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An Empirical Analysis of the Effectiveness of Japan's Official Development Assistance in the Development of the Asian Telecommunications Sector

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1. Introduction

Japan's Official Development Assistance (ODA) commenced in 1954 as part of Japan's commitment to the Colombo Plan. Japan started accepting telecommunication trainees from the Asian region in 1955. Ever since, Japan's government and industries have invested significant financial and human resources, conducted various kinds of ODA programs, and contributed to expanding the infrastructure network and human resource development in developing countries, especially in the Asian region.

However, after the mid-1990s, the tight financial conditions led to cuts in budgets for Japan's ODA and telecommunications fields. Moreover, the telecommunication carriers were privatized in developing countries in the 1990s, and the telecommunications business became the target of private investment. Since the beginning of the 21st century, cellular phone and Internet services have been rapidly penetrating the population in the developing countries, mainly in urban areas, making it difficult to set up projects, such as those for network development, as targets of ODA.

On the other hand, the least developed countries, especially their rural areas, still do not have the benefits of telecommunications services; therefore, they need assistance from developed countries to bridge the "South-North gap" of telecommunications and the "digital divide."

ODA comes from the taxes that citizens pay, and many projects involve telecom operators, manufacturers, etc., thereby necessitating the evaluation of the efficacy of the assistance. Institutions such as the Japan International Cooperation Agency (JICA) and the Japan Bank for International Cooperation conduct short-term valuations, such as reports on each project and the results of training, at each project stage for a large number of projects. Kihara [2009] uses East Asia as an example to analyze the contributions of projects and suggests a valuation method. Todou [2009] discusses evaluating the quantitative impact of a project. Moreover, many books and papers such as Nishigaki et al. [2009] analyze or offer proposals for Japan's ODA. Furthermore, Arase [2005] clarifies the features of technical cooperation of Japan, and compares it with other donor countries and organizations. However, thus far, no research has focused on the telecommunications field in Japan for analyzing the features of assistance and providing a comparison to other donor countries. Moreover, no research has evaluated a series of two or more development projects macroscopically.

In this paper, we analyze the records of Japan and other Development Assistance Committee (DAC) countries of the Organization for Economic Co-operation and Development (OECD) for ODA in the telecommunications sector. We discuss and compare the features of Japan and other DAC members. Japan regards telecommunications is an important field, and has clearly been the largest donor country in this field. Furthermore, Japan's assistance has emphasized the Asian region. The compound annual growth rates (CAGR) of telephone subscribers in recipient countries of domestic network projects are higher than the average CAGR of the region. Further, according to the assistance scale, CAGR will continue to increase. This means that the financial support from Japan has been effective in enabling the development of telecommunications infrastructure in recipient countries. Furthermore, considering the progress in technology, the content of training courses, and the number of trainees, it is clear that the acceptance of trainees and training center projects were beneficial for the development of human resources and for the transfer of technology to developing countries.

It would be worthwhile to survey the overall ODA activity in the telecommunications field, which has been ongoing for more than half a century, by clarifying whether cooperative assistance activities between governments and industries have contributed to the spread of telecommunications services in developing countries from a long-term perspective.

2. Characteristics of Japan's ODA in the Telecommunications Sector

(1) Significant Allocation to the Telecommunications Sector

Japan's ODA continued to increase until the 1990s, and its annual contribution became the largest in the world. However, general accounts budgets have been reduced because of the financial straits after the peak in 1997. Moreover, summing up the commitment basis elucidates that ODA has been decreasing since the 1990s (Fig. 1). Moreover, the change in the telecommunications sector's share of ODA for Japan and other DAC is shown in Fig. 2. Although both Japan and other DAC countries show a decreasing tendency, compared with other developed countries, Japan has continued to regard the telecommunication sector as important. As shown in Fig. 3, although Japan's ratio as a donor to global bilateral aid ODA is 14.9%, the ratio of Japan in the telecommunications field is 31.4%. It is said that Japan has always regarded economic infrastructure as important and the telecommunications field as even more important.

