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|---|---|
| Title | The critical factors in the effective policy implementation of the telecommunication industry |
| Sub Title | |
| Author | Cho, Gug-Hyeon |
| Publisher | Society of Business and Commerce, Keio University |
| Publication year | 1997 |
| Jtitle | Keio business review No.35(1997) ,p.71- 79 |
| JaLC DOI | |
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| Notes | |
| Genre | Journal Article |
| URL | https://koara.lib.keio.ac.jp/xoonips/modules/xoonips/detail.php?koara_id=AA00260481-19970000-00704559 |

KEIO BUSINESS REVIEW
No.35, 1997
pp.71-79.

**Final version received on 31st March 1998**

# The Critical Factors in the Effective Policy Implementation of the Telecommunication Industry

*By*

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## Abstract

Recently, there has been an increase in the number of national researches and development projects in the field of telecommunications technology. This study is based on the fact that the development of telecommunications was achieved in a short period of time thanks to the national research and development project. To find the factors that contribute to the success of policy implementation, this study will analyze the case related to industrial policies implemented in Korea.

## Key Words

telecommunications technology, TDX research and development project, Korea telecommunications equipment industry, technical/organizational/personal factors, policy implementation analysis model, complexity of joint action, implementation game, the will of decision-making organizations, the participation of manufacturing companies and purchasing organizations, the support for research development organizations, the economy of exchange mode selection and technology selection, the transfer extent of technical know-how, Fixer's support, quality management

## 1. Introduction[1]: Research Questions

The information environment which has deeply penetrated into our society, workplaces and homes, is dominated by the multi-media of computer and telecommunications. Various informations are being brought to our lives, and by using these informations individuals and organizations are enjoying cultural and economical living. It can be said that it has been realized by the combination of computer technology and the technology of information and telecommunications.

However in the 1970s this kind of situation was almost impossible to imagine. For example, installing a telephone line required a wait of at least three months, sometimes even one year. In addition, once the telephone line was established, often noises, line confusions and malfunctions followed. These kinds of problems were not solved until the beginning of the 1980s, and nobody imagined that Korea's telecommunications could develop so rapidly as to reach the current level. What kinds of

[1]I wish to thank Professor Uetake Teruhisa, Jae-Ho Yeom, and Gab-Su Kim for their thoughtful comments and their contributions to this study.

factors made possible this rapid development in Korea which did not have enough competitive edge in the telecommunications market? If the development was made possible by the effective implementation of policies, what are the factors which affected the performance? Is the telecommunications policy different from other general policies?

And is a particular policy needed? Or are there any factors that affected the result of policy implementation, which can be discussed in general?

This study starts from these research questions regarding the Time Division Exchange (TDX) research and development project case.

## 2. Theoretical Frameworks

Of the various theoretical arguments, Sabatier and Mazmanian's policy implementation analysis model (1980), Pressman and Wildavsky's complexity of joint action (1984), Bardach's implementation game (1977) were applied in this study.

### (1) The Policy Implementation Model of Sabatier and Mazmanian (1980)

This theory integrates experimental and systematical researches related to the factors affecting the result of the policy implementation and proposes them in a comprehensive way. It also makes possible the analysis of the policy implementation.

### (2) The Complexity of Common Behavior by Pressman and Wildavsky (1984)

This theory clarifies the reasons for the following: how the expectation toward the government is being frustrated, and why it is surprising that the governmental projects succeed. It proposes the complexity of common behavior by focusing on the participants varying viewpoints. This theory of the complexity of common behavior provides the theoretical basis which makes it possible to analyse how the relationship among the participants, who took part in the research and development project is controlled.

### (3) The Theory of the Policy Implementation Game by Bardach (1977)

This theory analyzes various implementation games which hinders policy implementation and proposes specific ways of overcoming those obstacles. Bardach's theory is very useful for considering the human factors of this study because it emphasizes the powerful authority and the problem-solving ability of the people with proper authority.

Based on these three theories, this study proposes the framework of analysis in Figure 2.

### (4) The Selection and Specification of Analytical Variables

The variables being analyzed in this study have been drawn out on the basis of the theories specifically proposed in above. As a result, the factors related to the project performance were generally divided into technological factors, organizational factors and environmental factors.

