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Business Models in Rural Area Telecommunications

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ABSTRACT

This paper discusses prerequisites for the provison of rural broadband telecommunication services through public and private sector collaboration. In terms of public-private partnerships, two types of business models that provide rural broadband access services stand out: (1) those built with public funds and run by the public sector, and (2) those built with public funds and run by the private sector. The present paper comprises two case studies in which I will try to identify the criteria by which any given type of public-private partnership is in fact selected. My inquiry was guided by the following research questions:

1. How exactly are these cases affected by the scale of respective access line investments?
2. How exactly is the selection of a suitable public-private partnership affected by the inseparability of facilities and services?

From the analysis of the present research we can conclude that the inseparability of facilities and services is strongly linked to the selection of business models incorporating public-private partnerships. The research outcome is useful not only when considering construction and management of broadband services in unprofitable rural areas but also with regard to the heated debate surrounding the use of the Internet for the retransmission of television broadcasts.

Keywords: broadband service in rural area, business models in unprofitable area, public-private collaboration business model

1. INTRODUCTION

This paper examines business models based on public and private sector collaboration with a view to providing broadband services in rural areas. Since the privatization of NTT and the introduction of competition in the Japanese telecommunications market in 1985, promotion of competition has been the chief pillar of Japanese telecommunications policy. Strategies for promoting competition have been quite effective not only in lowering prices of existing services such as traditional fixed-line telephone, but also in promoting new services such as ADSL, which enable broadband Internet access. However, while the provision of fixed-line telephone is regarded as a universal service, that of broadband access is not. In fact, the situation is a little more complicated in emerging sectors such as broadband access services where private initiatives are seen to create divides between urban and rural areas. Private enterprise infrastructure providers find little opportunity to generate business and recoup their investment in rural areas. In addition, given progressive price destruction in the telecommunication services, it appears almost hopeless for private sector capital to supply the entire nation with broadband networks. In this context, involvement of the public sector is being considered in many country areas. Introduction of the public sector does not necessarily spell the elimination of private initiatives. Rather, if we closely examine some innovative arrangements generating broadband services in rural areas, we often observe the private sector setting up business arrangements that involve collaboration with the public sector. In such instances, we note the emergence of business models maximizing benefits in terms of dynamic and flexible aspects of private sector business, while also ensuring the necessary public investments. Accordingly, the present paper focuses on business models in unprofitable rural telecommunication markets that rely on public and private sector cooperation while also examining prerequisites for the provision of rural broadband telecommunication services in terms of this collaboration.

2. TWO BUSINESS MODELS THAT INCORPORATE PUBLIC-PRIVATE COLLABORATION

For the purpose of this paper collaborative broadband telecommunication services are understood to comprise FTTH, cable, ADSL, Wireless (FWA, Wireless LAN), i.e. services that can provide more than just a few megabytes per second (Mbps) Internet access.

In unprofitable rural telecommunication markets, the public sector is found to have an important role in project financing. Focusing then on public-private partnerships, two types of business models which

provide rural broadband access services stand out: (1) those built with public funds and run by the public sector, and (2) those built with public funds and run by the private sector. The following two case studies will try to identify by what criteria either type of public-private partnership is in fact selected.

3. RESEARCH DESIGN

3.1. Brief Review of The Literature

Kita (1974) mentions two factors characterizing natural monopoly in public utility industries: (i) public utility services need massive fixed capital investments for their physical infrastructure, and (ii) the provision of public utility services (whether by public or private entities) is enabled only if they are closely connected with existing facilities, referred to as the inseparability of facilities and services [1].

Considering rural telecommunication markets in terms of these two factors, it can be inferred from (i) that if you select a physical access line that requires a massive investment, such as fiber optics or coaxial cables, the facilities of broadband access will be "built with public funds and run by the public sector." On the other hand, if you select a physical access line that requires less of an investment, such as ADSL and wireless (Fixed Wireless Access, Wireless LAN), the infrastructure of broadband access will be "built with public funds and run by the private sector." Total amount of investment varies with geographical conditions and given population density; however, it is generally accepted that an outlay of more than several hundred million yen is required for fiber optic access networks and a sum of billions of yen for a CATV network. In contrast, initial investment for constructing an access network using ADSL or wireless will be no greater than some tens of millions of yen. Clearly, the larger the investment, the longer the period before the break-even point. In rural areas, moreover, the term before reaching the break-even point is longer than in urban areas due to low population density. Therefore, if a huge investment is required for the provision of broadband telecommunication services in rural areas, the model of being "built with public funds and run by the public sector" is most suitable. In this case, any public-private partnership will rest on financial support from the public sector. At the same time, it can be equally inferred from (ii) that if you provide services in which the inseparability of facilities and services is strong, such as with cablecasts and telephone services, the construction and management of broadband access will be "built with public funds and run by the public sector." On the other hand, if you provide services in which the inseparability of facilities and services is weak, such as with data communications with Internet protocol, the construction and management of broadband access will be "built with public funds and run by the private sector."