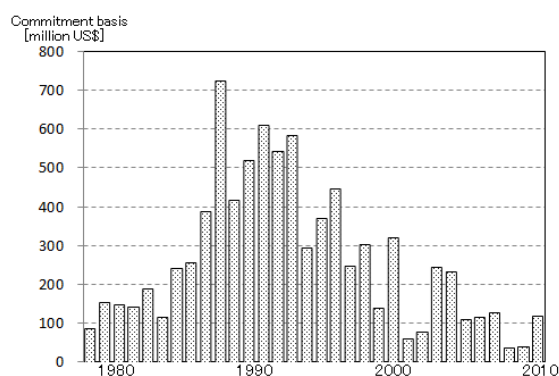


Figure 1. Japan's bilateral ODA disbursement to the telecommunications field
Source: Created based on an ODA white paper

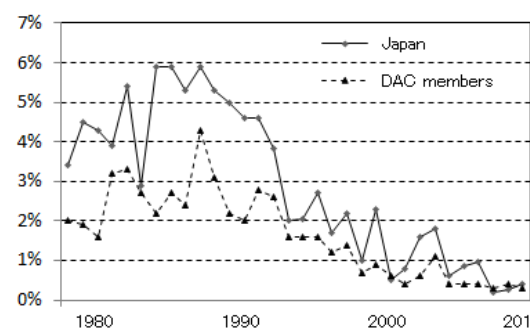


Figure 2. Telecommunication's changing share of bilateral ODA
Source: Created based on a white paper on ODA and OECD statistics

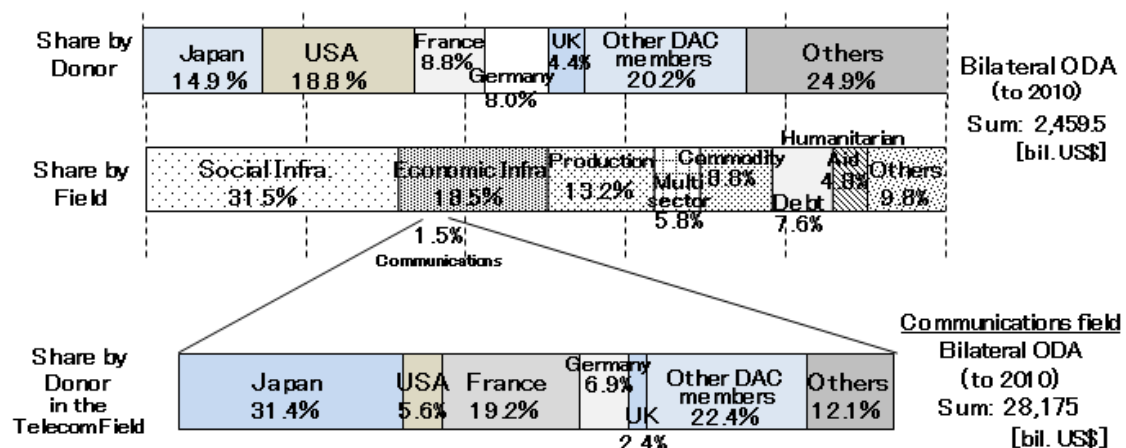


Figure 3. Share of Bilateral ODA and Telecommunication Field by Donor

Source: Created based on a white paper on ICT and OECD statistics

(2) Significant Allocation to the Asian Region

The regional allocation of each of Japan's assistance programs in the telecommunications field is shown in Fig. 4. Regional allocation of Japan's ODA, total DAC ODA, and the telecommunications sector's ODA from the World Bank are appended for reference. Across all the sectors, the proportion of Japan's ODA to Asia is quite high.

The development survey program of JICA, which conducts feasibility studies and master planning for financial ODA projects in Japan, had allocated a high proportion of ODA to the Asian region since the beginning. Loan/grant aid projects were set up based on the results of a survey. Therefore, the Asian region was

naturally a significant recipient. The allocation of grant aid to the Asian region exceeded 70% in the 1970s. However, although the annual sum to the Asian regions continued to increase until the 1990s, the proportion of ODA allocated to the African region increased after the 1980s because of the number of eligible countries. Moreover, Japan respects self-reliance efforts and the proportion of loan assistance (yen loans) is characteristically higher than that of other donors. With regard to the loans that recipients have to repay, the proportion going to the Asian region, where growth was expected, was high, and that going to the African region was low.

