Indonesia

Equipment Supply for Installation of Computer for

Industrial Statistics and Planning

Report Date:	October, 2002
Field Survey:	September, 2001

1. Project Profile and Japan's ODA Loan

Location Map of the Project

Mainframe Computer

1.1. Background

At the time of the appraisal (1982), there were no computer systems installed either in the MOI (Ministry of Industry) or in the BAPPENAS (National Development Planning Agancy). Consequently, the MOI had to consign to the CBS (Central Bureau of Statistics) most of its work on the industrial census, which it used to formulate development plans and give administrative guidance. Since the data-processing abilities of CBS had been declining, however, the MOI had to develop its own computer system for formulating development plans and to appropriately evaluating progress achieved. The BAPPENAS was also having difficulty handling its expanding workload, which included planning for the Replita (the National Development Plan); settlement of the national budget; and the implementation, management, and evaluation of projects.

Under the circumstances, it was difficult for the Government of Indonesia to draft its National Development Plan and industrial policy. Therefore, the Government developed a plan for Equipment Supply for Installation of Computers for Statistics and Planning, in 1979. Based on a detailed study of the need for computerization at MOI and BAPPENAS, conducted in cooperation with the Center of Overseas Cooperation for Computerization (COCC), the Government added the BAPPENAS computer system to the above plan and developed a revised plan, Equipment Supply for Installation of Computer for Statistics and Planning, in 1981.

1.2. Objective

To establish a system in which both the MOI and BAPPENAS can make industrial policy and develop national development plans effectively by developing a computerized database of industrial statistics, promoting office automation, improving information management, including the effective use of information,

and training computer and statistics experts.

1.3. Project Scope

Name of the system	Content
1. MOI main system	Introduction of medium- or large-sized general-purpose computer system and auxiliary equipment
2. MOI Regional Institutes -- Subsystem (Jakarta, Bandung, Surabaya, Yogyakarta)	Introduction of mini-computer system and auxiliary equipment
3. BAPPENAS system	Introduction of mini-computer system, auxiliary equipment and 35 general-purpose personal computers
4. Computer Network System for BAPPENAS	Connect 5 government offices (BAPPENAS, MOI, CBS, Ministry of Finance and Bank Indonesia) with an optical fiber cable
5. Others	Development of Application Program and Training Program in System Operation

1.4. Borrower/Executing Agency

The Government of the Republic of Indonesia/ Ministry of Industry (MOI) and BAPPENAS

1.5. Outline of Loan Agreement

Loan Amount	1,731 mil. Yen
Loan Disbursed Amount	975 mil. Yen
Exchange of Notes	Jan. 1982
Loan Agreement	May 1982
Terms and Conditions	
Interest Rate	3.0%
Repayment Period (Grace Period)	30 Years (10 Years)
Procurement	Partially Untied
Final Disbursement Date	May 1989

2. Results and Evaluation

2.1. Relevance

Computerization of the MOI and establishment of a computerized information distribution network were planned in accordance with the Government's long-range plan, started in the REPELITA IV (Five-Year National Development Plan, 1984-1988); therefore, the objective of the project was relevant.

The need for computerization at MOI and for the establishment of a computerized information distribution network is described in the PROPENAS 2000-2004 (National Development Program) and the INPRES Year 2001 (Presidential Instruction). Therefore, the project can still be considered a necessary step toward improving the agencies' work efficiency and decision-making capacity relating to industrial and national development in Indonesia.

During implementation, the relevance of the project scope was re-evaluated. The project scope for BAPPENAS (the introduction of mini-computer system, auxiliary equipment and 35 general-purpose personal computers) and the establishment of the computerized information distribution network were canceled for the

following reasons : (a) unexpected costs at tendering, in which even the lowest tendering price was significantly higher than the budgeted price, and (b) failure of coordination with the National Telephone Agency -- while the computerized information distribution network was designed for use with an optical fiber cable, such infrastructure was not available at the time. The cancellation of these components can be attributed to an underestimation of the budget and inadequate project plan.

