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**Attaining Universal Access:
Public-Private Partnership
and Business-NGO
Partnership**

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List of Abbreviations

BTTB	Bangladesh Telegraph and Telephone Board
COLR	Carrier of Last Resort
FITEL	<i>Fondo de Inversión en Telecomunicaciones</i>
GB	Grameen Bank
GP	Grameen Phone
GSM	Global System for Mobile Communications
GTC	Grameen Telecom
ICT	Information and Communication Technologies
JU	Jahangirnagar University
LCU	Local Currency Unit
NGO	Non Government Organization
OSIPTEL	<i>Organismo Supervisor de la Inversión Privada en Telecomunicaciones</i>
USO	Universal Service Obligation
VPP	Village Pay Phone
WTP	Willingness to Pay
ZEF	<i>Zentrum für Entwicklungsforschung</i>

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Abstract

This paper evaluates two alternative mechanisms, Public-Private Partnership in Peru and Business-NGO Partnership in Bangladesh, that provide rural people with access to telecommunications. The two mechanisms that are examined here are considered as two best practices in the provision of rural telecommunications in the context of developing countries. Under two geographically distinct market segments, rural market characterized by low per-subscriber revenue and urban market characterized by high per-subscriber revenue, the traditional provision mechanisms such as state ownership, regulated monopoly and competitive market structure may not provide universal access to the people living in rural areas of developing countries. Attainment of universal access therefore may require alternative institutions. Based on three criteria of universal service provision: non-discriminatory access, uniform pricing and quality restrictions, the study finds that while the Public-Private Partnership in Peru complies with all of the three criteria, the Business-NGO Partnership in Bangladesh complies with the first two criteria only. With respect to quality, users are less than satisfied with the current level of provision in Bangladesh. The success of the Business-NGO Partnership implies that the replication of such a mechanism might require the pre-existence of an organization with local level knowledge and public good objective. In contrast to that, the Public-Private Partnership ensures the provision of universal access under a written contract, and given the public objective, can attract private providers for rural telecom provisions.

Kurzfassung

Die vorliegende Arbeit bewertet zwei alternative Mechanismen, Public-Private Partnership in Peru und Business-NGO Partnership in Bangladesh, welche die Landbevölkerung mit Zugang zu Telekommunikationsleistungen versorgen. Die zwei hier untersuchten Mechanismen gelten als Musterbeispiele für die Bereitstellung von Telekommunikation im ländlichen Raum in Entwicklungsländern. Bei zwei geographisch unterschiedlichen Marktsegmenten, von denen der ländliche Markt durch niedrige Einnahmen pro Teilnehmer gekennzeichnet ist, der urbane Markt dagegen durch hohe Einnahmen pro Teilnehmer, kann es sein, dass traditionelle Versorgungsmechanismen, wie etwa Staatsbesitz, regulierte Monopole und wettbewerbliche Marktstrukturen der Landbevölkerung in Entwicklungsländern keinen allgemeinen Zugang ermöglichen. Für einen universalen Zugang wären daher alternative Institutionen erforderlich. Die Studie stützt sich auf drei Kriterien universaler Versorgung (keine Diskriminierung beim Zugang, einheitliche Preisgestaltung und Mindeststandards für die Qualität) und zeigt, dass, während Public-Private Partnership in Peru alle drei Kriterien erfüllt, Business-NGO Partnership in Bangladesh nur die ersten zwei Kriterien berücksichtigt. Hinsichtlich der Qualität sind die Teilnehmer nicht zufrieden mit dem derzeitigen Versorgungsniveau in Bangladesh. Der Erfolg der Business-NGO Partnership deutet darauf hin, dass die Übertragung eines solchen Mechanismus das vorherige Bestehen einer Organisation erfordern könnte, die über lokale Kenntnis verfügt und deren Ziel das Allgemeinwohl ist. Dagegen sichert die Public-Private Partnership die Bereitstellung eines allgemeinen Zugangs in einem schriftlichen Vertrag und kann durch ihre öffentliche Zielsetzung private Anbieter von Telekommunikationsleistungen im ländlichen Raum anziehen.

1 Introduction

This study deals with the question of ‘how to provide universal service’ in the context of developing countries, and provides two examples of alternative provision mechanisms for telecommunications in the context of rural areas in the two study countries: Bangladesh and Peru. The two alternative mechanisms that this study examines are considered as two best practices in the provision of rural telecommunications in the context of developing countries.¹ The study describes and evaluates the two best practices, i) Business-NGO Partnership in Bangladesh and ii) Public-Private Partnership in Peru that provide access for rural people to telecommunications services. More especially, the study accomplishes two tasks: first, it describes the institutional mechanisms – the operational and functioning mechanisms of these two institutions; second, it evaluates these two institutions in terms of attaining universal service goals. While the maintenance of universal service in telecommunications is a cornerstone of public policy in industrialized countries, its minimum achievement has remained the key public policy in developing countries.

Telecom has public good type characteristics,² and it is one of the basic components necessary to ensure access to information and communication technologies (ICT); the latter is widely recognized as a strategic factor to reduce poverty and enhance development.³ There are both economic and development rationales of providing universal service to telecommunications as such access ensures both private benefits, such as reduction in information and communication cost, and public benefits, such as creation of positive network externalities. Empirical evidence in the context of both industrialized and developing countries supports the notion that a reliable telecommunications infrastructure can also be growth enhancing.⁴

Despite the presence of strong economic and development rationales, ensuring universal access, particularly to people living in rural areas of developing countries, has remained a major challenge to policy makers and development thinkers alike. Though the telecommunications sector in most of the countries has experienced different regimes: state monopoly, private monopoly and open competition, these institutions have their own limitations in solving the question of universal service. As can be seen from Table 1 and Table 2 in the case of Bangladesh and Peru, rural telecommunications sectors in both countries had experienced all three traditional institutions; however, the issue of universal service has remained unresolved under these institutions.

¹ See, for example, Brook and Smith (eds.) (2001) that mentions the project in Peru as a best practice.

² See Leff (1984) for a detailed discussion on this issue.

³ For example, see Okinawa Charter (2000). See also Morales-Gomez and Melesse (1998).

⁴ See Easterly and Levine (1997) for developing countries and Röller et al (2001) for industrialized countries.

Table 1: Access to Telecommunications in Rural Areas in Bangladesh under Different Regimes

Indicators	Market Regime:	State Monopoly	Private Monopoly	Competition ⁵
	Year:	1989	1995	1998
Share of rural area as a % of total telephone		10.50	8.90	8.90
Telephone lines per '00' rural population		0.031	0.036	0.039
Telephone lines per '00' urban population		1.175	1.640	1.735

Source: Bangladesh Bureau of Statistics, various yearbooks.

Table 1 provides the state of indicators of access to telecommunications in rural areas in Bangladesh under three regimes. Similar to other countries, local telecommunications services in Bangladesh had traditionally been provided by a state monopoly under a regulated price structure. However, despite the cross-subsidization of local calls for long distance calls, the goal of the USO (Universal Service Obligation) had never been attained, and the extent of telecommunications services remained limited mostly to cities and urban areas. Since the late 80s, public policy of the country towards telecommunications has focused on liberalization and deregulation. As a part of the liberalization process, the authority privatised the rural telecommunications market in the year 1989. However, under the private provision, the access of people living in rural areas has improved only marginally and the relative share of rural areas has declined. Since 1996, the rural telecommunications market has been characterized by a competitive market structure. However, the access has remained at a very low level; as of 1998, the telephone main lines per 1000 rural population stood at 0.39 percent.

Table 2: Access to Telecommunications in Rural Areas in Peru under Different Regimes

Indicators	Market Regime:	State Monopoly	Private Monopoly	Competition
	Year:	1994	1997	1999
Share of rural area as a % of total telephone		0.83	0.87	1.1
Telephone lines per '00' rural population		0.06	0.12	0.16
Telephone lines per '00' urban population		3.7	7.2	7.6

Source: OSIPTEL, LSMS 1994, 1997, 2000

Table 2 provides the state of indicators of access to telecommunications in rural areas in Peru under three regimes. The telecommunications sector in Peru has undergone all three different regimes: state monopoly, private monopoly and open competition. Similar to other countries, the country had a public monopoly in the telecommunication sector until the mid '90s. The first stage ended in 1994 when the sector was transformed from a state owned monopoly to a private monopoly through privatisation. The second stage with the telecommunications sector under private monopoly lasted from 1994 to 1998. After the introduction of competition in 1999, the sector has been experiencing competition in all segments of the telecommunications market.

⁵ In Bangladesh, the authority has introduced competition in mobile telephony market in 1996. However, in the fixed telephony, rural telephony has remained under private monopoly structure.

However, despite these changes in regimes, the access of rural people has remained at a low level. Though each shift in regime was accompanied by an increase in penetration rate (telephone lines per 100 population) in rural areas and an increase in relative share of rural areas, both penetration rates reached only to 0.16 percent and relative share to a mere 1.1 percent in 1999.

