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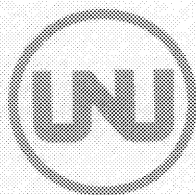
Programme Document

Project on Technology

**Transfer, Transformation,
and Development:**

The Japanese Experience

Takeshi Hayashi



THE UNITED NATIONS UNIVERSITY

From the CHARTER OF THE UNITED NATIONS UNIVERSITY

ARTICLE I

Purposes and structure

1. The United Nations University shall be an international community of scholars, engaged in research, post-graduate training and dissemination of knowledge in furtherance of the purposes and principles of the Charter of the United Nations. In achieving its stated objectives, it shall function under the joint sponsorship of the United Nations and the United Nations Educational, Scientific and Cultural Organization (hereinafter referred to as UNESCO), through a central programming and co-ordinating body and a network of research and post-graduate training centres and programmes located in the developed and developing countries.

2. The University shall devote its work to research into the pressing global problems of human survival, development and welfare that are the concern of the United Nations and its agencies, with due attention to the social sciences and the humanities as well as natural sciences, pure and applied.

3. The research programmes of the institutions of the University shall include, among other subjects, coexistence between peoples having different cultures, languages and social systems; peaceful relations between States and the maintenance of peace and security; human rights; economic and social change and development; the environment and the proper use of resources; basic scientific research and the application of the results of science and technology in the interests of development; and universal human value related to the improvement of the quality of life.

4. The University shall disseminate the knowledge gained in its activities to the United Nations and its agencies, to scholars and to the public, in order to increase dynamic interaction in the world-wide community of learning and research.

5. The University and all those who work in it shall

act in accordance with the spirit of the provisions of the Charter of the United Nations and the Constitution of UNESCO and with the fundamental principles of contemporary international law.

6. The University shall have as a central objective of its research and training centres and programmes the continuing growth of vigorous academic and scientific communities everywhere and particularly in the developing countries, devoted to their vital needs in the fields of learning and research within the framework of the aims assigned to those centres and programmes in the present Charter. It shall endeavour to alleviate the intellectual isolation of persons in such communities in the developing countries which might otherwise become a reason for their moving to developed countries.

7. In its post-graduate training the University shall assist scholars, especially young scholars, to participate in research in order to increase their capability to contribute to the extension, application and diffusion of knowledge. The University may also undertake the training of persons who will serve in international or national technical assistance programmes, particularly in regard to an interdisciplinary approach to the problems with which they will be called upon to deal.

ARTICLE II

Academic freedom and autonomy

1. The University shall enjoy autonomy within the framework of the United Nations. It shall also enjoy the academic freedom required for the achievement of its objectives, with particular reference to the choice of subjects and methods of research and training, the selection of persons and institutions to share in its tasks, and freedom of expression. The University shall decide freely on the use of the financial resources allocated for the execution of its functions. . . .

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**PROJECT ON TECHNOLOGY TRANSFER, TRANSFORMATION
AND DEVELOPMENT: THE JAPANESE EXPERIENCE**

Takeshi Hayashi

THE UNITED NATIONS UNIVERSITY

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I. OBJECTIVES

1. A summary of the major objectives, or the rationale, of the Project on Technology Transfer, Transformation and Development: The Japanese Experience (JE) is given as follows.

2. The study of development is now in a state of "disarray", as the United Nations University's Expert Group on Human and Social Development, at its meeting 10 to 14 November 1975, pointed out, in terms of approaches, conceptual frameworks, methodologies, and, more importantly, setting up development goals. There is an urgent need, therefore, to reexamine development problems and issues from fresh and diversified angles on a global scale.

3. With this in mind, the project will attempt to make a comprehensive study of various aspects of technology transfer (positive as well as negative), using the case of Japan as both a recipient and a transmitter of technology.

4. To date there have been numerous studies in Japan which have focused on the problem of the relationship between technology transfer and the attempt at increasing economic self-reliance. These studies, however, differ from those which the United Nations University envisages for two reasons: firstly, a consideration of developing countries, particularly in terms of development based on self-help and self-reliance, is absent; secondly, technology is narrowly defined, compared with the definition of the United Nations University's Human and Social Development Programme (UNU/HSDP). The task of the JE project, therefore, will be to review the history of modern Japan by taking into full account the problems related to development which the developing countries currently face.

5. Japan shares many things with other non-Western cultures and, at the same time, it shares much with Western industrial societies. This dualistic character of Japanese society enables us to understand the transcultural characteristics of technology and to transcend the conventional notion of the non-transferability

of technology. However, care must be taken with respect to the role and function of international relations as well as domestic conditions (i.e., socio-economic and political structures) corresponding to each stage of technology transfer.