2.2. Efficiency

2.2.1 *Project Scope*

As stated above, the entire BAPPENAS portion was canceled. As for the MOI portion, with the improvements in computer performance during the five years from the time of loan agreement to the time of contract, the project scope deviated from its original schedule in terms of both quantity and quality, as described below.

Table: Comparison of the Project Scope (Plan / Actual)

Item	Plan	Actual
1. MOI main system	a) Mainframe Computer: 1 set - CPU speed: more than 1.0MIP - User's memory: more than 4MB - Diskfiles: more than 1GB b) Workstation: 18 sets c) Data entry: 20 keyboards d) PC: 17 units	a) Mainframe Computer: 1 set - CPU speed: 4 MIP - Memory: 16MB - Diskfiles: 5.8GB b) Workstation: 80 sets c) -- (Included in b) Workstation: 80 units) d) PC: 36 units
2. MOI Regional Institutes (Jakarta, Yogyakarta, Surabaya, and Bandung) - Subsystems	a) Mini computer: 4 units - Memory: more than 500KB - Diskfiles: more than 80MB b) Workstation: 3 sets	a-1) PC: 25 units for Jakarta, Yogyakarta and Surabaya - Memory: 4MB - Diskfiles: 972MB a-2) PC (CAD/CAM): 14 units for Bandung b) Workstation: 24 sets
3. BAPPENAS system	Mini computer - Memory: more than 500KB - Diskfiles: more than 80MB PC:35 units	Cancelled
4.Computer network system for BAPPENAS	Optical fiber cable	Cancelled
5. Auxiliary equipment	Power suppliers, air conditioner, etc.	As planned
6. Others	a) Training program b) Developing 5 application programs	a) As planned b) As planned

The number of workstations and personal computers (PCs) in the main system was increased in anticipation of the shift from centralized-computing technology to client-server technology. For similar reasons, the number of workstations for the regional system was also increased from 3 to 24 units.

Instead of mini-computers, the regional systems were supplied with newly released personal computers. This modification occurred because personal computers were much cheaper than mini-computers, and they had the added advantages of better processing capability and the availability of software packages in the market. Also, the mini-computer originally selected for regional institutes in Bandung, was replaced with other hardware. This modification occurred because the mini-computer was unsuitable for engineering purposes

(CAD/CAM[1]). All of the scope changes were made to adjust to the times, and are considered appropriate.

2.2.2 Implementation Schedule

As stated earlier, the period from the date of loan agreement to the date of contract extended five years, contributing to a 78-month delay for the entire undertaking. The delay can also be attributed to the inability of the executing agency to prepare tender documents and to the change of computer models in response to computer technology improvements.

2.2.3 Project Cost

Since the project scope for BAPPENAS was canceled, the actual expenditure, 985 million Yen (of which 975 million Yen was covered by the Japan's ODA loan), turned out to be much lower than the original estimate project cost of 2,114 million Yen[2]. The MOI portion of the project cost was originally estimated at 1,301 million Yen (of which 1,161 million Yen was to be financed by Japan's ODA loan) at the time of appraisal. In the MOI portion of the project cost, the actual costs of the main system and subsystem exceeded the original costs, owing to the increase in the number of workstations. However, the total amount of actual expenditures, 985 million Yen, was still lower than the original estimated cost of 1,301 million Yen, representing, approximately, a 24% cost underrun (a 16% cost underrun for the Japan ODA loan portion). The cost underrun was accounted for by reduced cost of auxiliary equipment (original cost of 338 million Yen, as compared to the actual cost of 56 million Yen) and by the depreciation of the Rupiah[3].