Furthermore, regarding the expert assignment program, the proportion allocated to the Asian region is also high. However, in the case of Latin America, the number of experts dispatched is higher than that for other assistance programs. In Latin America, eight telecommunications training center projects were conducted by five countries through project-type technical cooperation. Human resource development was important for the region. Although the proportion of aid allocated to the Asian region is also higher than that to other regions for training programs, Japan has accepted trainees from all parts of the world, and most countries, except for developed countries, have sent trainees to Japan's program.

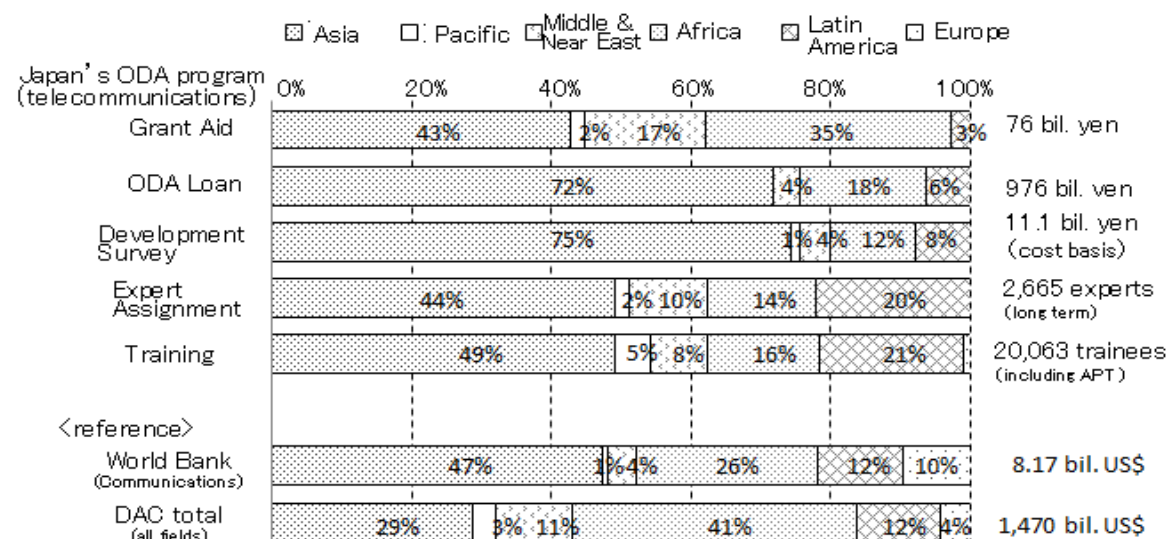


Figure 4. Geographical Distribution of Japan's bilateral ODA (Total as of 2010)

Source: Created based on a white paper on ICT, JICA annual reports, World Bank annual reports, and the OECD database

(3) A High Ratio of Loans

Japan allocates a high ratio to loan assistance, which has a repayment obligation, to urge the developing countries to become self-reliant, as mentioned above. Table 1 shows the ratios of loans to bilateral ODA. Of the total assistance in all fields by 2010, 62% was assigned to yen loans. Furthermore, within the telecommunication sector, yen loans accounted for 77% of the total.

Although assistance from developed countries in Europe and America is non-reimbursable in general, loans for the telecommunications sector account for 45% of the total aid from DAC members, except Japan, which is more than double the proportion of loans allocated to other fields. This implies that telecommunications sector projects are estimated to be more likely to result in reimbursement than projects in other fields.

Table 1. Ratios of Loans to Bilateral ODA

Country		Total		Telecom Field	
Japan	Loans	227.8	62%	6.833	77%
	Total	366.2		8.836	
DAC excluding Japan	Loans	267.3	18%	7.11	45%
	Total	1,480.3		15.92	

[bil. US\$]

Source: Created based on a white Paper on ODA and OECD statistics

3. Validity of Financial Support

The primary objectives of telecommunications financial support projects were the expansion of domestic networks, international communication networks (a satellite, a submarine cable), training centers, etc. Regarding domestic networks, as shown in Table 2, projects were completed for both the local and long-distance networks. We classify development projects for the domestic network by financial support and country, and compare the scales of the networks before and after the project.