The two provision mechanisms that will be discussed in this study, Public-Private Partnership in Peru, and Business-NGO Partnership in Bangladesh, are two examples of the innovative use of markets in attaining universal access for rural households, the segment of the population that is usually ignored by traditional market mechanisms. The two provision mechanisms are also examples of two different roles of government: while in Peru government plays an active role to correct the market failure, in Bangladesh government plays almost no role. As a result, these two examples show how government intervention can solve the universal service obligation with minimum distortion and how universal service can still be achieved when there is no government intervention.

A notionally similar and more applicable concept in the context of developing countries to universal service is universal access. In contrast to industrialized countries that define the access to telecommunications at household level, the notion of universal access seeks to ensure access at a 'reasonable' level, e.g., at community level. The present study uses the two terms, universal service and universal access interchangeably. Though one can draw a distinction between the two and universal access is often viewed as a precursor of universal service, it does not make a distinction between universal service and universal access as they are closely related to each other. Moreover, though the distinction can have applicability in industrialized countries' context, such distinction plays only a minor role for the present purpose.⁶

The remainder of the study proceeds as follows: first, it develops a theoretical framework that describes the limitations of traditional institutions in providing universal service. This is followed by the description of Public-Private Partnership in Peru and Business-NGO Partnership in Bangladesh. Once the partnerships are described, the study evaluates the institutions in terms of attaining the universal service goal. The study ends with conclusions and policy implications.

⁶ See, Federal Communications Commission (1999) for details.

2 Theoretical Framework

Economic literature concerned with the question of universal service provision usually recognizes the existence of two geographically distinct markets: an urban market segment, which is profitable, and a rural market segment, which is a high cost area.⁷ Under this set up, the challenge is how to ensure universal service to the high cost rural area without distorting the competitive market environment in the urban segment.

2.1 Access of Rural Households under Market Provision

A universal service obligation is typically viewed as the obligation of an operator to provide to all users a 'basic' package of services of 'good' quality and at 'affordable' prices.⁸ Traditionally, the pursuit of USO has been achieved under a state monopoly through cross-subsidization. However, the economic cost of cross-subsidy is the loss of allocative efficiency resulting from the market distortions. In addition, there could be some adverse distributional consequences as well.

To overcome the distortion stemming from monopoly, the often-suggested policy prescription is the liberalization of the telecom sector. Increase in competitive market forces through privatisation can enhance efficiency, network extension and provide a higher quality of services.⁹ However, the transformation of telecommunications from a regulated monopoly to a competitive market brings the question of universal service to the forefront. Market based private providers might not offer the best alternative to a state, or a state-based monopoly for rural areas in particular, as market based solutions might result in under-provision.

The reason for under-provision of telecommunications in rural areas under market conditions is ineffective demand, as revenue per subscriber might not support network extension. However, it does not imply that the extension of telecommunications networks in rural areas does not generate any positive consumer surplus. In fact, it is possible that despite higher willingness to pay per call by a rural subscriber compared to that paid by an urban subscriber, rural areas might remain underprovided.¹⁰ The figure below explains such circumstances more vividly.

⁷ See, for example, Gasmı et al (2000).

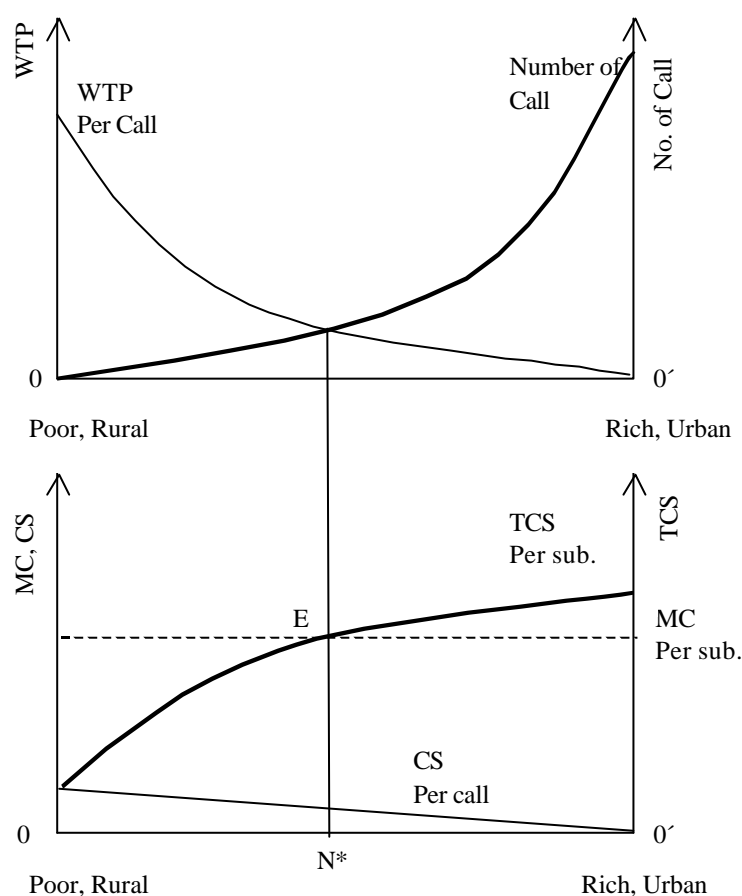
⁸ See Valletti (2000).

⁹ Gasmı et al (2000).

¹⁰ For the evidences on rural households' high willingness to pay for access to public telephones, see Torero et al (2002).

Figure 1 has two panels. The upper panel combines willingness to pay (WTP) per call and number of calls per subscriber (sub.), while the lower panel combines underlying consumer surplus (CS) per call and total consumer surplus (TCS) per subscriber (sub.). In the lower panel, the TCS curve can be viewed as the individual demand curve, as well as total willingness to pay per subscriber, and the dotted line is the marginal cost of telecom provider which is assumed here as constant per subscriber. The two corners of the horizontal axis of both of the panels 0 and 0' can be viewed either as income dimension, or as rural-urban dimension, or both. Here 00' represents total population.

Figure 1: Telecom Network under Market Provision



Source: Author

Despite the higher CS per call and associated willingness to pay of a poor/rural subscriber than that of a rich/urban subscriber, as shown in Figure 1, a private telecom provider cannot extend its network beyond $0N^*$ as the marginal cost (MC) of network extension is lower than the total consumer surplus and associated total WTP of such a subscriber. That means, out of a total of $00'$ population, the competitive market extends the network up to $0N^*$, leaving $0N^*$ population without a telecommunications network due to the ineffective demand.

To overcome the ineffective demand, that is the inadequate revenue per subscriber, one possible solution is to sum up the individual demand; demand of the individuals left of N^* could be summed up and subdivided in such a way that every individual is included in the network while the marginal cost of inclusion of such a subscriber is less than, or equal to, the marginal revenue from that subscriber. Solutions that are widely used in reality to address part of the ON^* are telephone booths and public call centres. However, network extensions through telephone booths and call centres have also remained underprovided.¹¹

2.2 Access under Partnership

By partnership the study means to describe a situation where parties involved, e.g., business, government or NGO share cost and/or investment in the production and/or provision of telecommunications services. It is assumed that the production and provision of telecommunications require two inputs, y and z where y is the input from the business and z is the input from the government or from the NGO. If $N(n)$ is the expected output, where n is the number of rural households that have access under partnership, then

$$F(y, z) = \begin{cases} N(n) & \text{if } z > 0 \\ 0 & \text{if } z = 0 \end{cases} \quad (1)$$

Here, $F(y, z)$ is the production function that includes all the services necessary for the provision of rural telecommunications including management and distribution. Note that the input z is essential to provide telecommunication services to the households in rural areas.

Given the above background, it is now possible to formalize the problem. The problem is to maximize the number of persons, n , that have access to telecommunications subject to the restrictions that it does not reduce the number of persons that have access when the market acts alone. Other restrictions are the joint production possibility of the business and of the government/NGO, and revenue and cost considerations. The problem, then, is as follows:

$$\text{Maximize } N(n) \quad (2)$$

Subject to:

$$N(n) \geq N^* \quad (3)$$

$$F(y, z) - N(n) = 0 \quad (4)$$

$$R(n) \geq C(y, z) \quad (5)$$

Here, $N(\cdot)$, is the number of individuals that have access to telecommunications. Equations (3) to (5) are the constraints: (3) restricts the total access to at least at the market

¹¹ For instance, in Bangladesh, as of 1998 the number of inhabitants per public telephone including call centers was 50,000. (Source: author's calculation using ITU' 2000 data set).

provided level, (4) is the joint production function where y and z are the inputs of the business and government/NGO respectively, and (5) is the revenue and cost restriction which can be viewed as a resource constraint as well. Combining (3) and (4) into a single constraint, the objective and the constraints can be combined in the Lagrangian expression:

$$L = N(n) - \mathbf{I}[F(y, z) - N^*] - \mathbf{w}[R(n) - C(y, z)] \quad (6)$$

Differentiating with respect to n , y , and z , and assuming no corner solutions, the first order condition (f.o.c) for a maximum is given by:

$$N'(n) - \mathbf{w}R'(n) = 0 \quad (7)$$

$$- \mathbf{I}F_y(y, z) + \mathbf{w}C_y(y, z) = 0 \quad (8)$$

$$- \mathbf{I}F_z(y, z) + \mathbf{w}C_z(y, z) = 0 \quad (9)$$

The first order condition (7) shows the marginal subscriber and the revenue from that subscriber. Conditions (8) and (9) show the marginal product and marginal cost of the business and government/NGO respectively, where F_y, C_y, F_z, C_z are the respective partial derivatives. The f.o.cs imply that the marginal cost that both the business and the government/NGO incur in order to ensure the inclusion of the marginal subscriber need to be less than, or equal to, the marginal revenue from that subscriber.