2.3. Effectiveness

The installation of the computer system and the training program facilitated an increase in qualitative effectiveness, which can be measured in terms of certain indicators. Those indicators are as follows:

2.3.1 Advantage in Statistic Analysis and Data Handling

a) MOI Main System

A computerized database tracks its capacity and speed of processing data. With the mainframe computer installed in this project, the MOI was able to process, analyze and release industrial statistics based on the CBS data that it had been unable to handle previously. Such industrial statistics, including export-import data, industrial production data and industrial enterprise data, had been processed by the CBS. With the mainframe computer, the MOI gained the capacity to develop its own database of industrial statistics.

According to the MOI, however, it failed to update the industrial data by itself. Each private enterprise was supposed to provide updated data to a related MOI division annually, but they did not do this regularly. One of the major factors was the fact that updating industrial data was voluntary, and private enterprises simply did not consider it an obligation. As a result, the MOI was dependent on updated industrial data from the CBS.

During project implementation, MOI developed 5 application programs for the mainframe computer, to handle various data. However, only 2 of them (Industrial Enterprises[4] and Industrial Statistics Reporting[5]) were

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[1] CAD = Computer Aided Design, CAM = Computer Aided Manufacturing
[2] Out of 2,114 million Yen, the loan agreement amount was 1,731 million Yen (entire foreign portion) financed by the Japan's ODA loan, while the local portion (383 million Yen) was supposed to be covered by the Indonesian Government Development Budget
[3] The exchange rate shifted from 1 Rupiah = 0.37 Yen to 0.09 Yen.
[4] Industrial Enterprises: The purpose of this system is to establish and maintain a database of industrial enterprise data, to permit the monitoring of industrial performance, and to formulate industrial development policy.

used for the mainframe computer. These programs could handle 12,000 ~13,000 records at one time, and contributed to the development of the industrial database in the MOI. The other 3 application programs (Personal Administration, Finance and Budget, and Inventory) were used for the PCs instead of the mainframe computer, because the format of the raw data from each division changed every year and the PC-based system could more flexibly adjust to the different data formats[6]. As a result, the MOI was able to effectively utilize all five application programs.
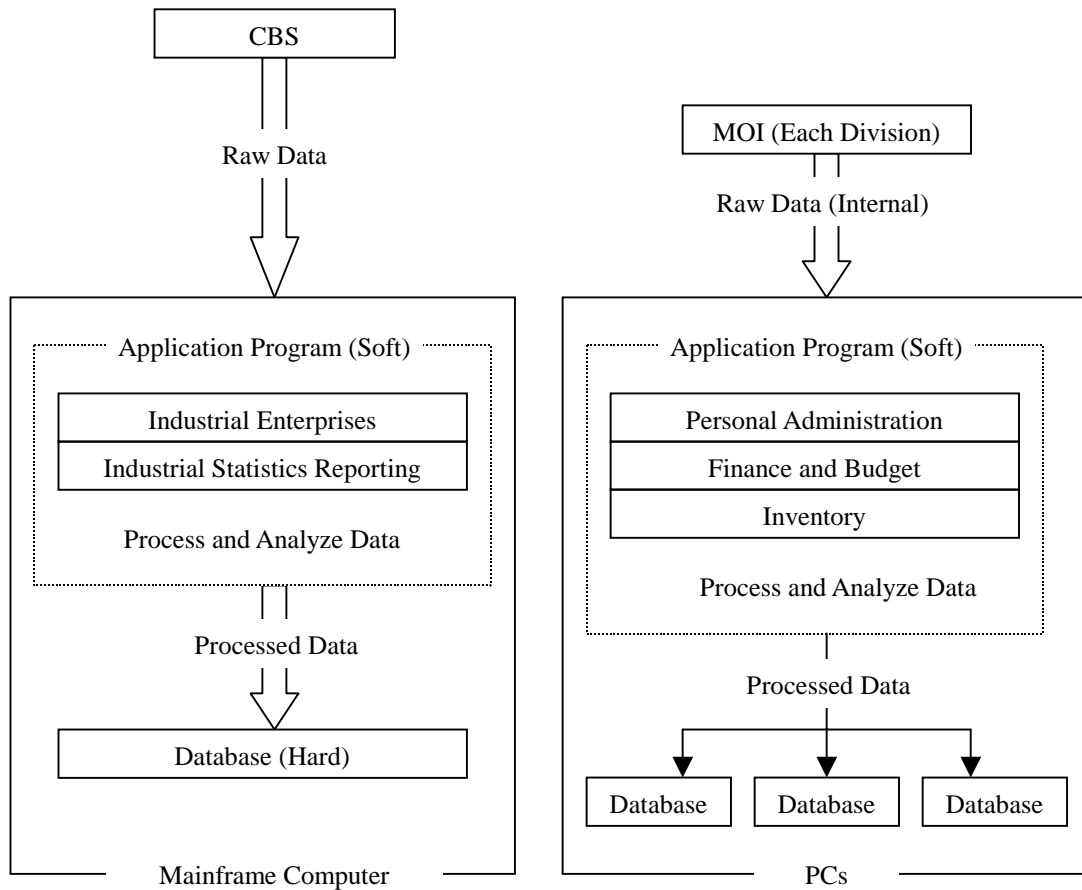