However in the case of the research and development project as the subject of this study, the mechanism which can weaken or overcome various conflicts and limit-

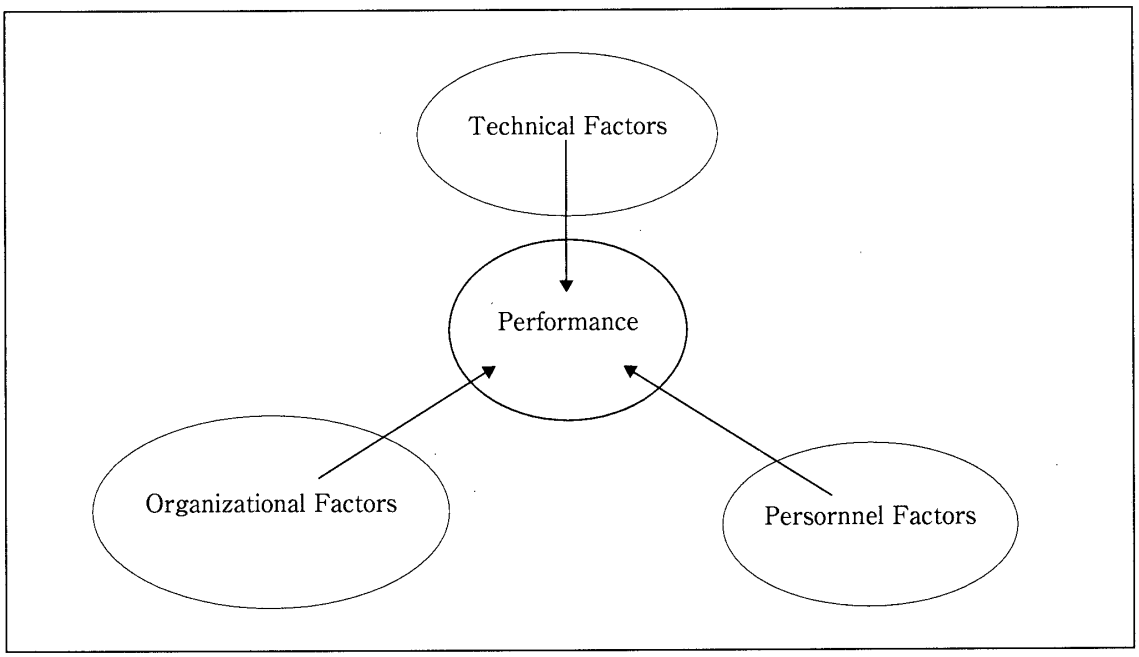


**Figure 1. Critical Factors in Project Performance**

ing elements produced in the process of policy implementation should be clarified. In this viewpoint, personnel factors were added and environmental factors eliminated.

Therefore this study analyzes the technological factors,[2] organizational factors,[3] personnel factors,[4] the variables that affected the success of the project (Figure 1).

The framework was largely made up of seven variables (Figure 2). The variable comprises the following: i) the will of decision-making organizations; ii) the participation of the manufacturing companies and the purchasing organizations; iii) the support of research development organizations; iv) the economical mode selection and technology selection; v) the transfer extent of technical know-how; vi) the support of Fixer; vii) quality management. The basic analysis method employed was interviews and questionnaires.

These variables and their measurement variables are listed in Table 1 (see p. (75)5).

i) The variable of the will of decision making organizations is connected to the policy implementation process, and coordination, unification and management among independent organizations because the deficiency of coordination and unification obstruct an effective project implementation. Therefore, hierarchical integration among independent organizations is important to the success of the project. As related variables, this study takes the following as examples: the legislative organ of the

[2] To fully use the limited domestic resources and capabilities and developed hi-technology by securing the least necessary resources, resources should be concentrated into the fields that are most worthy of investment after the worth of the project and technological ability has been previously considered.

[3] When a country in the developing stage of technology intends to achieve an epochal technological innovation, the existence of the support and nurturing strategy on the governmental level determines whether the technology innovation could be facilitated.