3 Public-Private Partnership in Peru

Peru offers a unique set of experiences due to its adverse geography and extreme dispersion in the rural population. According to the Population and Housing Census of 1993, around 6 million inhabitants in Peru live in more than 70,000 rural settlements that are characterized by lack of basic infrastructure services such as electricity, water and sewage. So the provision of universal access may lead to the promotion of social and economic development in those areas. In addition, the institutional mechanism that the regulatory authority of Peru has employed to attain universal service in telecommunications for people living in rural areas, the Public-Private Partnership, is also unique in the developing countries' context.

In the case of Peru, the relevant concept is universal access, rather than universal service. The Telecommunication Act 1998 that liberalized the market defined the provision of telecommunications based on the principle of equity and extended the right to telecommunications services throughout the country. However, the introduction of competition and subsequent rebalancing of tariffs eliminated the possible source of cross-subsidy for universal access/rural areas.

To ensure universal access, Peru has followed a two-pronged policy. First, contractual obligation with the operators; during the issuing of licenses, the telecom authority of the country included a clause that obliged operators to install and maintain public phones in all localities with more than 500 inhabitants by the end of 1999. For instance, through the concession contract, the Peruvian government obliged *Telefónica del Peru* (TDP) to install 1.1 million additional lines according to a regional distribution, and to install at least one public telephone booth in more than 1,500 villages across the country with more than 500 inhabitants.

Second, the setting up of a development fund named FITELE after the Spanish acronym (Fund for Investments in Telecommunications, FITELE, *Fondo de Inversión en Telecomunicaciones*, or FITELE) was invited. The basic objective of the fund is to finance the operation of telecom services in places where private operators do not provide services. As the regulatory obligation on private operators was not sufficient enough to ensure access for all rural people, it was necessary to find additional mechanisms to finance telecom services in rural areas and places of major social interest.

FITELE can be viewed as a Public-Private Partnership where public authority and private telecommunications operators work together to achieve a public objective, the so-called universal access. Under this partnership the public authority finances universal access (part of the cost) and private market provides the access. The introduction of competition and subsequent rebalancing of tariffs eliminated the possible source of cross-subsidy for rural areas. To fill the

gap, the authority has taken the policy of direct subsidy for rural areas and responded by setting up the fund, FITEL. The primary objective of the fund is to provide access for rural people to public telecommunications services where the private sector acts as a telecommunications provider. The target of the authority is to install at least one public phone for each village. In addition to voice telephony, the public phone has capacity for fax and data transfer at low speeds. However, before describing the program in Peru, the possible role of the private sector in public good provision and auction as a process in public good provision is reviewed in brief.

3.1 Private Provision of Universal Service Through Auction

Private sector involvements through a competitive environment in public good provision can be welfare improving in general; as such involvements create private incentive for efficiency and innovation in public service delivery.¹² During the last two decades, the 1980s and 90s, reforms that sought to improve the efficiency of public services both in industrialized and in developing countries have resulted in various ways of private sector involvement in public good provision such as change in ownership from public to private through privatisation, contracting out specific services to the private sector, and quasi contracts, to mention only a few. Experiences across a wide range of countries and sectors that have transferred the responsibility of provision of public service to the private sector have shown that such transfers have typically improved efficiency in service delivery and resulted in greater availability of services.¹³

For the regulatory authority in Peru, the issue is how to design policies to ensure universal service and to promote competition where possible so that it is possible to maximise the gains from universal service and yet to retain almost all the benefits of a competitive environment. That means, for a public authority that wants to maximize total social welfare, the issue is how to design policies to enable competition in telecommunications and yet extend universal service so that benefits of both competition and universal service can be attained simultaneously. The problem is to frame universal service in such a way that efficiency, competition and commercial operation are encouraged.

In Peru, the regulatory authority has approached this problem through the private provision of universal service where private participation is ensured through the use of auction in universal service provision. Though the idea of using auction to allocate subsidy for universal service is a relatively new approach, the auction itself is a widely used process in government procurements. It provides the opportunity to reconcile the conflict between the use of a competitive market and the provision of universal service, it minimizes the distortion caused by intervention, facilitates efficient entry and promotes investment.¹⁴

¹² See Hart et al (1997) for a formal model and an application for private provision of prisons. .

¹³ For a host of recent examples, see Brook and Smith ((eds.) 2001).

¹⁴ In a relatively early paper, Demsetz (1968) showed that auction can achieve second best average cost pricing under natural monopoly.

When it is necessary to compensate for universal service for areas where the private provider does not voluntarily provide the services under price and quality restrictions, auction offers a suitable alternative. The objective of a universal service auction is to minimize the subsidy through competitive bidding among carriers. Auction shifts this information problem from the regulator to carriers and provides a means of revealing the carriers' valuation of the universal service obligation. However, in order to call an auction for universal service, it (universal service) must be clearly defined and auctionable.¹⁵

Auctions for universal service are usually viewed as a 'Carrier Of Last Resort' (COLR) auctions; i.e., auctions whose object is the obligation to offer pre-specified services at an agreed price. There is a wide range of circumstances in which COLR auctions can reduce the cost of universal service provision compared to more traditional universal service schemes.¹⁶ However, instead of one for all auctions, repeated auctions over time are important in order to adjust the universal service package and associated support due to change in technology, cost of universal service production and demand for universal service. In addition, the presence of more than one universal service provider can promote ex-post competition among the carriers.

3.2 Operation and Functioning of the Program

The functioning of the projects involves the following steps:

- Defining the service and selection of a project area
- Selection of an operator
- Monitoring the selected operator.

Defining the Service and Selection of a Project Area: Service definition includes the type of services that have to be provided, service standards, and service coverage. At the present stage, services that are provided include at least one public pay phone in each settlement/locality providing access to local and long-distance voice and narrow-band data communications. In addition, the service package also includes one point of public access to the Internet at district level. Once a project is signed, the operator is obliged to provide the agreed services for a 20-year period.

Project areas are usually selected by OSIPTEL based on expressed local demand and the net present value of a project. However, the selection process also takes local authorities' opinions into consideration and includes criteria such as population coverage, existence of education and health facilities, centrality of a location, and relative isolation in terms of

¹⁵ See Weller (1999) for a full treatment of the issue.

¹⁶ See Sorana (2000) for a formal proof.

telephone access. However, once a project is selected, it needs to get the Ministry's approval before its implementation.

Selection of an Operator, Tariffs, and Incentives: Once the Ministry has approved a project, the next step is to select a private operator. For this, the regulator, OSIPTEL, issues an international request for proposals and arranges an auction for minimum subsidy. The auction process is a single round sealed bid. The private bidders are required to provide ex ante financial guarantees that ensure the seriousness of their offer and to prevent 'winner's curse'. A private bidder can choose one or several rural areas or combine them. Under this process, given that an operator satisfies minimum technical specifications, service quality and reliability requirements, an award is made to the operator who requests the lowest subsidy through an open bid. The subsidy covers all items involved in the service provision.

The tariff is regulated by OSIPTEL under a price cap regime that maintains parity with the urban areas. The support amount that an operator receives is region specific. Financial contracts specify the subsidy amount between OSIPTEL and a selected operator resulting from the auction process. The contract usually specifies the terms and conditions of fund disbursement, tying it in with project implementation and service quality: 35 percent of the fund is paid at the start of the project, 25 percent of the fund after the instalment of the facilities, and the remaining 40 percent in half-yearly instalments over a five year period, subject to compliance with the terms and conditions.¹⁷ When a selected operator fails to comply with the service mentioned in the contract, the regulator adjusts the support amount based on the clause included in the contract.

Once an operator is selected, it builds the network, operates, and maintains it. The life of a concession is 20 years, and the operator gets the ownership of the network. Apart from delivering local telecommunication services specified in a contract, the operator is also obliged to provide interconnection with other rural villages on long distance services. OSIPTEL regulates the private operators and ensures the continuity of the service delivery.

Monitoring the Operators and Future Adjustments: The regulator needs to monitor the quality and availability of the service at a specified level. For this, there is a built-in mechanism. OSIPTEL supervises project implementation and monitors the operation through a network management system, and requires a dedicated data circuit in the operators' headquarters to oversee service quality and billing. Based on the observations, the OSIPTEL staff prepare a half-yearly report that works as the basis for half-yearly payments of the support funds (from FITEL) to the private operators.