6. The Japanese experience provides evidence that the growth-oriented strategy has been pushing aside problems concerning human rights, life-styles, the quality of life, and cultural and national identity (linkages with the projects on Human Rights in the Context of Development, and Socio-Cultural Comparative Evaluation of Development Alternatives in a Changing World). The lagging development in pollution control technology is also attributable to this strategy. Therefore, the necessity of studying the impacts of technology transfer, particularly its cultural and social costs and its relationship with environmental problems, has to be emphasized.

7. On the other hand, it should be emphasized that technology—broadly defined—is useful and, moreover, is inevitable for human and social development. In this connection, it is meaningful to re-evaluate the significant role of endogenous technology (linkage with the Project on the Sharing of Traditional Technology). In any case, what is needed is to conduct careful studies on the objectives and methods of technology transfer, together with the agents and/or channels of such transfer (i.e., individuals as well as groups or organizations).

II. APPROACH AND CONCEPTUAL FRAMEWORK

8. The major aspects which characterize our basic approach are summarized as follows.

9. The conventional development theory is based on the assumption that capital is scarce in developing countries but that these countries abound with natural resources and labour. The experience of many developing countries shows that the rate of capital dependence on outside sources increases, and the exploration and utilization of natural resources tend to follow a direction inconsistent with the self-reliance efforts of the developing countries.

10. It is not unusual to witness the fact that employment-absorptive capacity fails to increase during the course of growth-oriented capital-intensive industrialization. Moreover, it is often the case that the products of the domestic industries are neither competitive in the international market nor effective in attempts to have them substitute for imports.

11. The lack of recognition of the rural society and its structural poverty and the pattern of employment among planners and academics creates additional difficulties for development efforts. Urban unemployment resulting from unorganized massive migration from rural areas is precisely the outcome of inadequate understanding of rural problems. On the other hand, developing countries are suffering from a drain of skilled labourers and professionals to other countries.

12. Faced with these realities, it seems necessary both to expand and diversify the concept of development and to differentiate clearly between "development" and "growth". This relates to the establishment of development objectives and indicators (linkage with the Project on Goals, Processes and Indicators of Development). However, it should be noted that these are subject to change over time and at various stages of development. As the Japanese experience shows, pursuit of uniform objectives and indicators does not prove to be successful.

13. One of the important issues in development is "poverty". The study of the structural relationship between the rural poor and the marginal urbanites, and its implication for technology and employment, will be an important corner-stone of the project. Unfortunately, studies of the Japanese case up to now do not provide any systematic treatment of this matter.

14. The Human and Social Development Programme has a pragmatic and problem-solving nature. Each society, each region within a society, and each minority group in a society, has its own problems. However, we have to start with the search for a technology which is effective in promoting the cultural identity, local security, and social welfare of a nation-state, with the parallel aim of eliminating various social tensions and hardships which afflict every individual and minority group. At the same time, it is equally important to investigate technological measures which are helpful in intensifying mutual understanding among local, ethnic, and minority groups and promoting collective self-reliance for the purpose of the building up of nations.

15. One serious bias which exists concerning technology transfer is the assumption that the technology of developed countries is always superior and that the endogenous technology of developing countries is inferior and inefficient. This belief totally ignores the cultural aspects of technology. Moreover, it should be noted that any study of transferred foreign technology which lacks a proper understanding and assessment of endogenous technology in terms of its level of efficiency, its system of dissemination, its social characteristics (open or closed; location-specific or universally valid), etc., would inevitably produce biased results.

16. The interrelationships between endogenous and foreign technology envisaged in the project are given in the following cases:

- (a) imported modern technology replaced traditional or endogenous technology (i.e., iron, steel, railway transport, etc.);
- (b) imported modern technology failed to replace traditional or endogenous technology (i.e., tractor farming);
- (c) imported modern technology co-existed with traditional or endogenous technology (i.e., mining industry); and
- (d) imported modern technology was integrated with traditional or endogenous technology (i.e., irrigation).

17. The research project will select certain key industries relevant to each case and examine the interacting process with the specification of time and location. It is conceivable that the second type of relationship between traditional and modern imported technology, observed at one time in some places, for example, might shift to the third or fourth type of relationship after a time lag and in other ecological conditions.

18. Any technology, whether it is endogenous or foreign, has two characteristics, hardness and softness. These characteristics are not related to the nature of technology itself but rather to the social uses of the technology. A certain technology does not demand changes in an existing social system in a direct manner. The impact of this kind of technology is felt indirectly after a certain time lag and is often utilized by the prevailing power élites to preserve or even strengthen their political and social positions. This is called "hard technology". On the contrary, "soft technology" demands certain changes in the social and institutional framework before and after transfer and transformation can occur. Life-styles and patterns in the use of natural resources will change accordingly. Difficulties arising from technology transfer occur mostly in these cases. The Japanese experience suggests that the channels and agents of transfer of such "soft technology" had a decisive influence in eliminating the difficulties involved with the mitigation of conflicts caused by the transfer. However, there is much to be done before these experiences are incorporated into a theory of technology transfer.