[4] It is focused on who propelled the related policies of the project and played the role affecting the performance of the project. It is very important in putting the success factors together to clarify who actually affected the project performance result and to observe the contents and results of the policies implemented by them.

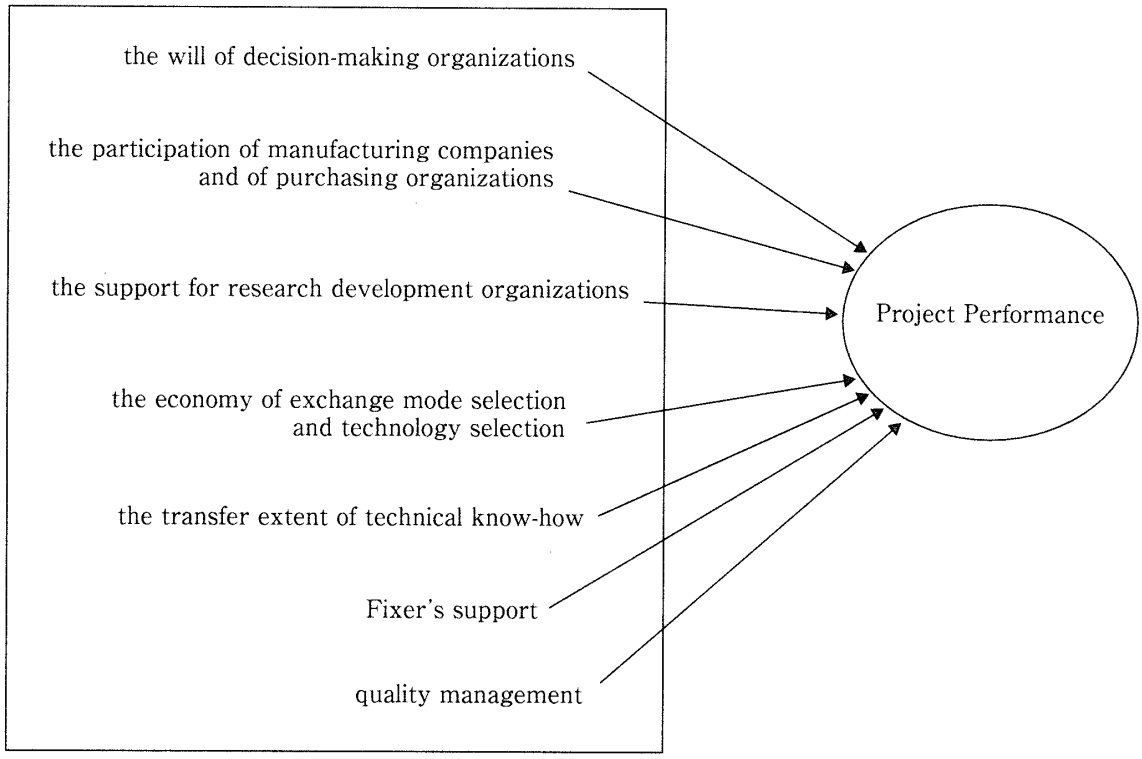


**Figure 2. Critical Factors in Project Performance**

committee as policy decision-making organizations; the direct involvement of the government in the early stage; the consensus about goal technology.

ii) It is important for the participation of manufacturing companies and of purchasing organizations to reduce risks related to project implementation because their participation fully enhances their abilities, such as holding assets and accumulating technology, and guarantees a market for goods. As related variables, this study takes the following as examples: the participation variable of manufacturing companies and the purchasing organizations; the extent of collaboration and competition; incentive institutions; stability of project-competent authorities; the consistent participation of the user.

iii) Research and development organizations collect data or materials and furnishes all sorts of information to the manufacturing companies. The variable of support for research development organizations is important because it improves the power of competition in various fields of information industry. Discussion of this variable includes the stability of project research development-competent authorities system and the substantial technology initiation.

iv) To reduce the degree of air pollution, a suitable technology which can measure the degree of air pollution is necessary. Similarly, when a research and development is propelled, suitable technology for implementation project is necessary. In this respect, the variable of the economy of exchange mode selection and technology selection is important. Discussion of this variable includes the reflection of the scientist's will and the absorption and internalization of imported technologies from more developed countries.