In the case of an operator not complying with the terms specified in the contract, there is a pre-specified penalty that the regulator can impose on the operator. For instance, the regulator

¹⁷ See Cannock (2001), p. 17.

reduces the half-yearly instalments by US\$1000 per day for pay phone and network monitoring outages, and by 10 percent per locality per week of delay in initiating service for up to one month, at which point the balance of the subsidy is penalized.¹⁸

The contract with the private operator also specifies other indicators of performance such as: grade of service (network congestion in peak hours), time to get a dial tone, and overall service quality measured by mean opinion scores.

3.3 Projects under the Partnership

Up to March 2001, three rounds of competitive bidding have been taking place where four or more bidders have been participating. Accordingly, the authority has assigned six projects of rural telephony under FITEL that will translate into 8,653 rural telephones and will benefit 4,237 rural settlements covering approximately 4 million rural inhabitants. Under the program, the objective of the authority is to cover 5000 rural settlements by 2003.

The distribution of the projects and the probable direct and indirect beneficiaries are shown in Table 3. Out of the six, five projects are in the process of implementation. Gilat to Home is in charge of the North Project (Amazonas, Cajamarca and Piura) and the Centre West Project (Huanuco, Junin, Urna, Pasco and Ucayali). Cand GAvantec has the concession for the Centre North (Ancash, La Libertad and Lambayeque) and finally Telerep has the concession for the South (Arequipa, Moquegua, Puno and Tacna), Centre-South (Apurimac, Ayacucho, Cusco, Huancavelica, Ica and Madre de Dios) and the North Jungle (Loreto and San Martin) projects. According to information provided by FITEL, however, Gilat to Home has recently acquired the projects from Telerep.

Table 3: Rural Communication Projects under Public-Private Partnership in Peru

Project	Settlements	Direct Beneficiary Population	Indirect Beneficiary Population
North ¹⁾	938	519957	499114
South ²⁾	534	135917	249468
South Centre ²⁾	1029	303260	528734
North Jungle ²⁾	374	141621	187424
North Centre ³⁾	582	317648	363682
West Centre ¹⁾	780	259668	343930
Total	4237	1678071	2172352

1) Gilat to Home; 2) bid to Telerep; 3) CyG Telecomm Avantec

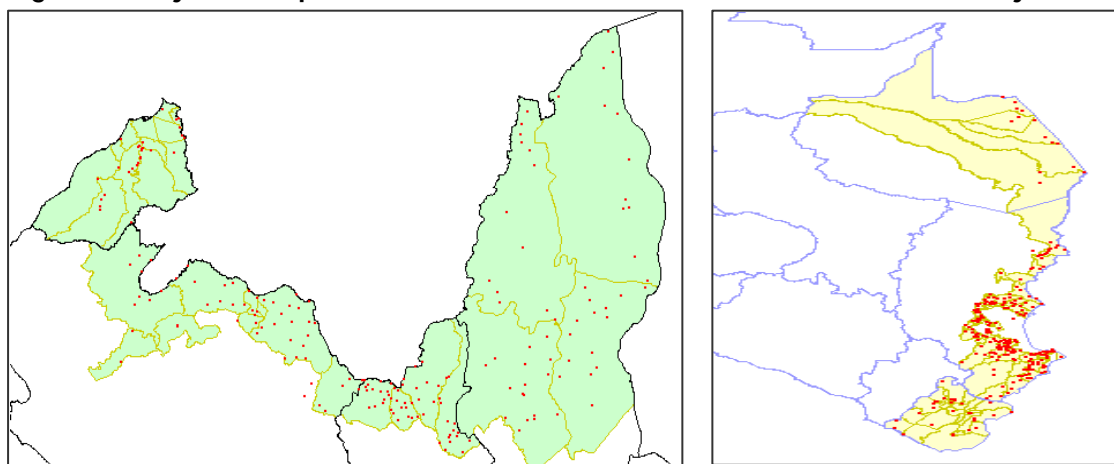
Source: OSIPTEL_FITEL

¹⁸ See Cannock (2001), p. 17.

There are two pilot projects currently in operation (Figure 2, dots are the settlements with public telephone). The first project, that of the North Borderline Project, comprises the instalment, operation and maintenance of 1 public telephone in each of 193 rural settlements. The fund awarded for the instalment cost is US\$ 3.727.379, for operating and maintaining for 20 years is US\$ 998.465, and the project fee that the project will have to pay in the fifth year is US\$4.909.292. It may be mentioned that the requested amount for operation and maintenance of the net is paid out in half-yearly quotas over 5 years. In this way the winning offer in actual value is US\$ 1.661.563, which is 41 percent less than the originally budgeted amount of US\$ 4.053.000, which represents a public investment per inhabitant of US\$ 11. To have an idea of the impact and benefit of the project, it can be mentioned that the execution of this project will considerably decrease the distance to the nearest telephone for the communities, and will increase the proportion of the population with telephone access in that zone from 48 percent to 88 percent.¹⁹

The second project is the one for the South Borderline. This project comprises the installation, operation and maintenance of 1 public telephone in 252 rural villages of Tacna Department and the border districts of Puno and Madre de Dios Departments. In terms of impact, the execution of this project will effect a considerable reduction in the distance to the nearest telephone and will increase the proportion of the population with access to the telephone in that zone from 68 percent to 85 percent.²⁰

Figure 2: Projects in Operation in Peru: Northern and Southern Borderline Projects



Source: Bertolini et al (2002).

3.4 Sustainability of the Program

The project depends neither on additional public finance nor on cross-subsidy; contributions collected from the sector are used within the sector. The contributions to the fund come from the telecommunications operators that contribute 1 percent of their annual gross

¹⁹ OSIPTEL-FITEL (1999).

²⁰ OSIPTEL-FITEL (1999).

revenue (less tax and interconnection charges) to the fund. Since the inception of the fund in 1994, it has been growing by US\$12 million annually.²¹ The fund is used exclusively for the financing of telecommunications services in rural areas and localities deemed to be of social importance.

FITEL leverages private investment. As seen in the case of the North Borderline pilot project financed by FITEL, for each dollar of subsidy, the fund has attracted two dollars of private investment. In addition, the administrative cost of the fund is also low, which is less than 2 percent of the collected fund. As FITEL's committed subsidy for the selected projects spreads over a period of five years, the subsidy helps to compensate for the cash flow of the projects at the initial periods. However, once the traffic starts up and grows, the projects are expected to become self-sustainable.

²¹ ITU (1998), p. 79.

4 Business-NGO Partnership in Bangladesh

The Public-Private Partnership described above is an example of attaining universal access for rural areas when the public authority intervenes and corrects the possible market failure. But what if such an authority does not intervene? Is it still possible to use the market in attaining universal access for rural areas? The business-NGO partnership that has undertaken a project named village pay phone program, henceforth VPP program, in Bangladesh provides such an example. However, the description and evaluation of the VPP program is preceded by a brief discussion on NGO and public good provision and how an NGO can contribute in a rural telecom project.

4.1 NGO and Public Good Provision

The past decade has witnessed a surge in non-governmental organizations (NGOs) in many industrialized as well as in developing countries. One way to see the emergence of this 'third sector' is as a response to "fill" the niches where both the state and the markets have failed. Though many kinds of NGOs exist, the current study is interested in the type defined in Anheier and Salamon (1998): it is an organized sector, institutionally separate from government, and does not return any profits to its owner(s).

Though the economists tend to attribute the production of economic services either to the private sector or to the public sector, the economic contribution of NGOs as a sector is quite significant.²² In addition to the measured economic contribution, the sector offers more potential, such as innovations in public service delivery and improving the quality of services, and can play supportive roles to the public services.²³ NGOs are considered, particularly by donor agencies, effective to reach and target part of the population and an increasing proportion of both the domestic development budget and foreign aid in developing countries is being channelled through NGOs.²⁴

The underlying economic theories that have evolved to explain the rapid emergence of this third sector include demand-side theories, supply-side theories, partnership theory, and social origins approach.²⁵ And two benchmark models most often used are the public good model

²² As found in the study of Salamon et al (1998) on the nonprofit sector in 22 countries of varying income levels, the sector as a whole contributed to 4.7% of GDP in 1995 on an average.

²³ See Badelt (1985); see also Rose-Ackerman (1996) that mentions three important functions that can be played by nonprofit organizations.

²⁴ For instance, in 1997, the World Bank had most of its environment projects (in 68 countries) implemented through NGOs. See World Bank (1997), pp. 4-5.

²⁵ For an overview see Salamon and Anheier (1998)

and the private consumption model.²⁶ In the public good model, a desire to increase the provision of public good motivates an NGO to contribute, and thus an NGO would contribute only if it increases the supply of public good to its target group. The current study rationalizes the NGO's contribution in the rural telecom project based on the public good motive. More precisely, in the present framework, an NGO differs from a business (and public) organization in two ways: first, in its concern for increasing the supply of public good; and second, in its information advantage.