We can say then, that the stronger the connection between facilities and services, the higher the tendency for construction and management of broadband access service to be undertaken by a single entity, namely the public sector. Both scale of capital investment and inseparability of facilities and services are seen to have an effect on the type of public-private partnerships that will be selected in any given locality, but we do not know at this point which factor has the more powerful effect.

3.2. Research Questions (Framework For Case Analysis)

The present research tries to identify major criteria for the selection of one type of public-private partnership over another by asking the following research questions:

1. How exactly are these cases affected by the scale of respective access line investments?
2. How exactly is the selection of a suitable public-private partnership affected by the inseparability of facilities and services?

My research is divided into two case studies. In the first study, I examined the likelihood of the causal connection between types of public-private partnership that are being selected and factors addressed in my research questions. Then, to confirm the outcomes of this study, I made a detailed study of specific access lines. The selected cases, for the first part of my research classified by access line are shown in Table 1. I selected localities that accepted field research or offered plenty of publicly available information.

In my second study, I focused attention on the cases using fiber optics but showing a difference in business model selection. The cases for this study are shown in Table 2. I chose those localities that received subsidies from the national government to build access networks based on fiber optics between 2002 and 2004. I examined the connection between selected types of public-private partnerships and the inseparability of facilities and services. In some areas there have been municipal mergers, however I used former town or village names for the sake of convenience.

Table 1. Cases in the first case study

Access Line	Broadband Access Service	Cases
fiber optics	FTTH (fiber to the home)	Yashima-machi (Akita Pref.) *1, Kijyo-cho (Miyazaki Pref.), Nishiokoppe-mura (Hokkaido)
coaxial cables	CATV internet	Tohno-city (Iwate Pref.)
copper lines	ADSL	Rural area in Akita Pref., Awaji-cho (Hyogo Pref.) *2
wireless	FWA, Wireless LAN	Hramachi-city (Fukushima Pref.), Kamiyubetsu-cho (Hokkaido)

Notes: *1 In March 2005, Yashima-machi merged into Yurihonjyo-city.
*2 In April 2005, Awaji-cho merged into Awaji-city.

Table2. Cases in the second case study

Accounting Year	Cases
2002	Naganuma-cho (Hokkaido), Yashima-machi (Akita. Pref.) *1, Takebe-cho (Okayama Pref.), Osakikamijima-cho (Hiroshima Pref.)
2003	Nanakai-mura (Ibaragi Pref.) *2, Nou-machi (Niigata Pref.)*3, Asuke-cho (Aichi Pref.)*4, Kijyo-cho (Miyazaki Pref.)
2004	Niseko-cho (Hokkaido), Kucchan-cho (Hokkaido), Yuri-machi/Cyokai-machi (Akita Pref.) *1, Yawata-machi (Yamagata Pref.), Katsuta-cho (Okayama Pref.)*5, Kamiyama-cho/Sanagouchi-son (Tokushima Pref.)

Notes: *1 In March 2005, Yashima-machi, Yuri-machi and Cyokai-machi merged into Yurihonjyo-city.
*2 In February 2005, Nanakai-mura maeged into Shirosato-machi.
*3 In March 2005, Nou-machi marged into Itoigawa-city.
*4 In April 2005, Asuke-cho merged into Toyota-city.
*5 In May 2005, Katsuta-cho merged into Mimasaka-city.

4. FIRST CASE STUDY: ANALYSIS

4.1. Research Question 1

I classified cases by type of public-private partnership based on field research and publicly accessible information. The results are shown in Table 3. There are various ways in operating third-sector companies depending on contributions prorated by the public sector, variations in government involvment and so on. However, in this paper, based on capital ties, I classified third-sector companies as “public sector.”

From Table 3. it is apparent that all cases of access lines that require a relatively small investment (such as copper lines supporting ADSL, or wireless for FWA and Wireless LAN), are “built with public funds and run by the private sector.” On the other hand, looking at cases of access lines which require a large investment (such as fiber optics supporting FTTH, or coaxial cables for cable Internet), we find two types of public-private partnerships. As can be seen with fiber optic access lines, service providers may come from either the public sector or the private sector. How do we account for this discrepancy?