Figure: Flow of Data Processing

Currently, the MOI is able to process and analyze all of the data it collects using application programs in PCs. Since the performance of PCs improved significantly in the 1990s, a single PC now used in the MOI can handle approximately 25,000 records, which is almost double the data-handling capacity of the mainframe computer.

b) MOI Regional System

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[5] Industrial Statistics Reporting: The purpose of this system is to have a framework for processing data from CBS, i.e, industrial census data, manufacturing statistics, water and electricity statistics, etc.

[6] The advantages of the mainframe computer : (a) the capacity was larger than each PC, (b) it took less time to process and analyze the data.

[7] Industrial Enterprises: The purpose of this system is to establish and maintain a database of industrial enterprise data, to permit the monitoring of industrial performance, and to formulate industrial development policy.

[8] Industrial Statistics Reporting: The purpose of this system is to have a framework for processing data from CBS, i.e, industrial census data, manufacturing statistics, water and electricity statistics, etc.

25 units of general purpose PCs were provided to several regional institutes in Jakarta, Yogyakarta and Surabaya, while 14 units of CAD/CAM (PCs for engineering purpose) were provided to several regional institutes in Bandung. For example, 3 units of CAD/CAM were provided to one of the regional institutes in Bandung, which were visited for field survey. (There are 5 regional institutes in Bandung.) These PCs were used for processing and analyzing industrial products, and through these processing and analyzing, the regional institute provided technical assistance to the local companies. In addition, joint researches were conducted with local universities and institutes based on these PCs. It was impossible to collect information through the hearing toward MOI staff about the PCs that were provided to several regional institutes in Jakarta, Yogyakarta and Surabaya.

Table: Condition of the provided facilities

Item	Actual	The use of the provided facilities
1. MOI main system	a) Mainframe Computer: 1 set - CPU speed: 4 MIP - Memory: 16MB - Diskfiles: 5.8GB	a) Mainframe computer was operated to develop MOI's own database concerning industrial statistics. 2 application programs (Industrial Enterprises and Industrial Statistics Reporting) were installed in mainframe computer to contribute to the development of the database. Mainframe computer was used until 1995, for 6 years.
	b) Workstation: 80 sets	b) Workstations were mainly used for extracting data from the mainframe computer. As these functioned with the mainframe computer, it almost ceased its role when the mainframe computer stopped its operation.
	c) PC: 36 units	c) 3 application programs (Personal Administration, Finance and Budget, and Inventory) were installed and used for the PCs. Most of the PCs were replaced with new models by 1997.
2. MOI Regional Institutes (Jakarta, Yogyakarta, Surabaya, and Bandung) - Subsystems	a-1) PC: 25 units for Jakarta, Yogyakarta and Surabaya - Memory: 4MB - Diskfiles: 972MB	a-1) No information collected through this survey.
	a-2) PC (CAD/CAM): 14 units for Bandung	a-2) Used for processing and analyzing industrial products.
	b) Workstation: 24 sets	b) For example, printers and connectors were provided and were used adequately.
3. Application programs	Developing 5 application programs	While 2 (Industrial Enterprises and Industrial Statistics Reporting) were used for the mainframe computer, the other 3 (Personal Administration, Finance and Budget, and Inventory) were used for the PCs.