19. The JE project will search for an effective and meaningful technology (broadly defined) which will contribute to "human and social development". One of the important aspects of the project is that the emphasis is placed on the linkages between technology and labour: the structure and dynamism of the working population; employment opportunities (especially equal opportunity); acquisition of certain techniques and their dissemination; organization of labour and discipline; working conditions (i.e., safety and health); problems relating to the employment of the aged and female labour; etc.

20. The development of technology to date has been regulated by the extent of availability of resources and the amount of invested capital. Omitting labour, technology tends to concentrate in places where the optimal use of resources and capital are expected. But this tendency often results in the formation and expansion of the urban centres in developing countries. The growing disparity, in terms of the availability of, and accessibility to, information, education, public services, etc. that can be observed between capital and local cities, and between urban and rural areas, is not a healthy sign of development.

21. Excessive concentration of technology in an urban centre is an outcome of a particular structure of agricultural production (e.g., mono-culture) and also corresponds to the inadequate development of diversified economic activities at the local and regional level. Development of local cities cannot be expected without the development of rural areas, which should be planned to develop in such a way as to mobilize the unemployed and under-employed population to form social overhead capital (e.g., public works) and rural (i.e., cottage) industries. In this respect, Japan has sought solutions in land reform and co-operative movements, but the problems of temporary migration (i.e., the role of rural

migrant labourers in off-seasons and the problem of their families that were left behind), rural exodus, and excessive expansion of metropolitan areas exist even today.

III. RESEARCH AGENDA

22. In view of the necessity of reevaluating the problems of technology transfer associated with the development previously explained, the actual work of the JE project will be carried out through two methods: the formation of a network, and then the actual research on the subject matter. The tasks assigned to the research network are as follows:

- (a) review and reappraisal of existing studies;
- (b) collection of information concerning on-going research, researchers involved, and hypotheses and theories developed therein; and
- (c) collection of information on the experiences of other countries.

23. Major areas of inquiry of case studies to be conducted can be listed as follows.

Technology and urban society

- (a) Urban expansion and ecological changes in life-style resulting from the development of transportation, and waterworks and sewage systems.
- (b) Conflict and coexistence between the old and new urbanism (especially the adjustment of marginal urbanites to a new setting and new occupational patterns).
- (c) Urban planning and its financing (especially the improvement of the urban environment and the capacity to bear its cost).
- (d) A solution for reducing the disparity between urban centres and local areas by the excessive concentration of industry and information in the urban areas.

Technology and rural society

- (a) Assessment of the endogenous technology and the level of the irrigation infrastructure prior to the introduction of foreign technology.

- (b) Improvement and dissemination of agricultural implements and machines.
- (c) Agents of the dissemination of high level technology (e.g., mechanical and biological) and the feed-back mechanism from government experiment stations, farmers organizations, and individual farmers.
- (d) Role of co-operatives, farmers associations, and irrigation associations in the development of technology.
- (e) Consolidation of village organization and the production base, particularly in connection with capital formation outside the market economy.
- (f) Changes in the division of labour by sex and age.
- (g) Changes in consumption patterns and labour migration.
- (h) The function of the rural poor and rural *zatsugyo-so* (those engaged in unspecified jobs) in the labour market and labour organization.

Technology transfer and the nature of industries

- (a) Leading industries undergo changes in status in the course of socio-economic development. Textile and miscellaneous goods industries (e.g., knitting, matches, etc.) were once the leading export industries in Japan. The former depended on female workers for a major portion of its labour force, while the latter relied on marginal urbanites. Both industries sought markets for their products in neighbouring countries and contributed greatly to the development of technology and to the earning of foreign currency.
- (b) Another important area of inquiry that the JE project will take up is the role of basic industries such as iron and steel, coal mining, and railway transportation in connection with labour organization, recruitment of labour, on-the-job training systems, etc. Major machine and heavy industries prospered on the foundation created by these key industries. The chemical industry will also be dealt with in this context.

Combination of resources and technology and changes in the ecology (ecosystem)

Resources are not equitably distributed among different countries and regions within any given country. Consequently, the pattern and direction of the resources/technology mix are basically regulated by the available resources and by economic, as well as non-economic, factors inherent in each ecological setting. Three types of regions have been decided upon for case studies of this project (Hokkaido, Northern Kyushu and Niigata), with the possibility of adding other regions as the research progresses.

The role of education and technology

The role of education as a dissemination medium of technology is well known.

In this project, four types of education will be taken up: formal, informal, vocational and on-the-job training.

The export of technology and technical training

An appropriate system of technical training, necessary for the successful transformation of the technology transferred, is sought. It may be useful to analyze the technology which Japan has developed and is currently exporting to other countries by comparing it with the differences in the socio-economic and cultural environment prior to technology transfer.