Although it is thought that the amount of traffic circulating within the network is a suitable index to measure the effect of the project, there is a lack of reliable traffic data for developing countries before the 1990s (such as that provided by the International Telecommunications Union [ITU]). However, the demand for and convenience of telecommunications are dependent on the number of subscribers or network externality. Therefore, the CAGRs of the number of telephone subscribers can be used as an index measuring network improvement. Aid volume divided by project duration and divided again by a scale of the network (number of fixed telephone subscribers) is defined as a relative assistance volume.

Even the purpose of an expansion project on a long-distance network, which does not accommodate subscribers directly, is to increase the number of subscribers domestically. The relationship between a relative assistance scale and the CAGR of the number of subscribers is analyzed.

Table 2. Targets of Financial Support Projects for Domestic Networks

Targets Financial Support Projects		Grant Aid (85)	Loan (166)
Expansion of telecom network		29%	29%
Backbone Network	Microwave Circuits, Optical Fiber Circuits	14%	38%
Local Network	Metropolitan Area	26%	14%
	Provincial Area	31%	19%
T o t a l		100%	100%

Excluding projects for training facilities and international networks

Source: Created based on a white paper on ICT and JICA annual reports

(1) Grant Aid Projects

In terms of grant aid projects, 65 domestic network projects were carried out in 23 countries, starting with a project for “microwave circuit construction in Laos” in 1970. The average period of a project, from construction of equipment to service for new subscribers, was three years. Sequential projects following within the next three years were regarded as one project. Fig. 5 shows the relationship between the relative assistance scale and CAGR. When the relative assistance volume is large,

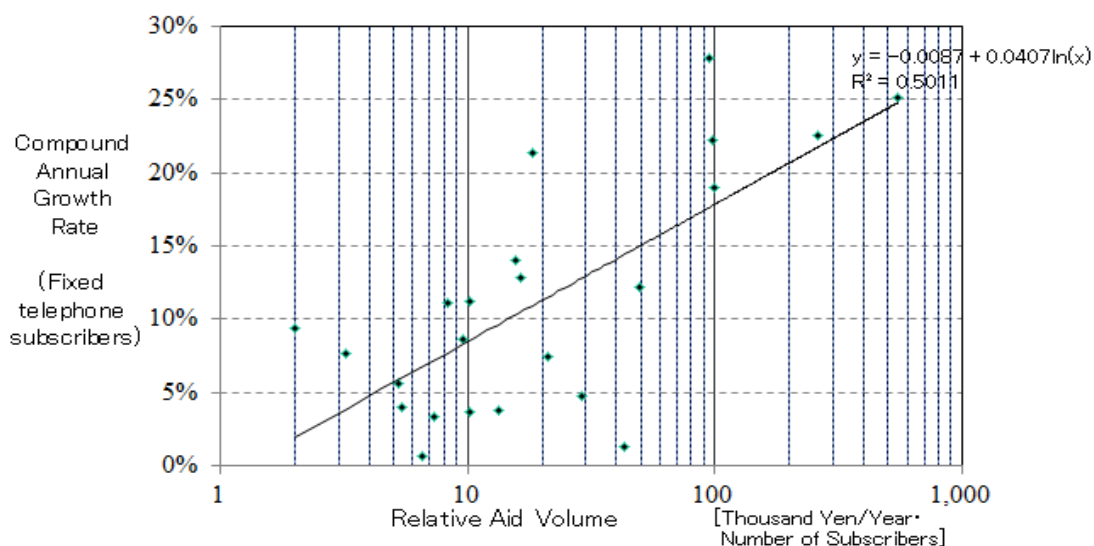


Figure 5. Expansion of telecom networks (fixed telephone subscribers) caused by Japan's grant aid projects

Source: Created based on a white paper on ICT and ITU statistics

the average CAGR tends to be high. Although the CAGR of Mongolia and six countries of the sub-Saharan African region is approximately 5%, other countries have exceeded the average of this region.