4.2. Research Question 2

In order to explain this discrepancy, we need to examine the relationship between type of public-private partnership and the degree of inseparability of facilities and services. To do this I have added communication services to cases in Table 4.

I removed telephone services from the case analysis, because they had already been provided by telecommunications carriers separately form the construction of regional broadband networks. I also removed telephone service using the CATV network from consideration, because it is provided in addition to conventionally regulated telephone services within a limited service area.

We note that in cases which harbor services in which the inseparability of facilities and services is strong, the selected type of public-private partnership is identified as being “built with public funds and run by the public sector.” For example, the provision of cablecast services requires special and rather large scale facilities. These facilities entail both a large fixed capital cost and a significant maintenance cost. In addition, services provided using that infrastructure require large operating outlays. It is for that reason that partnerships “built with public funds and run by the public sector” are better suited for providing broadband access in rural areas. On the other hand, in cases where the inseparability of facilities and services is relatively weak, the type of public-private partnership employed may be identified as being “built with public funds and run by the private sector.” This is due to the fact that financial backing form the public sector will reduce the investment expected of the private sector and open up appropriate market opportunities to private companies. Moreover, it will help establish a competitive environment in rural telecommunication markets.

5. SECOND CASE STUDY: ANALYSIS

From the analysis of the first case study, it seems more likely that the inseparability of facilities and services is strongly linked to the selection of the business models incorporating public-private partnerships than the total amout of investment. To confirm this, I conducted the second case study. I focused on fiber optic access lines that show service providers come from both the public and private sector. Cases classified by type of facility construction and service provision entity are shown in Table 5. I classified these localities based both on interviews with municipal officials over the phone or by e-mail and publicly available information.

From Table 5. it is apparent that in cases which operate services such as cablecast, where the inseparability of facilities and services is strong, the selected type of public-private partnership is identified as being "built with public funds and run by the public sector." On the other hand, in cases that provide services where the inseparability of facilities and services is relatively weak, the selected type of public-private partnership is identified as being "built with public funds and run by the private sector."

Table3. Cases classified by access line and type of public-private partnership

Access Line	Types of Puplic-Private Partnerships		Cases
	facility construction	service provision	
fiber optics (FTTH)	public fund	private sector	Yashima-machi (Akita Pref.), Kijyo-cho (Miyazaki Pref.)
	public fund	public sector	Nishiokoppe-mura (Hokkaido)
coaxial cables (CATV internet)	public fund	public sector	Tohno-city (Iwate Pref.)
copper lines (ADSL)	public fund	private sector	Rural area in Akita Pref., Awaji-cho (Hyogo Pref.)
wireless (FWA, Wireless LAN)	public fund	private sector	Hramachi-city (Fukushima Pref.), Kamiyubetu-cho (Hokkaido)

Note : In coaxial line cases, third-sector companies are includes in the public sector.

Table4. Cases classified by access line, type of public-private partnership, and communication service

Access Line	Types of Puplic-Private Partnerships		Cases	Communication Service
	facility construction	service provision		
fiber optics	public fund	private sector	Yashima-machi (Akita Pref.), Kijyo-cho (Miyazaki Pref.)	IP based data communication
	public fund	public sector	Nishiokoppe-mura (Hokkaido)	cablecast, IP based data communication
coaxial cables	public fund	public sector *1	Tohno-city (Iwate Pref.)	cablecast, IP based data communication
copper lines	public fund	private sector	Rural area in Akita Pref., Awaji-cho (Hyogo Pref.)	IP based data communication
wireless	public fund	private sector	Hiramachi-city (Fukushima Pref.), Kamiyubetu-cho (Hokkaido)	IP based data communication

Notes : *1 In coaxial line cases, third-sector companies are included in the public sector.

Table5. Cases receiving government subsidies for construction of fiber optics access network

Communication Service	Facility Construction Entity	Service Provision Entity	Types of Puplic-Private Partnerships	
			facility construction	service provision
IP based data communication and cablecast	Takebe-cho (Okayama Pref.)	Okayama Network, Inc. (third-sector company)	public fund	public sector
	Nou-machi (Niigata Pref.)	Itoigawa-city		
	Asuke-cho (Aichi Pref.)	Himawari Network, Inc. (third-sector company)		
	Kamiyama-cho, Sanagouti-son (Tokushima Pref.)	Cable terevision Tokushima (third-sector company)		
IP based data communication	Naganuma-cho (Hokkaido)	Hokkaido Telecommunication Network Co., Inc.	public fund	private sector
	Yashima-machi (Akita Pref.)	Nippon Telegraph and Telephone East Corporation		
	Osakikamijima-cho (Hiroshima Pref.)	Energia Communications,Inc.		
	Nanakai-mura (Ibaragi Pref.)	Japan Broadband Communications Corp.		
	Kijyo-cho (Miyazaki Pref.)	Nippon Telegraph and Telephone West Corporation		
	Niseko-cho (Hokkaido)	Nippon Telegraph and Telephone East Corporation		
	Kucchan-cho (Hokkaido)	Hokkaido Telecommunication Network Co., Inc.		
	Yuri-machi, Cyokai-machi (Akita Pref.)	Nippon Telegraph and Telephone East Corporation		
	Yawata-machi (Yamagata Pref.)	Nippon Telegraph and Telephone East Corporation		
	Katsuta-cho (Okayama Pref.)	Nippon Telegraph and Telephone West Corporation		