NGOs and Rural Telecom Provision: Provision of universal service in rural areas involves production of services, e.g., building networks, and the operation and management of the service, e.g., subscriber selection. Assuming that these two steps, production, and management and operation of a rural telecom project that intends to provide access for rural people to telecommunications are totally separable, an NGO has a comparative advantage over business in the operation and management of the project in rural areas. This is because the NGO might incur lower operating costs compared to business in the rural context.

Why does an NGO incur lower costs in rural areas compared to a business? Some possible reasons for why an NGO might incur less management/operating cost compared to a business in rural areas are the NGOs presence in rural areas and, related to that, its information advantages. If an NGO has its existing operation and network in a rural area, it does not need to incur substantial set-up costs, which are fixed in nature. By the same logic, the NGO might also need to incur lower variable costs, like operating costs, than a business. In addition, due to its local knowledge, it can overcome the imperfect information problems that exist in rural areas. The empirical evidence that NGOs are more efficient than business are inconclusive. A major problem with comparing the relative efficiency between NGOs and business is that NGOs do not necessarily supply the same good as business.²⁷

The argument that an NGO with rural operations may incur lower operating/distribution costs compared to a business is not the sufficient condition for a Business-NGO Partnership. In fact, the significant difference between an NGO and a business rests on the difference in their objective functions; while businesses are profit driven, NGOs are ideology driven, for instance, increasing the supply of public good for the intended beneficiaries in rural areas.²⁸

4.2 Village Pay Phone Program Under The Business-NGO Partnership

As described in the theoretical framework, a competitive market that relies on marginal cost pricing cannot extend the telecommunications network beyond N^* , leaving ON^* rural population without having access to telecommunications (Figure 1). Now in order to extend

²⁶ See Roy and Ziemek (2000).

²⁷ See Rose-Ackerman (1996), pp. 721-23, for evidence and a discussion on relative efficiency of business and NGOs.

²⁸ For evidence that nonprofit organizations are usually ideologically motivated, see James (1982).

access beyond N*, the partnership could set up telephone booths where individual demand can be summed up, or it could establish call centres. However, due to the higher operating and maintenance cost, setting up telephone booths was not a viable option. Therefore it has opted for the call centre and established it under private ownership. In addition, due to the NGO's public good motive, it wants to ensure access of the rural poor in general and its beneficiaries in particular, and it selects only poor individuals as owners/operators of the call centres as a result.

Grameen Bank (GB) is a non-governmental organization that provides formal credit to rural poor women without requiring any direct collateral, known as group lending.²⁹ As of February 2000, the bank had 2,355,985 borrowers of which 94.77 percent were female. At its current state, the bank covers around 58.61 percent of all the villages³⁰ in Bangladesh. As a policy, GB's staff travel everyday to the doorsteps of its borrowers and collect weekly instalments.³¹ GB's focus on information and communication technologies could be found in the establishment of three sister organizations: Grameen Communications, Grameen Cybernet and Grameen Telecom.

Grameen Phone (GP) is a commercial venture in Bangladesh. It is a joint venture company that has four shareholders; with a 35 percent stake Grameen Telecom (GTC) is one of its shareholders. Other shareholders include Telenor Invest AS of Norway, Marubeni Corporation of Japan, and Gonophone of the USA. GP was granted a nationwide license for cellular mobile phones in November 1996. GP uses Global System for Mobile (GSM) technology, which is one of the widely accepted digital systems as people in 130 countries use it at present.³² As a part of its operation, GP establishes networks, and operates and provides telephone connections.

To address the issue of rural peoples' access to telecommunications, Grameen Bank and Grameen Phone have started a joint project named village pay phone (VPP) program. The project is a partnership between Grameen Bank and Grameen Phone. Under the partnership, the Grameen Phone offers access to the network at a discounted rate, and Grameen Bank operates and manages the project. Grameen Bank, through its wholly owned subsidiary, Grameen Telecom, and in collaboration with Grameen Phone, allows female borrowers of the Grameen Bank's credit program to become the owner-operators of mobile phones under the VPP program.

Under the VPP program, GTC provides cellular phones to the selected borrowers of GB. The members purchase the phone under the lease program of the Bank and make the telephone available to the other villagers. Here each VPP owner-operator acts like a public call office (PCO); she re-sells phone calls, provides message services within the village, and lets others receive incoming calls. Table 4 shows the growth of VPP over the years. Started in 1998, the

²⁹ See Stiglitz (1990) for the economics of group lending.

³⁰ Villages are rural settlements and are usually characterized by inadequate or absence of infrastructure in general.

³¹ See <http://www.grameen-info.org/bank/supdates.html>

³² GP's annual report 1999.

VPP program has brought, as of March 2001, more than four thousand rural settlements under its telecommunications network. By 2004, GTC plans to expand the program to all 68,000 villages of Bangladesh. In addition, GTC has a plan to add other products like fax and email services to the VPP program at a later stage.

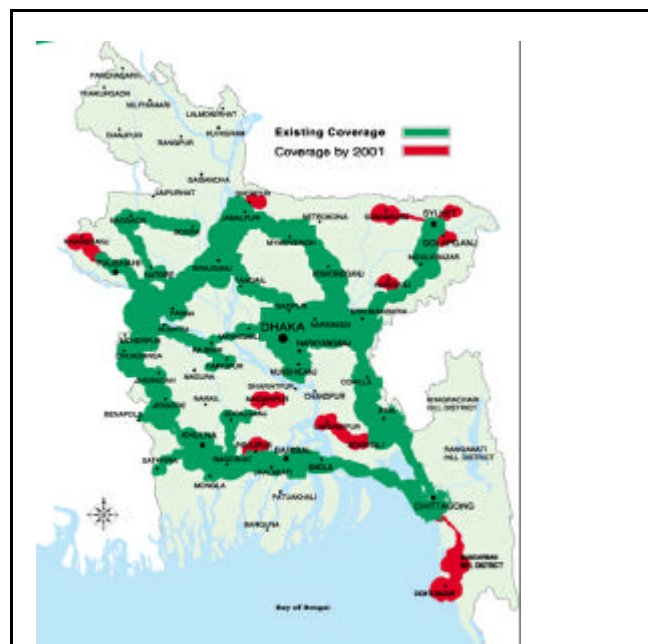
Table 4: Growth of Village Pay Phones over the years

Year	Number of VPP	Growth (in %)
1997	28	
1998	179	539.29
1999	1114	522.35
2000	3085	176.93
2001 (March)	4166	140.16

Source: Grameen Telecom

Figure 3 shows the coverage of Grameen Phone as of 2001. The VPP program is expanding following the expansion of the network of Grameen Phone. The railway fibre optic that GP uses as the backbone of its physical network covers a distance of around 12 kilometres from any point of the network. Villages after 12 kilometres require additional antennae, and hence additional investment. For such villages, GTC supplies the antenna, GB extends necessary credit, and VPP owner-operators pay additional instalments. However, GP does not commit any additional investment. Table 5 shows the different components of cost of the VPP packages including the cost of antennae that the VPP owner-operators need to pay to Grameen Telecomm.

Figure 3: Potential Coverage of VPP in Bangladesh



Source: Grameen Phone

Table 5: Cost of Village Pay Phone (VPP) Package in Local Currency (Tk.)

Time period	Basic Package	Antenna*	Mobile Set
1997-98	18,100	6,500	Nokia 1610
1999-Feb'2000	15,000	4,500	Nokia 1610
March-April 2000	17,000	5,000	Nokia 8110
May-Dec. 2000	15,000	5,000	Nokia 5110

*If necessary. Source: Grameen Telecom. Exchange Rate in 2000 (US\$1=Tk.50).

4.3 Operations and Functioning of the VPP Program

The screening and selection of VPP owner-operators: GB staff select VPP owner-operators exclusively from among credit group members. In the selection process, GB uses financial criteria, such as the borrower's track record of credit and repayments regularity, and financial solvency, such as type of business and flow of income. The technical requirements that GB seeks are literacy, particularly familiarity with Roman numerals; availability of electricity connection in the house; and the centrality of the operator's location within the village. In addition, GB also checks whether a potential operator is willing to offer the service around the clock and go to users' doorsteps to provide message services within the village.

Based on these criteria, GB officials prepare a preliminary list of group members who want to become VPP operators, and all members of the group, in the presence of local GB officials, jointly select one VPP operator for the respective village. GB officials offer the phone to the selected VPP operator through the bank's lease program. Similar to group lending, the group as a whole remains liable for the credit, and members of the group monitor the performance of the VPP operator. At the beginning, GB offers the phone only for three months and monitors the performance and, if satisfied, it then continues further. As part of the program, GTC trains the operators as well as handling all service related issues, and GB collects the bill and monitors the VPP operators through peer monitoring.³³

Pricing policy: GTC buys bulk airtime from GP at a discounted rate and passes it to the VPP operators. VPP owner-operators pay at the same rate that GTC pays to GP. In addition, operators also pay 13 percent on the airtime charge, to cover GTC's overhead costs and GB's collection costs. VPP owner-operators also charge different rates for incoming calls depending on the type of call. It is important to note that the users who make calls from VPP pay at the same rate that other private GP subscribers pay. That means, under given circumstances, a person willing to make a call is indifferent between calling from a VPP or making a call from his/her private mobile phone (when she/he is a direct subscriber of GP's mobile phone).