(2) Yen Loan Projects

In terms of yen loan projects, 166 domestic network projects were carried out in 36 countries, starting with a project for “the expansion of telephone and telegram networks in Pakistan” in 1962.

As compared to grant aid projects, the scale of yen loan projects is larger, and the average completion period is eight years. Computing the relationship of the relative assistance volume and CAGR as above, Fig. 6 does not show any particular correlation. However, on extracting the data for the Asian region (Fig. 7) from Fig. 6, excluding China and South Korea, which grew sharply from foreign aid and governmental investment, we found that CAGR tends to increase with relative assistance volume, thereby implying that the assistance volume of the yen loan programs has an impact on CAGR.

The countries in Africa are divided into the following two categories and there is no correlation between assistance volume and CAGR for either of these: countries where the growth rate is high and those where the growth rate is low (Fig. 8). However, the growth rate of recipient countries is higher than the average growth rate of African countries (6–8%), except for several recipient countries in the low-growth part.

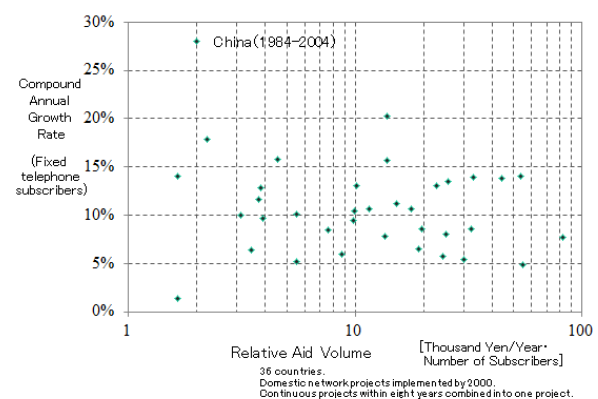


Figure 6. Expansion of telecom networks (fixed telephone subscribers) caused by yen loan projects

Source: Created based on a white paper on ICT and ITU statistics

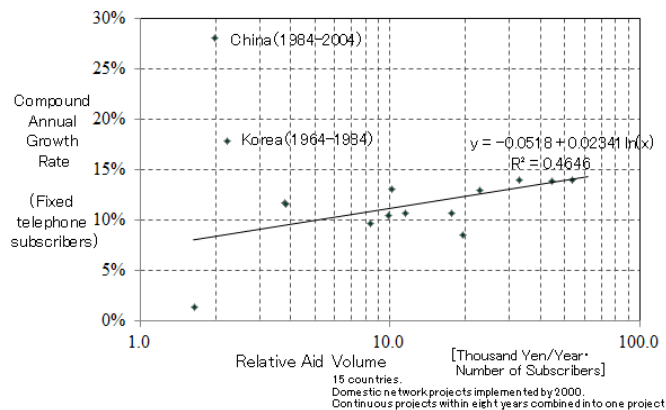


Figure 7. Expansion of telecom networks (fixed telephone subscribers) caused by yen loan projects: Asia

Source: Created based on a white paper on ICT and ITU statistics

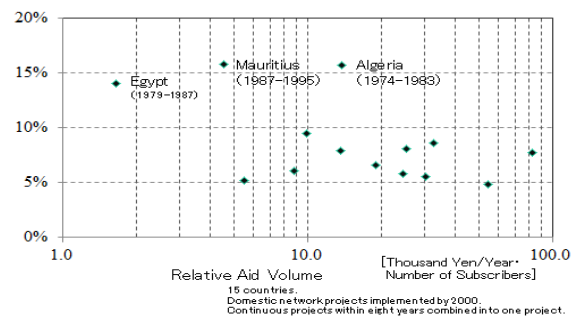


Figure 8. Expansion of telecom networks (fixed telephone subscribers) caused by yen loan projects: Africa

Source: Created based on a white paper on ICT and ITU statistics

(3) Financial Support Projects to Accelerate Growth

In order to evaluate the effects of a project, a country in the same situation as the recipient should be chosen and the cases with and without the project should be compared. However, the circumstances vary in each country, such as the extent of the existing network, economic conditions, and number of engineers.