6. DISCUSSION

From the case analysis, we can say that the inseparability of facilities and services is strongly linked to the selection of the business models incorporating public-private partnerships.

One of the chief advantages of "built with public funds and run by the public sector" is the provision of ample funding by the public sector. This type of business model is suitable for providing services where the inseparability between facilities and services is strong, such as in cablecast. However, there are many problems with this business model. For example, the public sector faces difficulties catching up with rapid technological progress while providing telecommunication services. Although the public sector is licensed for the telecommunications business, it does not constitute a regular telecommunications company. Therefore, they need to operate communications services with limited technical capabilities and service operation know-how. Futhermore, providing broadband communications services as a public service will raise difficult questions, such as "What are the minimum neccessities in the communication environment to maintain an acceeptable level of broadband life?" When I visited Nishiokoppe-mura and interviewed the village office in August 2004, I learned that the municipality provides 1 Mbps Internet access, cablecast, an on-line nursing service and other functions at a monthly charge of 1,000 yen. At that time, public officials faced problems accompanied with requests from some residents for speeding up Internet access. Officials appeared sandwiched between residents who were content with the present Internet access speed and those who were not. In a case like this, establishing consensus on a specific degree of communications service as a public service might be a big issue. At the time, Nishiokoppe-mura managed to solve the problem by creating an additional high-speed Internet access service (enabling 4 Mbps Internet access) and sharing the incremental cost among high-speed access users [2].

Meanwhile, one of the chief advantages of "built with public funds and run by the private sector" is efficient service provision by private enterprise. In this business model, entities that have different incentive mechanisms come from both the public and private sector to work together to achieve a common purpose. On the other hand, it is often pointed out with regard to this model that building high-speed access networks with government subsidies may lead to the possibility of the public sector bearing down on private-sector. However, in unprofitable rural telecommunication markets, the public sector does have an important role in project financing. If the public sector's involvement in project financing encourages new entry of private businesses into the rural telecommunications market, it can be said that this model has a positive impact on the construction and management of rural telecommunications. For instance, one of the civil servants who works for the Awaji-cho town office said about the benefit of public-private partnerships in an interview held in October 2003, "Promotion of broadband infrastructure by the public sector alone is far from easy. In addition, in the telecommunications industry, technology advances rapidly. As for us, it is so hard to catch up with new communications technology in such circumstances. Collaboration with private companies in providing broadband services reduces the strain on the public sector while the private sector has an opportunity to develop a new market. It is a collaboration which works both ways."

7. CONCLUSION AND IMPLICATIONS

From the present case analysis, we can conclude that the inseparability of facilities and services is strongly linked to the selection of the business models incorporating public-private partnerships. In other words, services provided over physical infrastructures have a more powerful effect on the selection of the business models than does the choice of physical infrastructure itself.

The research outcome is useful not only when considering construction and management of broadband services in rural areas but also with regard to the heated debate surrounding the use of the Internet for the retransmission of television broadcasts. If we can use the Internet for the purpose of retransmission of televison broadcasts, it will be a low cost solution, because the inseparability of services and facilities is weak in IP base services. However, this implies considerable changes in existing business models in broadcasting. Accordingly, this issue arouses great controversy. Transition from analog to digital broadcasting is scheduled to be completed by 2011 with the exception of terrestrial radio broadcasting [3]. This transition in broadcasting will further spread television interference, which is caused by certain technical configurations, not only through rural but also through urban areas. In these surroundings, the use of the Internet for the retransmission of television broadcasts would be a low cost solution to this problem. Before offering television broadcasting through the Internet, however, we need to reform laws and regulations concerning telecommunications and

broadcasting. To this end dialogue among the various interested parties should be initiated.

What we can say with a fair degree of certainty now is that in unprofitable rural areas public-private partnerships will be a key factor in creating a successful and sustainable business model.

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