2.3.2 Advantages of Office Automation

Before the project was implemented, most secretaries and officials used typewriters; very few employees were able to use either a word processor, a spreadsheet or a database application run on a PC. After project completion, the majority of personnel were able to use a PC and all its applications in their daily work. Many personnel at the MOI believe that the greatest benefit of office automation has been improvements in individual work efficiency and a boost in productivity. Moreover, with the PCs provided by this project, personnel are able,

to use the e-mail and e-scheduling system, which has become the main method for exchanging data and information.

2.3.3 Advantages of Training Program

The training program consists of overseas training provided by the Japanese supplier and domestic training provided by the local contractor. Overseas training concentrated on operating procedures and technical programming for the mainframe computer, mainly in the categories of: (a) Installation and construction of advance database systems, (b) Installation and construction of Relational Information Query Systems, and (c) Operation of Advance Database Systems. Overseas training also included various advanced computer skill training such as Design Systems, System Engineering, Database Programming and Advance COBOL[9] Programming.

Domestic training, on the other hand, provided basic knowledge of PCs and software packages for daily tasks. The domestic training consisted of three types of training, shown below:

1. User Training: To learn MIS[10] and Data Collection Methods and Basic Computer skills for hardware and software.
2. Operator Training: To be familiar with and use the COBOL and ACOS[11] languages.
3. Instructor Training: To help participants learn to teach colleagues who did not get any training.

The number of personnel from the MOI who got training totaled 65 for Overseas Training, and 214 for Domestic Training. Overall, the training program was conducted effectively in terms of diffusion of computer knowledge. Domestic Training aimed to impart basic knowledge of PCs, and thus, those people who got Domestic Training were readily able to apply their new knowledge to their daily work. Furthermore, the performance of trainers, according to the MOI, was excellent, and all the training manuals, written in Indonesian, were effective.

Overseas training, on the other hand, was not as effective as domestic training in terms of utilization of the knowledge acquired. According to the MOI, the training program was not designed to meet MOI training requirements. The training might have been too technical or advanced, so that those people who got such training were not necessarily able to apply their knowledge to operating the mainframe system.

2.4. Impact

Technology transfer can be considered an indirect impact of the project. The knowledge acquired from the training program was applied not only to the operation of the computers provided by this project, but also to new technology, such as IT and new application programs. As a result, most of the MOI personnel were ready for the computer technology innovations of the 90s and were able to adjust themselves to the rapid environmental changes. This adjustment to a computerized environment has contributed tremendously to boosting work efficiency and productivity.

The project also contributed to one of the overall project objectives, effective planning of industrial policy. According to the MOI, it took 2~3 years to process, analyze and provide data, particularly export-import data and industrial product data, to the Minister of MOI before project implementation. After the project was completed, the MOI (PUSDATIN) was able to provide such data to the Minister within 3 months. As a consequence, the MOI is able to make industrial policy more effectively and use the latest data.

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[9] A programming language for simple computations on large amounts of data.
[10] MIS: Management Information System
[11] A programming language that returns a numeric value in radians that approximates the arccosine of the argument.

2.5. Sustainability

PUSDTIN (Center for Data and Information), under the Ministry of Industry and Trade[12] (MOIT), was responsible for operations, and a private company contracted by MOIT was responsible for maintenance, including development of application programs, for a period of 10 years starting from the date of final acceptance of the whole system. Maintenance service consists of preventative maintenance, such as monthly inspections,[13] and corrective maintenance[14].