Therefore, paying attention to differentiation in the number of telephone subscribers before, during, and after each project, we classified the tendency of an increase in subscribers in Fig. 9. In most cases, the average differentiations increased according to the timeline of before, during, and after the project. Apparently, countries were successful in promoting growth by taking advantage of Japan's ODA projects, the timing of which was believed to be appropriate.

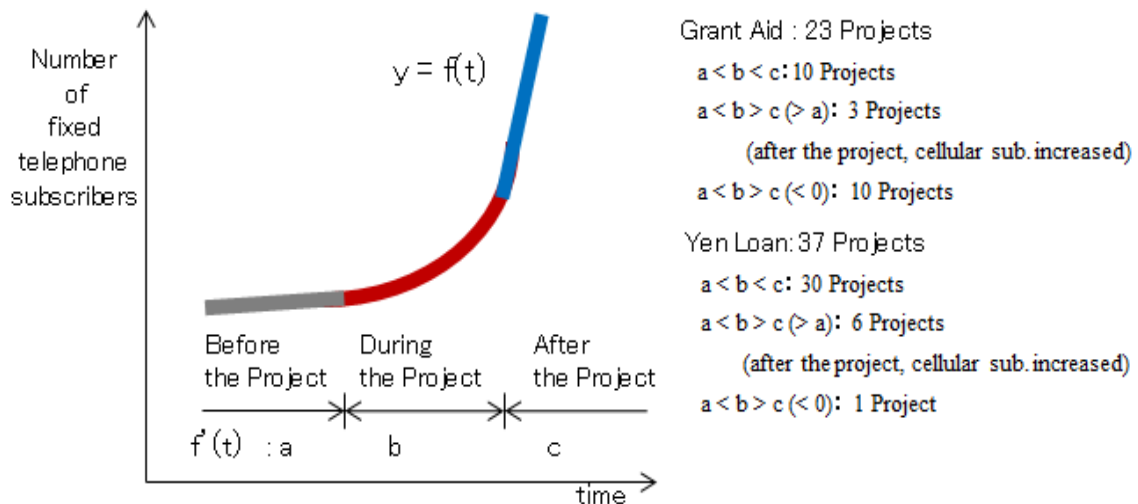


Figure 9. Categorization of Network Growth

Source: Created based on a white paper on ICT and ITU statistics

4. The Contribution to Human Resource Development

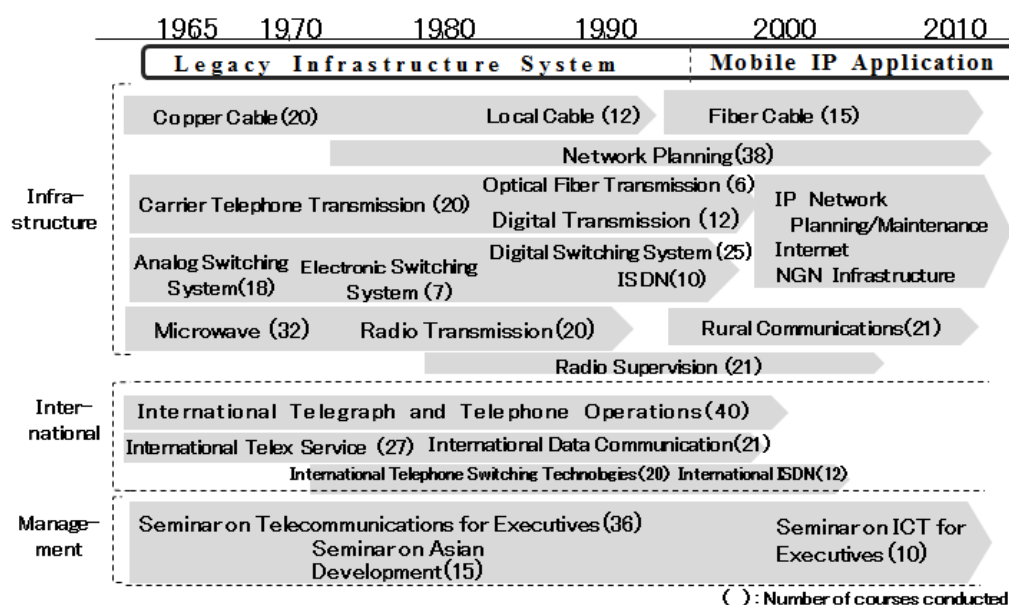
Each of Japan's ODA programs relates to the human resource development of the recipient country. Japan's technical cooperation has emphasized the "cultivation of human ability." In accordance with this principle, for over half a century, Japan has continually offered telecommunications engineers from other countries the opportunity to receive training in Japan. Unlike for financial support, regional imbalance in the training program is small (Fig. 4).