³³ See Besley et al (1993) for more on peer monitoring.

4.4 Cost and Information Aspect

Cost aspect: In the theoretical framework described above, constant marginal cost per subscriber has been assumed; as the market extends telecommunications to rural areas, the marginal cost per additional subscriber remains the same as for the urban subscriber (Figure1). However, empirical evidence shows that marginal cost per subscriber increases as the telecom provider moves from urban to rural areas and this requires either subsidy for rural areas as described in the case of Peru or a higher access price for the people living in rural areas compared to the access price that people pay in the urban areas. However, as will be shown later in this paper, the VPP program ensures price equality between both urban and rural areas, and between both subscribers and non-subscribers without any subsidy from the government or a cross-subsidy from the urban area. How does the partnership keep the cost low?

There are two types of costs related to the VPP program: the cost of building the physical network in rural areas and the cost of operating and managing the program. For the first, while the building of the physical network is the responsibility of the business – GP under the partnership program – the cost related to operating and managing the program is borne by the NGO – GB. However, as described under the operating and functioning of the program, Grameen Phone does not incur any additional physical investment for the project. For the second, to keep the marginal operating cost at a constant level due to additional subscribers, the partnership uses GB's existing network that keeps the operating and collection cost at a minimum. As the NGO (GB) already has extensive rural operations, the operation and management of the VPP program does not require substantial cost. In addition, to expand the telecom network in rural areas at an affordable price, it is also necessary to create effective demand. To create new subscribers, the partnership has transformed the characteristics of the product; it has transformed the phone from a consumption to a production good and offers it to a class of subscribers, VPP owner-operators, who otherwise would not demand it. To achieve this, the partnership offers credit through the GB's lease program to this new class of subscribers so that they can finance their new investment.

Information aspect: The approach that the Business-NGO Partnership has adopted in telecommunications provision is unique in the selection of subscribers, which are the VPP operators. The selection process is unique and also important as both economic success – creating effective demand while keeping the cost low, and public good objective – providing access for rural people to telecommunications, and ensuring ownership of telecom to the rural poor, depend on the performance of the VPP operators. It should be mentioned that when a business alone wants to ensure access for rural poor people to telecommunications utilizing the same mechanism, it faces all three classical problems of imperfect information: screening, incentives and enforcement problems in selecting private owners/operators for its centres. Due to the difference in the likelihood of performance of different individuals, it is costly for a business to evaluate the risk associated with each individual and design a different contract accordingly. This high cost argument is true for the other two as well; it is costly for a relatively new entry to

design incentives for the individuals to maximize the payment likelihood, and enforcement of contract in a rural setting for such an entity could prove to be difficult and costly also.

How does the partnership overcome problems related to imperfect information? For this, the partnership relies on the NGO; as the NGO has local level knowledge and interlinkages with other markets, with the credit market in the present case, it does not face the problems stemming from imperfect information. As the program selects from GB's borrowers only, it does not face problems related to imperfect information, as borrowers are well known to GB. In addition, as GB has credit linkage with VPP operators, monitoring the performance and implementing the contract is relatively cheap.

The VPP operators are part of the multilateral debt contract of Grameen Bank's micro credit program where the selection of the VPP operators, the monitoring of their performance, and enforcement of contracts are done by other group members. Such multilateral contracts can solve part of the problem stemming from imperfect information. Specifically, such multilateral contracts can address the screening problem, as group members are known to each other due to frequent social interactions, and each member of a credit group may have better information about other member's efforts and abilities than does the business.³⁴

The repayment incentive comes from two sources: first, a default member/group does not have access to micro credit. Given the fact that such borrowers do not have access to formal credit markets, and interest rates prevail in the informal credit market, for example, the interest rate that the money lender charges is relatively high, the NGO's sanction could be a significant penalty for such a member/group. Second, a default member/group may lose the social connections through defaults. Such a penalty might come in the form of denial of access to community facilities, informal credit among others. The multilateral credit contract under group lending provides an opportunity to use non-market institutions to design repayment incentives of individuals and groups.³⁵

4.5 Sustainability of the Program under Business-NGO Partnership

To examine the sustainability, the study estimates the profit (loss) from each of the providers that it earns from the VPP program under partnership. The providers of the VPP program include credit group members of the Grameen Bank, those who are the owner-operators of the phone, the network and access provider, Grameen Phone, and the manager of the program, Grameen Bank and Grameen Telecom.

³⁴ See Stiglitz (1990) for the likelihood of repayment in a group-lending scheme.

³⁵ See Besley and Coate (1995) for the use of non-market institutions in group lending.

VPP owner-operators: For this group, profit estimation is based on two primary surveys conducted jointly by Jahangirnagar University (JU), Bangladesh, and the Centre for Development Research (ZEF), Germany. The first survey was conducted in June-August 1998; it included 50 VPP owner-operators and 356 users. The second survey was conducted in June-August 2000 and followed up part of the 1998 survey sample; it included 100 users and 24 VPP owner-operators. The details of the two surveys can be found in Bayes et al (1999) and Bayes et al (forthcoming). Table 6 shows the distribution of weekly revenue and profit of VPP operators in 1998-2000.

Table 6: Distribution of Weekly Revenue and Profit of VPP Operators (in Tk.)

	1998		2000	
Revenue	1076.82	(417.92)	1575.80	(2233.28)
Profit	591.29	(213.92)	1314.80	(2115.68)

The numbers in the parentheses are the standard deviations (Exchange rate in 2000: US\$1=Tk.50.00).

Source: JU-ZEF survey

In calculating profit, the labour cost, interest payment and depreciation have been taken into account in addition to the airtime and service charge payment. Depreciation is estimated at 10 percent per year on the total payment that a VPP operator needs to make, and the interest rate is assumed to be 23 percent per year. With a mean profit of Tk.591.29 per week, that can vary from as low as Tk. 230 to as high as Tk. 1149, the VPP ensures a positive return to its operators. Note that in a country like Bangladesh, where per capita income is US\$270, the reported mean profit of US\$615 is an attractive return to a family that lives close to the poverty line. In addition, as can be seen from the table, the revenue and the profit for the year 2000, the village pay phone has remained a permanent income source for the owner-operators over the period.

Grameen Phone (GP): GP does not incur any additional investment for the VPP program; it offers the access for the VPP owner-operators at a discounted rate. Despite this lower rate, the VPP program ensures a positive return to GP. Two specific reasons that explain this apparent contradiction are: high airtime usage of VPP, and minimum operating cost. As mentioned in GP's annual report 1999, the average airtime usage of VPP is more than double that of a typical business user in urban areas. As GB takes care of the whole operating and collection issues, GP treats the whole VPP program as a single user and incurs a minimum operating cost only. Therefore, as written in GP's annual report 2000, even with discounted prices, the VPP program has proven to be a profitable business for it.

GB and GTC: For GB, the new program neither requires any significant physical investment, nor increases its operating cost, as GB does not expand its office network or human resources due to the VPP program. As of December 2000, GB has earned a net profit of Tk. 867,000.00 from the VPP program. Though the exact figure for GTC is not known, the VPP program is a profitable venture for it as well.

5 How far are the Partnerships in Providing Universal Service?

How effective are these alternative institutions described above, Public-Private Partnership in Peru and Business-NGO Partnership in Bangladesh, in universal service provision? To evaluate the change in access due to these alternative provision mechanisms, the following question is asked:

Does the Public-Private Partnership/Business-NGO Partnership comply with universal service restrictions?

For this question, the analysis is based on three broad criteria of universal service: access, quality, and uniform pricing. The major changes that have been taking place in access due to these two institutions can be analysed by analysing these restrictions.

Before proceeding further we need to elaborate on the question: Where does the evaluation of a universal service provided either by a Public-Private Partnership under auction or a Business-NGO Partnership under a joint project take place? Should it take place at the regulator level or at the users level? However, the problem at regulator level is that it does not have control over total price (tariff plus the subsidy) and hence on social welfare as the price depends on the market outcome that the regulator cannot fully control. The regulator may be unable to observe the quality of service as well, as it might be costly to verify the state and it is the users not the regulators who are the ultimate receivers of the service. These imply that the evaluation of any universal service may be based at the users level.

To evaluate whether the alternative provision mechanisms comply with access, quality, and uniform pricing restrictions of universal service, the study relies on the user's opinion that has been collected from primary surveys in Bangladesh and Peru.³⁶ It compares all the three restrictions between settlements with and without public telephones so that one can understand the difference that the public telephone provision is making in universal access. For each of the criteria, the study has chosen some specific indicators described below.