There were several minor problems associated with the operation of the mainframe computer. For instance, the mainframe computer was very sensitive and stopped working when the air conditioner was not working. The private company adequately solved such minor problems.

PUSDATIN had monitored operation of the mainframe computer for approximately 6 years. However, due to several reasons, mentioned below, PUSDATIN decided to terminate the use of the mainframe in 1995. The PCs were also gradually replaced with newer models, and by 1997, most of the PCs installed in this project were replaced with more current ones.

2.5.1 Improvements in Computer Technology

The rapid changes in computer technology not only enhanced processing capabilities, but also reduced maintenance costs significantly. Newly installed systems, which were brought in during the '90s, had larger processing capabilities, had a much greater processing speed, and combined the advantages of much-improved system reliability with a more compact size.

2.5.2 Shift of data processing from closed to open system environment

The software used for the mainframe computer was not designed for an open system[15], and no on-line data transfer was possible. In fact, data exchange between MOIT and CBS was done using tape as the medium for exchange. Meanwhile, computer technology had already shifted to an open-system environment.

2.5.3 Government budget cut off

The most important reason for terminating mainframe use was the decision of the Secretary General of MOIT to stop all maintenance expenses for the mainframe computer in 1995, because of development budget constraints. At that time, it was extremely inefficient to operate the system. Maintenance service costs hovered at 660 million Rupiahs per year, and there were many alternative data processing systems with lower or no maintenance cost. Since 1995, the budget has been reduced steadily by the Ministry of Finance, as shown below.

Table: Maintenance Budget Allocation of PUSDATIN, 1994-2001

(Million Rp.)

1994	1995	1996	1997	1998	1999	2000	2001

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[12] The MOI changed its name to the Ministry of Industry and Trade (MOIT) in December 1995.

[13] Monthly inspection included inspection of the Mainframe computer and all PCs, to verify that they were functioning adequately.

[14] Corrective maintenance was done on request. The private company had an office within the MOIT building so that they could provide immediate service to the MOIT if something happened to the computers.

[15] Open System (OS) is "a system that implements sufficient open specifications for interfaces, services, and supporting formats to enable properly engineered components to be utilized across a wide range of systems with minimal changes, to interoperate with other components on local and remote systems, and to interact with users in a style that facilitates portability."

| Maintenance Budget | 660 | 279 | 142 | 140 | 128 | 92 | 76 | 81 |

Today, a computer's lifecycle is said to last only about three years. Owing to the failure of the computer system facilities installed in this project to keep pace with the unexpectedly fast pace of computer technological innovation, most of the equipment, including the mainframe computer, are no longer utilized.

Currently, the MOIT possesses a total of 885 PCs. All industrial statistics and application programs developed by the mainframe computer were transferred to those PCs.

The MOIT is now providing technical assistance to private enterprises and government offices such as the BAPPENAS, that includes programming and setting up local network systems. The MOIT has also provided training for its own personnel regarding the basic operation of software.

In fact, this project made it possible not only to develop the base for a computerized information system but to develop computer experts in the MOIT.

3. Recommendations

It is essential to conduct survey in detail concerning IT projects by the following viewpoints;

a) How to cope with the rapid technological progress when purchasing and providing IT equipments.

b) How to review the equipment specifications flexibly during project implementation.