Moreover, after summarizing changes to the theme and contents of the training courses in Fig.10, it is clear that the contents of infrastructure-related courses have changed according to the progress of technologies, moving to digital and IP from analog. The themes of training have shifted from the planning, construction, and maintenance of legacy infrastructure systems to mobile IP or applications. On the other hand, management seminars for executives have continued for over 50 years because of their universal themes. Overall, approximately 20,000 trainees have been accepted since 1955. The number of trainees accepted in 2012, including APT (Asia-Pacific Telecommunity) trainees, exceeded 400. Although the number of training programs has not been reduced, other aid programs in the telecommunications field have decreased. It is clear that the acceptance of trainees is beneficial for the development of human resources and the transfer of technology to developing countries.

Further, Japan has established telecommunications training centers in several Southeast Asian and Latin American countries. In these countries, following project implementation, the network is developed smoothly because experts are dispatched and training programs are carried out simultaneously. Training center projects have not been carried out in Africa. Fig. 11 shows the variation in telephone lines per employee on the vertical axis and telephone density on the horizontal axis based on data from 1995; this indicates the level of efficiency in telecommunications operations.

Each country where the training center project were conducted, were able to extend their telephone density and the number of telephone lines per employee considerably over the corresponding figures that existed in 1980.

In the twenty-first century, Japan began focusing assistance on capacity development in terms of higher education rather than vocational education for telecom operators. This shift is in accordance with the progress in information technology.