v) When policies are implemented, one inevitably finds ways of coping with the problems related to the policies. The variable for transfer degree of technical know-

**Table 1. Independent Variables and Measurement Variables of This Study**

| Independent variables | Measurement variables |
|---|---|
| the will of decision-making organizations | • the legislative organ of the committee as policy decision-making organizations<br>• the direct involvement of the government at an early stage<br>• the consensus about goal technology |
| the participation of manufacturing companies and of purchasing organizations | • the participation variable of manufacturing companies and the purchasing organizations<br>• the extent of collaboration and competition<br>• incentive institutions<br>• stability of project-competent authorities<br>• the consistent participation of the user |
| the support for research development organizations | • the stability of project research development-competent authorities system<br>• the substantial technology initiation |
| the economy of exchange mode selection and technology selection | • the reflection of the scientist's will<br>• the absorption and internalization of imported technologies from more developed countries |
| the transfer degree of technical know-how | • the technology import contract by remunerative term<br>• systematical technology development |
| Fixer's[5] support | • the presence of the problem-solving oriented Fixer |
| quality management | • the stability of quality management system<br>• the linkage of technology development and commercial business |

how is important because an implemented policy is effective only when appropriate ways are found. Discussion of this variable includes the technology import contract by remunerative term and the systematical technology development.

vi) The variable of Fixer's support focuses on who actually affected the policy implementation and contributed to the project's success. It takes the presence of the problem-solving oriented Fixer as an example.

vii) Products developed by research and development project must be high in quality given the rapid technology development. Elmore (1977) takes the example of objective means which can measure the project performance as a factor of effective political implementation. The measurement variables of quality management are the stability of quality management system, the linkage of technology development and commercial business.

[5] Fixer indicates an important figure that influences on project performance. For a detailed discussion refer to Bardach (1977)

## 3. Case Analysis and Results

This study intends to analyze the case—TDX research and development project —related to industrial policies implemented in Korea. TDX research and development project refers to the independent development of the electronic exchange technology. The TDX series developed comprises largely TDX-1, TDX-1A, TDX-1B and TDX-10. The major contents are listed in Table 2.

**Table 2. Major Contents of Project Implementation Stages**

| stages | the 1st stage | The 2nd stage | the 3rd stage |
|---|---|---|---|
| technology development stage | technology import and predevelopment stage | rural exchange development stage | urban exchange development stage |
| period | 1977-1981 | 1982-1988 | 1987-1991 |
| characteristics | emphasis on the expansion of telephone network and technology import | • pharallelizing of technology import and internal research development<br>• technology transfer from research institutes to industries | cooperative research development by industries/academia/institutes |
| major activities | • acquisition of analogue Exchange and technology import<br>• basic research on the digital method exchange and concept formation | development of new items | development of new technologies |
| acquired technological factors [i)] | production/output technology | parts/treatment technology | design technology |
| majors sources of technology [i)] (the degree of interior dependence) [i)] | major exterior (low) | exterior/interior (low) | interior/exterior (high) |
| the degree of design technology [i)] | low | middle | high |
| major implementation situation | • establishment of Korea telecommunications technology research institute | • digital exchange technology import contracts<br>• TDX-1 development<br>• technology transfer from Electronic Telecommunication Institutes to the manufacturing companies<br>• TDX-1A development | • TDX-1B development<br>• TDX-10 development<br>• the realization of narrow width ISDN function |