For access, the chosen indicators are: distance to the nearest public telephone in kilometres, time required to reach the nearest public phone, transport means to reach the phone, alternative means used to communicate if there were no public telephone, and average expenditure in alternative means of communication as indicators. For the quality of service, the

³⁶ Unless otherwise stated, data used in this section are from two primary surveys. For survey details see Chowdhury (2002) for Bangladesh and Torero and Galdo (2000) for Peru.

users' opinion of the present service, and for the price, the non-tariff cost of access such as transport cost to reach the nearest phone, and the value of travelling time have been chosen as indicators.

Public-Private Partnership and Universal Service: As one can expect, a priori, the availability of a telephone at village level reduces the distance and time required to reach the public phone. The mean distances for a village with a telephone and a village without a telephone are 2.1 kilometres and 21.5 kilometres, respectively. The mean time required to reach the nearest telephone from a village with a telephone and a village without a telephone is 0.018 hours and 0.587 hours, respectively. The differences in means of distance of telephone and time between a village with a public telephone and a village without a public telephone are statistically significant (Table 7).

Table 7: Mean Distance and Time to the Nearest Public Telephone: Peru

	Total		Village with phone		Village without phone		Mean Difference ¹⁾	
Distance of nearest telephone (in km)	12.9	(34.0)	5.192	(38.216)	13.555	(38.161)	-8.362**	(2.426)
Time to the nearest telephone (in hrs)	0.305	(0.894)	0.018	(0.147)	0.587	(1.184)	-0.569**	(0.054)

Source: GRADE (1999)

¹⁾ Mean difference between village with phone and village without phone; Values in the parentheses are the standard deviations.

** Significant at 1% level.

Table A1 to Table A6 in the Appendix show the findings related to the access to telecommunications services in rural Peru in more detail. With the exception of around three percent of the surveyed households, the overwhelming majority use community centre and public telephones as the access point for telecommunications (Table 1). The importance of public phones as the access point is reflected in the case of both types of villages, and in the case of both the poor and not poor.

For the quality of service, the survey asked the users three questions: first, how do they rank the phone service offered by the public phone established under the FITEL program; second, what is their opinion of the service; third, what are the disadvantages of the current phone service. Table 8 shows the users' opinion of the present phone service (other tables are given in the Appendix). As can be seen from the table, about half of the surveyed households consider the present service provided under the FITEL project is better than average (good) and the overwhelming majority consider that the service is not poor.

Table 8: How will You Rank the Telephone Service?

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Excellent	13.1	13.6	14.4	12.9	12.4	11.8	13.2
Good	49.6	45.7	49.8	42.1	56.6	59.4	52.3
Regular	33.7	37.6	33.5	41.2	26.6	26.6	26.5
Poor	2.7	2.9	2.4	3.4	2.4	1.7	3.3
Very Poor	0.9	0.2	0.0	0.4	2.1	0.4	4.6

Source: GRADE (1999)

The maximum tariff that an operator can charge under the FITEL project is set by the regulator, and the regulation ensures that the operators comply with the tariff cap. So the tariffs in rural areas are similar to that of urban areas, and uniform pricing between urban and rural users is enforced through regulation. However, there are non-tariff costs such as transport costs and value of travel time reported in Table 9. It is important to note from the table that the non-tariff costs for the households that live in villages with public telephones are not zero. As expected, the non-tariff costs for the households from villages without telephone are much higher than their counter group and the difference in means between the two groups is significant.

Table 9: Mean Transport Cost and Value of Travel Time to the Telephone (in LCU): Peru

	Total	Village with phone	Village without phone	Mean Difference ¹⁾
Transport cost	0.98 (3.50)	0.071 (0.683)	1.872 (4.720)	-1.801** (0.215)
Value of Travel time	0.23 (0.68)	0.019 (0.148)	0.432 (0.906)	-0.413** (0.041)

Source: GRADE (1999)

¹⁾ Mean difference between village with phone and village without phone; Values in the parentheses are the standard deviations. ** Significant at 1% level.

Business-NGO Partnership and Universal Service: Table 7 shows the mean distance and time to the nearest telephone. The other indicators of access are presented in the Appendix. The mean distances for a village with a telephone and a village without a telephone are 1.14 kilometres and 8.59 kilometres, respectively. The mean time required to reach the nearest telephone from a village with a telephone and a village without a telephone are 0.23 hours and 0.99 hours, respectively. The differences in means of distance of telephone and time between a village with a public telephone and a village without a public telephone are statistically significant (Table 10). It is important to note that the introduction of the VPP program has changed the access of rural households in general; though every village does not have a telephone yet, the access of households from villages without a telephone has also changed due to the introduction of a telephone in a nearby village.

Table 10: Mean Distance and Time to the nearest Public Telephone: Bangladesh

	Total		Village with phone		Village without phone		Mean Difference ¹⁾	
Distance to nearest telephone (in km)	4.887	(5.391)	1.135	(0.872)	8.587	(5.422)	-7.453**	(0.462)
Time to the nearest telephone (in hrs)	0.612	(0.585)	0.227	(0.208)	0.991	(0.590)	-0.764**	(0.053)

Source: JU-ZEF survey

¹⁾ Mean difference between village with phone and village without phone; Values in the parentheses are the standard deviations.

** Significant at 1% level.

Table 11 shows whether the users of VPP are satisfied with the current level of service. In contrast to Peru, users in Bangladesh are less satisfied with the quality of service. One major problem reported in the survey is the poor call completion rate. However, as the quality of the fixed network operated by the state owned BTTB has remained a major problem, improvement in call completion cannot be attained by the VPP program alone.

Table 11: Are You Satisfied with the Current Level of Service?

	Poor	Not Poor	Total
Satisfied	42.86	45.16	44.79
Dissatisfied	42.86	19.35	23.18
Extremely Dissatisfied	14.29	35.48	32.03

Source: JU-ZEF survey

Though the regulator of the country does not require it, the VPP program ensures tariff equality between both urban and rural areas, and between both subscribers and non-subscribers. However, as the program operates in a cellular network, the tariff is higher than the fixed network that subsidizes the local tariff for long distance and international tariff. Turning to the non-tariff costs, the difference between mean transport cost and value of travel time between the households that live in villages with a telephone and the households that live in villages without a telephone is significantly different (Table 12).

Table 12: Mean Transport Cost and Value of Travel Time (in LCU): Bangladesh

	Total		Village with phone		Village without phone		Mean Difference ¹⁾	
Transport cost	10.28	(9.97)	4.539	(6.033)	15.944	(9.849)	-11.405**	(0.971)
Value of Travel time	41.76	(35.72)	17.021	(16.512)	66.154	(32.671)	-49.133**	(3.079)

Source: JU-ZEF survey

¹⁾ Mean difference between village with phone and village without phone; Values in the parentheses are the standard deviations.

** Significant at 1% level.

6 Conclusions and Policy Implications

The paper has shown that if there are two geographically distinct markets characterized by two different types of users in terms of revenue generation, users of the segment whose per capita revenue generation is less than marginal cost of telecommunication network extension may not be covered under an unregulated competitive market structure. This outcome may take place even if willingness to pay per call is higher than the cost per call. The primary reasons are the low demand of rural poor households and the high fixed cost of network extension in rural areas and, in some cases, adverse geography.

However, to correct this socially undesirable outcome, the direct intervention of governments through production of services may not be the best alternative. As the experiences of the study countries have shown, such direct state provision may not be sufficient to extend the network to rural areas. Instead, government can ensure market provision through auctions for universal access for areas where the market does not voluntarily extend services. In the absence of government intervention, universal access can still be achieved through market provision given that some entity, for instance an NGO, provides the necessary inputs required for rural areas.

It should be noted that the success of the business-NGO partnership described in this paper might require the pre-existence of a successful NGO, such as Grameen Bank. However, the existence of any organization with local knowledge is the necessary condition and the public good objective of such an organization is the sufficient condition to provide universal access in rural areas in cooperation with a business/public entity that usually serves the urban segment. However, this generalisation is based on the assumption that there will be no contractual problem between such two entities.

Two projects described and evaluated in the paper are the examples of innovative use of markets in universal service provision through additional input either from government or from an NGO. Empirical evaluation of the two projects has shown that the projects comply with the criteria of universal service obligation, such as quality, availability (non-discriminatory access) and uniform pricing, both in the case of Bangladesh and in Peru.

One important difference is that FITEL ensures the provision of universal access under a written contract between a public authority and a private provider where the private operator is obliged to provide services under pre-specified terms and conditions. Unlike VPP, where the provision of universal access is voluntary in nature, the existence of a formal contract under FITEL ensures the achievement of universal access for rural inhabitants.

Appendix

Access to Telecommunications: Peru

Table A1: From where do you use the phone?