Source: Created based on a white paper on ICT and JICA annual reports

Figure 10. Changes to the Training Program

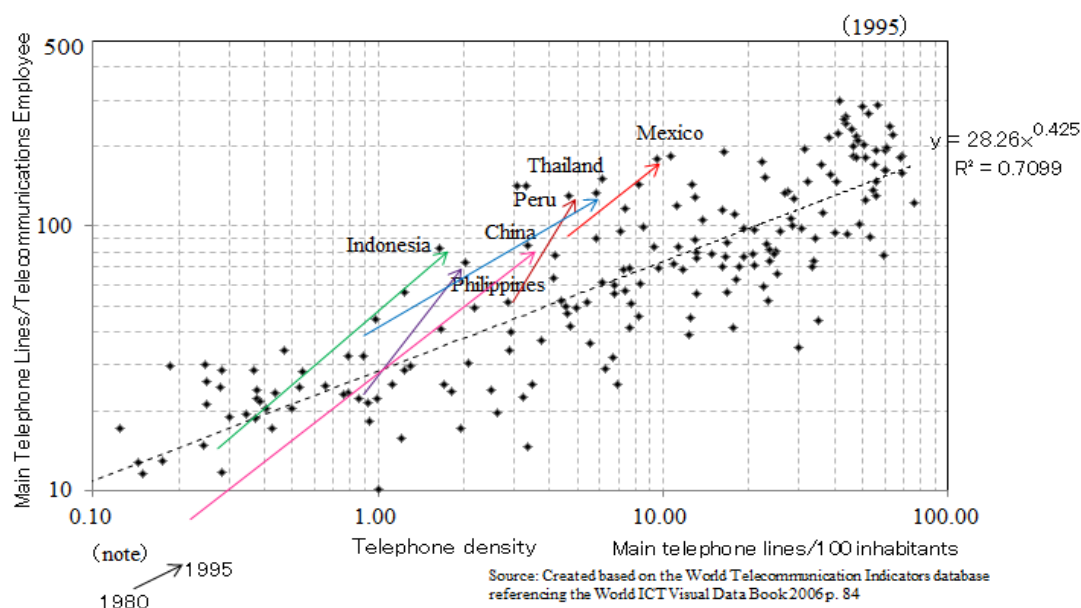


Figure 11. Telephone lines per employee

5. Conclusions

Japan's ODA in the telecommunications sector devoted a considerable proportion to the Asian region for each assistance program and contributed to telecom infrastructure expansion and human resource development in recipient countries.

The CAGRs of telephone subscribers in grant aid recipient countries where domestic network projects were implemented are higher than the average CAGRs of those regions. Further, according to the assistance scale, these CAGRs will continue to increase. This implies that the financial support from Japan enabled the development of telecommunications infrastructure in recipient countries. Similarly, it is proven that loan projects in Asia were beneficial for recipient countries.

Although the proportion of Asian trainees in training programs is high, the regional imbalance of trainees is smaller than that for other assistance. Although we expect that various training courses on IP networks and application services will be implemented, for the least developed countries, engineering courses on

infrastructure and telecom carriers' own operations are necessary. Most trainees who come to Japan are expected to play significant roles in their countries in future. Therefore, the scale of the training program should be maintained. Although there has been a shift from specific technologies that were dedicated to telecommunications carriers to general-purpose IP technology, technology transfer of network management and operational skills for telecom engineers is also required.

The effect of assistance activities varies according to the situation of the network, engineers' level of training, circumstances related to politics and the economy, etc. Therefore, it is difficult to specify the effect of each project. The change in the penetration of fixed-line telephone and cellular phone in the countries that were the main targets for Japan's ODA are shown in Fig. 12; the penetration ratio of mobile phones in these countries exceeded the average ratio in developing countries. It appears that technology transfer and personnel training enabled the expansion of the telecommunication industry.

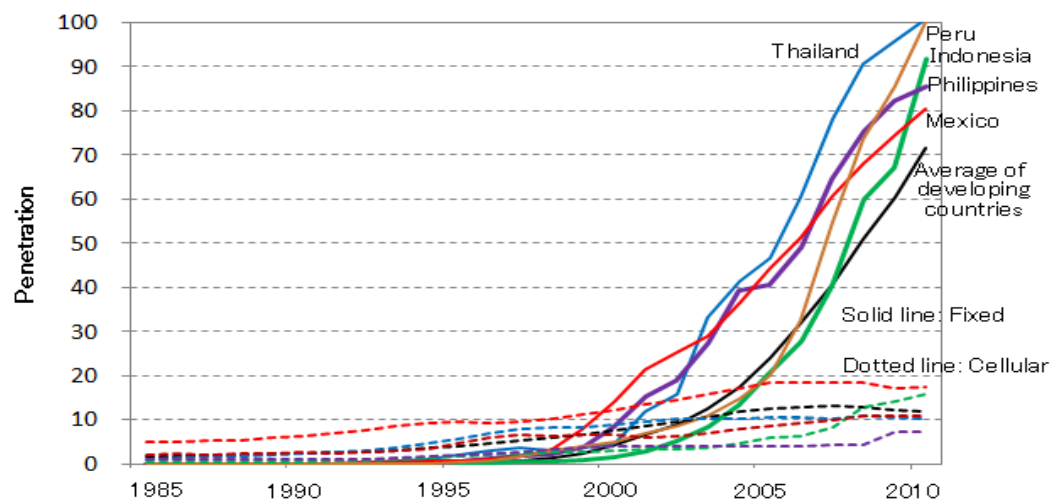


Figure 12. Fixed and Cellular Penetration in Main Recipient Countries

The development assistance policy of Japan ascribes serious consideration to recipient countries focusing on the construction of infrastructure and human resource development. In the telecommunications field, the expansion of networks in a developing country is important also for developed countries because of the "externality of demand." It is expected that Japan's ODA will play a significant role in the telecommunication field in the future.

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