapters, placing the various contributions in an overall framework that generalizes across industries and geographic settings, identifying the improvements and extensions to current research and practice offered by the contributions, and outlining further possibilities for research and practice suggested by the work presented in the book.

NOTES

1. One of the earliest papers to make use of the term 'bottom of the pyramid' in reference to opportunities for companies with regard to the world's poor is Prahalad and Hart (1999).
2. Also, to the extent that competing networks are not compatible with each other, competition can deny consumers benefits from being part of a larger network, 'network externalities' in the parlance of economists (Shy, 2001). In some instances, particularly telecommunications, such network externalities can be significant and provide, at the very least, justification for mandating network interconnection.
3. None of the examples in Prahalad's well-known book (2005) are about utilities. Widely cited case studies of BOP initiatives include the experiences of Hindustan Lever (consumer goods), ITC (commodities), Cemex (cement), Casas Bahia (retailing) and Aravind Eye Care (health care).
4. Karnani (2007) has argued that many BOP initiatives, such as Hindustan Lever's sale of Fair & Lovely skin whitening cream, exploit the poor's vulnerabilities for the enrichment of multinational corporations.