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Community centre	37.7	38.8	36.5	40.8	35.6	37.6	32.7
Public Phone	59.2	57.4	59.6	55.4	62.5	61.1	64.7
In House or from house of family or friend	1.9	2.3	2.9	1.7	1.3	0.9	2.0
Others	1.2	1.6	1.0	2.1	0.5	0.4	0.7

Source: GRADE (1999)

Table A2: Distance to the nearest telephone (in km)

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.5
Maximum	400.0	400.0	400.0	28.0	400.0	400.0	180.0
Mean	12.9	2.1	3.9	0.6	21.5	19.4	24.9
Std. Deviation	34.0	24.2	34.6	3.0	38.1	40.9	33.1

Source: GRADE (1999)

Table A3: Time Required to Reaching to the nearest public phone in hours

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Minimum	0	0	0	0	0	0	0
Maximum	4.500	2.750	2.750	1.033	4.500	4.500	4.500
Mean	0.305	0.018	0.018	0.018	0.587	0.565	0.629
Std. Deviation	0.894	0.147	0.187	0.087	1.184	1.144	1.260

Source: GRADE (1999)

Table A4: Transport means to reach the phone

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Walking	73.5	95.5	97.1	94.0	33.4	39.7	23.8
Bicycle	4.4	1.1	1.0	1.3	10.3	13.1	6.0
Public transportation	18.3	1.1	1.0	1.3	49.5	39.7	64.2
Motorcycle	0.1	0.0	0.0	0.0	0.3	0.0	0.7
Car	0.4	0.5	0.0	0.9	0.3	0.0	0.7
Animal transportation	2.1	0.0	0.0	0.0	6.1	7.4	4.0
Others	1.3	1.8	1.0	2.6	0.3	0.0	0.7

Source: GRADE (1999)

Table A5: Alternative means used to communicate if there were no phones

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Transport Agency	13.4	14.8	14.4	15.2	11.2	11.3	11.0
Letters with friends of known agency	44.8	45.2	44.7	45.7	44.2	43.1	46.2
Parcels	7.6	7.4	7.4	7.4	8.0	8.0	8.1
Radio	7.6	7.8	7.4	8.2	7.4	7.3	7.5
Travel to other village where there is a phone	29.6	30.0	20.2	40.3	29.0	22.3	41.6
Send mail	2.8	3.0	3.5	2.5	2.6	3.7	0.6
Own private short wave radio	0.4	0.6	0.0	1.2	0.2	0.0	0.6
Rented short wave radio	2.5	2.8	0.4	5.3	2.0	2.4	1.2
Others	4.2	3.6	4.3	2.9	5.2	7.0	1.7

Source: GRADE (1999)

Table A6: Average expenditure you will have in the alternative means (in LCU)

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Total	7.3	6.7	5.8	7.5	8.2	9.2	6.7
Transport Agency	6.1	6.7	7.2	6.3	4.8	5.0	4.5
Letters with friends of known agency	5.0	4.3	4.5	4.0	6.1	7.2	4.1
Parcels	15.5	13.4	12.9	13.8	18.5	14.6	25.7
Communication by radio	8.4	9.9	4.4	15.2	5.9	6.0	5.9
Travel to other village where there is a phone	7.8	8.2	5.5	9.7	7.0	7.4	6.6
Send mail	6.2	5.8	5.6	6.2	7.0	7.2	5.0
Own private short wave radio	2.5	3.0	0.0	3.0	0.0	0.0	0.0
Rented private short wave radio	11.7	3.9	3.0	4.0	28.7	34.8	4.5
Others	14.4	7.9	5.5	11.9	21.4	22.5	13.0

Source: GRADE (1999)

Quality of Service: Peru

Table A7: What is your opinion of the phone service?

	TOTAL	With phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
I receive a lot more of what I pay	1.3	1.1	0.5	1.7	1.6	0.9	2.6
I receive more than what I pay	3.2	2.7	3.3	2.1	4.2	4.4	4.0
I receive what I pay, the price is fair	58.5	59.3	63.2	55.8	57.1	53.3	62.9
I receive less of what I pay	32.3	31.2	29.7	32.6	34.2	38.4	27.8
I receive a lot less of what I pay	4.7	5.7	3.3	7.7	2.9	3.1	2.6

Source: GRADE (1999)

Table A8: What are the disadvantages of the current phone service?

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Too much distance	21.6	3.2	1.8	4.4	52.4	49.6	56.4
Costly	18.9	20.0	26.5	14.3	17.1	17.1	17.1
Bad communication	8.3	11.3	9.6	12.7	3.4	3.9	2.8
Don't find the person in charge	7.0	7.4	8.2	6.8	6.4	7.8	4.4
Only can call at certain hours	21.4	27.4	23.7	30.7	11.2	10.1	12.7
No disadvantage	22.8	30.6	30.1	31.1	9.6	11.6	6.6

Source: GRADE (1999)

Pricing and Affordability: Peru

Table A9: How do you consider the current tariff that you pay?

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Too high	42.4	39.0	37.3	40.5	48.5	48.2	49.0
Appropriate	56.2	59.4	61.2	57.8	50.4	50.9	49.7
Too low	1.4	1.6	1.4	1.7	1.1	0.9	1.3

Source: GRADE (1999)

Table A10: Transport cost spent to reach the public telephone

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
N	991	491	257	243	500	327	173
Minimum	0	0	0	0	0	0	0
Maximum	40	10	10	2	40	40	40
Mean	0.98	0.07	0.13	0.01	1.87	1.07	3.38
Std. Deviation	3.50	0.68	0.94	0.13	4.72	3.30	6.36

Source: GRADE (1999)

Table A11: Value of travel time (in LCU)

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
N	991	500	257	243	500	327	173
Minimum	0	0	0	0	0	0	0
Maximum	4.52	2.76	2.76	1.04	4.52	4.52	4.52
Mean	0.23	0.02	0.02	0.02	0.43	0.36	0.57
Std. Deviation	0.68	0.15	0.19	0.09	0.91	0.79	1.08

Source: GRADE (1999)

Access to Telecommunications Services: Bangladesh

Table A12: Time required reaching to the nearest public phone in hours

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Minimum	0	0.000	0	0	0.333	0.333	0.333
Maximum	2	0.500	0.5	0.5	2.000	2	2
Mean	0.612	0.227	0.292	0.184	0.991	0.845	1.051
Std. Deviation	0.5853	0.208	0.197	0.206	0.590	0.544	0.600

Source: JU-ZEF survey

Table A13: Distance to the nearest public telephone (in KM)

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Minimum	0	0	0	0	4	4	4
Maximum	20	2	2	2	20	20	20
Mean	4.887	1.135	1.429	0.941	8.587	7.524	9.030
Std. Deviation	5.391	0.872	0.735	0.904	5.422	5.186	5.482

Source: JU-ZEF survey

Table A14: Transport means to reach the phone

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Walking	53.0	77.1	70.0	78.9	20.0	25.0	19.4
Public Transport	24.1				57.1	75.0	54.8
Rickshaw	20.5	20.8	30.0	18.4	20.0		22.6
Others	2.4	2.1		2.6	2.9		3.2

Source: JU-ZEF survey

Table A15: Alternative means used to communicate if there were no VPP

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Would not communicate	2.1				4.5		4.8
Telephone from other place	20.8	19.2		22.7	22.7		23.8
Post office	16.7	26.9	25.0	27.3	4.5		4.8
Sending a person	58.3	53.8	75.0	50.0	63.6	100	61.9
Other	2.1				4.5		4.8

Source: JU-ZEF survey

Table A16: Average expenditure you will have in the alternative means of communication

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Time in alternative means (hours)	49.5	63.5	5.5	75.1	33.5	4	34.95
Cost in alternative means (in LCU)	141.1	81.8	67.5	84.5	211.7	80	218.25

Source: JU-ZEF survey

Quality of Service: Bangladesh

Table A17: Are you satisfied with the current level of service?

	Poor	Not Poor	Total
Satisfied	42.86	45.16	44.79
Dissatisfied	42.86	19.35	23.18
Extremely Dissatisfied	14.29	35.48	32.03

Source: JU-ZEF survey

Pricing and Affordability: Bangladesh
Table A18: Average expenditure, number of call and duration

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
Avg. monthly exp. on telephone call	362.4	401.5	54.2	477.7	305.0	56.3	338.2
Avg. Number of call per month	4.8	3.6	1.8	4.0	6.6	1.8	7.2
Avg. duration per call	4.4	4.9	3.9	5.1	3.6	2.8	3.7

Source: JU-ZEF survey

Table A19: Transport cost for telephone (in LCU)

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
N	284	141	56	85	143	42	101
Minimum	0	0	0	0	8	8	8
Maximum	40	20	20	20	40	40	40
Mean	10.28	4.54	4.64	4.47	15.94	16.38	15.76
Std. Deviation	9.97	6.03	5.38	6.46	9.85	10.86	9.45

Source: JU-ZEF survey

Table A20: Value of travel time in LCU

	TOTAL	With Phone			Without Phone		
		Total	Poor	Not poor	Total	Poor	Not Poor
N	284	141	56	85	143	42	101
Minimum	0.00	0.00	0.00	0.00	23.33	23.33	23.33
Maximum	120.00	45.00	45.00	45.00	120.00	120.00	120.00
Mean	41.76	17.02	21.58	14.02	66.15	58.29	69.42
Std. Deviation	35.72	16.51	15.58	16.51	32.67	32.51	32.33

Source: JU-ZEF survey

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