| stages | | the 1st stage | The 2nd stage | the 3rd stage |
|---|---|---|---|---|
| Transfer of organizations | technology development organizations | establishment of telecommunications development task force in the industry of postal services and telecommunications | establishment of TDX development division in the Electronic Telecommunication Research Institutes | cooperative research development division and manufacturing companies |
| | policy decision organizations | | TDX development committee in the telecommunications development task force | telecommunications policy division in the Ministry of Postal Services and Telecommunications |
| | technology development project management organizations | | • establishment of Korea Telecommunication<br>• TDX project division in Korea Telecommunications | managed by the project development division |
| Exchange equipment industry | analogue exchange production | • Korea Electronic Communications (Ltd.)<br>• Goldstar Semiconductors (Ltd.) | • Korea Electronic Communications (Ltd.)<br>• Goldstar Semiconductors (Ltd.) | • Samsung Electronic (Ltd.)<br>• Goldstar Semiconductors (Ltd.) |
| | digital exchange production | | Dong Yang Electronic Communications (Ltd.) | • Dong Yang Electronic Communication (Ltd.)<br>• Samsung Electronic (Ltd.)<br>• Goldstar Semiconductors (Ltd.)<br>• Daewoo Telecommunications (Ltd.) |
| Technolgy import | introduced technology | analogue exchange technology | digital exchange technology | |
| | technology import method | • technology contracts<br>• co-investment/ technology contracts | • technology contracts<br>• co-investment/ technology contracts | |
| Expansion of telecommunications facilities | number of telephone facilities (unit; 1,000 lines) [ii] | '76 1,389 (3.5)<br>'81 3,491 (8.4) | '86 8,905 (18.1) | '90 15,293 (31.0)<br>'91 17,500 (35.0) |
| | supply quantities of TDX (unit; 1,000 lines) | | '85 24 (TDX-1)<br>'86 189 (TDX-1A) | '87 832 (TDX-1A)<br>'89 3,178 (TDX-1B)<br>'91 62 (TDX-10) |

| stages | the 1st stage | The 2nd stage | the 3rd stage |
|---|---|---|---|
| major research and development performances | • first experimental items developments (96 lines)<br>• second experimental items developments (200 lines)<br>• third experimental items developments (500 lines) | • TDX-1 development (9,600 lines)<br>• TDX-1A development and pragmatization<br>• RSS development | • TDX-1B development and pragmatization<br>• TDX-10 development and pragmatization<br>• the realization of narrow width ISDN function |

[i] indicates phasal factors by Lee et al. (1988).
[ii] indicates the number of telephone service contracts per one hundred people.
* *Source* : Lee (1993).

This study analyzed TDX research and development project in Korea telecommunications equipment industry and found the following.

First, the will variable of decision-making organizations was affected by the legislative organ of the committee as policy decision-making organizations and by the direct involvement of the government in the early stage, and the consensus about goal technology. Second, the participation variable of manufacturing companies and of purchasing organizations was affected by collaboration and competition, incentive institutions, stability of project competent authorities, and the consistent participation of the user. Third, the support variable of research development organizations was affected by the stability of project research development-competent authorities system and substantial technology initiation. Fourth, the economy variable of exchange mode and technology selection affected by the reflection of the scientist's will, the absorption and internalization of imported technologies from more developed countries. Fifth, the transfer degree of technical know-how variable was affected by the technology import contract by remunerative term, and systematical technology development. Sixth, the variable of Fixer's support was affected by the existence of the discretionary experiments with bargaining ability and the bureaucratic entrepreneur with integrating ability. Seventh, the quality management variable was affected by the stability of the quality management system, and the link between of technology development and commercial business.

## 4. Conclusion : Policy Implication

According to these findings, the practical and theoretical implications of this study are as follows. First, the factors of policy implementation success included institutional factors. Second, the theoretical contribution of this study is the application of Linstone(1981)'s multiple perspective in analysis paradigm. Linstone's multiple perspective concept was applied to a national research development project. Third, for developing countries to utilize fully their scarce resources and to share the risks, collaborative development is an important technological strategy. However, it is difficult for the competing firms to collaborate voluntarily because of the uncertainties and risks of technology development. Therefore, the role of the government in leading and managing the collaboration at an early stage is important. At a later

stage, however, the government's role must be changed to support and encourage technological advancement. Fourth, the introduction of competition among the participants of collaborative research and development can speed up the collaborative development process and improve the quality of outputs.

However, collaboration and competition must be balanced according to the accumulation of technological capabilities and be supported by fair evaluation and coordination mechanisms. Finally, the political implications of this study include the improvement of the purchasing institution, the user's active role, the Fixer's devotional efforts for fixing, the parallel strategy of technology import and technology development, the consensus about technology development goals, and the reflection of the scientist's will.

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