Comparison of Original and Actual Scope

Item	Plan	Actual
I. Project Scope		
1. MOI main system	Mainframe: 1 set - CPU speed: more than 1.0MIP - User's memory: more than 4MB - Diskfiles: more than 1GB Workstation: 18 sets Data entry: 20 keyboards PC: 17 units	- CPU speed: 4 MIP - Memory: 16MB - Diskfiles: 5.8GB Workstation: 80 sets PC: 36 units
2. MOI Regional Institutes (Jakarta, Yogyakarta, Surabaya, and Bandung) - Subsystems	Mini computer: 4 units - Memory: more than 500KB - Diskfiles: more than 80MB Workstation: 3 sets	PC: 25 units for Jakarta, Ygoyakarta and Surabaya - Memory: 4MB - Diskfiles: 972MB PC (CAD/CAM): 14 units for Bandung Workstation: 24 sets
3. BAPPENAS system	Mini computer - Memory: more than 500KB - Diskfiles: more than 80MB PC:35 units	Cancelled
4.Computer network system for BAPPENAS	Optical fiber cable	Cancelled
5. Auxiliary equipment	Power suppliers, air conditioner, etc.	As planned
6. Others	Training program and development of application programs	As planned
II. Implementation Schedule		
1. Tendering	May 1982 – Aug. 1982	1st Tendering: July 1985 2nd Tendering: Oct. 1985
2. Contract	Oct. 1982	Jan. 1987
3. L/C Open	Dec. 1982	Mar. 1987
4. Installation	Dec. 1982 – Nov. 1983	Feb. 1988 – May 1989
5. Training	Apr. 1983 – Aug. 1983	July 1987 – May 1989
III. Project Cost		
Foreign currency	1,731 mil. Yen	985 mil. Yen
1. MOI Portion	1,161 mil. Yen	975 mil. Yen
2. BAPPENAS Portion	570 mil. Yen	---
Local currency	1,051 mil. Rp	121 mil. Rp
1. MOI Portion	384 mil. Rp	121 mil. Rp
2. BAPPENAS Portion	530 mil. Rp	---
Total	2,114 mil. Yen	985 mil. Yen
ODA Loan Portion	1,731 mil. Yen	975 mil. Yen
Exchange Rate	1 Rp. = ¥ 0.37 (As of May 1982)	1 Rp. = ¥0.09 (The Weighted Average)

Independent Evaluator's Opinion on

Equipment Supply for Installation of Computer for Statistics and Planning

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Relevance

1. The project was intended to improve efficiency and productivity in the MOI and Bappenas in fulfilling their task for industrial statistics and planning sectors. However, such policy was not guaranteed a high priority by the government at the time of appraisal. It lacked priorities among other government's development program. Therefore, Evaluator concludes that the objective of the project is not relevant to the government's policy at that time. As the time elapsed, government shows more appreciation on such needs and provides higher degree of priority, make such project becomes more relevant at present time.

2. The deletion of Bappenas portion and excessive delays made the project losing its relevancies even more. The goal of creating better coordination between MOI and Bappenas for statistics and planning purposes was missed. On the MOI side, the computerization project brought benefits in boosting work efficiency and productivity among MOI personnel. However, it was not a strategic achievement.

3. The project's revision after Bappenas elimination and delays brought positive impacts on achieving better result on MOI side. The system performance was much more powerful and the quantity of components were more compared to the proposed specifications. Yet, the system was failed to achieve its targeted utilization rate and technical lifetime as planned due to external reasons.

Impact

1. Once installed, the system provided the MOI benefits on database management and information system aspects. The database and information system allowed the MOI to develop its own database of industrial statistics and release the statistics to the public, it handled general administration tasks using developed application programs, it helped disseminating the industrial information and statistics to local or regional institutions /companies, and it boosted work efficiency and productivity among MOI personnel. The office automation system has given significant contributions to make the planning of industrial policy more effective.

2. The project provides indirect positive impact on allowing the MOI personnel to make use of computer system for office automation system and get involved in the technology transfer process.

3. There were no negative impacts mentioned in the reports. However, there were some negative drawbacks that make the positive impacts meaningless. The system was under-utilized, make less benefits than planned; the system's life was shorter than expected, due to its inability to compete with newer technology and its expensive operational cost; and the system was likely inappropriate to the exact needs and limitations on operational aspects. All were responsible for making the system economically unviable and missing its intended goals.