

A Study on the Office Automation  
In Local Autonomous Government (Ōtu city)  
PART IV

Masayuki TAKEBE\*

ABSTRACT

Very few cities and towns have as yet decided to introduce the EDP system for local administration after analyzing their administrative office work analysis ( ① motion study, ② functional approach, and ③ behavior approach) on the basis of the numerical and other standards.

In Ōtu city, an investigation has been made concerning:

- 1) jobs as an object of the EDP system
- 2) possible styles to utilize the EDP system
- 3) an estimate of data processing cost

and its data source is a report entitled "A Report of the Investigation Results regarding the office work Analysis in Ōtu city" in 1979.

In this study, further investigations and studies are supplemented by "A Report on the plan to introduce the Data Control System in Ōtu city" in 1980. A study was made to determine how to handle problems related to the architecture of data control system, as well as on updated office automation. An approach was also made toward solving the various problems in implementing them.

---

\* Department of Electric and Electronic Engineering

## 1. THE BASIS ON WHICH TO BUILD THE INHABITANT'S DATA CONTROL SYSTEM

For a few years, the computer's memory capacity has been greatly enlarged and by using Random Access Memory (RAM) we can now stock and retrieve data in handy and convenient form.

From the viewpoint of a computer system user an ideal inhabitant's data base system must enable the user at any time, ① to collect data, ② to retrieve it, ③ to process it and to get answers immediately, in relation to the details of all work in the city office.

The information that arise from city office work may be roughly classified as follows:

- 1) numerical data processing
- 2) letter (alphabetical) data processing
- 3) figure (drawing) data processing
- 4) communication data processing, etc.

For example, the office motion analysis (work analysis) in "A Report of the Investigation Results regarding the office work analysis in Ōtu city, 1979" shows that, of all the office work, handling of numerical, letter and or figure data take up 46.3% of the available office time, handling of communication data 31.6% and other 21.3%.

As administrative services grow more intensified and sophisticated in the future, it is expected that processing of communication data will increase a great deal. Therefore, it is as a matter of course that in the city administration accuracy, timeliness, swift and efficient control and processing of data should be attained, particularly on the following points:

- 1) Collection of data
- 2) Formation and processing of data
- 3) Storage and renewal of data
- 4) Retrieval of data
- 5) Offer and delivery of data, etc.

It should also be considered that "Audience-participation program system" be set up concurrently as a means of delivering environment information services between the city and the inhabitants, which include administrative service, security (the public safety, the individual safety), health and welfare, and education. It is advisable that such an all-round data management system be constructed for the inhabitants.

The inhabitant data management system makes it easy for us to analyze and make a decision by way of its functions of collecting the inhabitant's data, checking, inspecting, processing and reporting any double input of same data. (see Fig. 1)

## 2. FROM A FUNCTIONAL DATA CONTROL TO DATA BASE MANAGEMENT SYSTEM

The function of a data bank which elevated the efficiency of the IDMS is evident when we reflect the traditional system approach.

In the Ōtu city office, data processing has been applied to such software as the municipal taxation system, the fixed assets taxation system, the inhabitant's register system, the national health insurance system and so on.

items		percentage
1. Numerical data processing	write	24.8
2. Alphabetical data processing	calculate	6.5
3. Design data processing	compare	5.3
	classify	2.2
	copy, print (etc.)	7.5
	Total	46.3
4. Communication data processing	discuss with the inhabitant	3.6
	communicate with related sections	3.3
	wait for bill or machine finish	0.3
	discuss on jobs	6.1
	morning convention or conference	2.2
	carry the documents or outing	16.1
	Total	31.6
5. Miscellaneous	go to toilet	1.8
	recess	9.0
	overtime work	5.8
	miscellaneous	4.7
	Total	21.3

Fig. 1 Office Worker's Motion Study (%)

These softwares are basically designed to comply with the need of specific functions or a specific field. Each system has its own files and a "updating cycle" for these files has not yet been unified. Since these files are used for a specific field, they are unavailable for any other field.

Supposing that an inhabitant comes to the inhabitant section to apply for an issuance of a "transfer certificate", for an example. In this case, it would be advisable that no issuance will be made until confirmation has been made on whether he "has completely paid" the inhabitant tax, the fixed assets tax, the national health insurance premium, the national annuity insurance premium, etc. which are due from him.

However, such information cannot possibly be expected from a specific functional data control system.

When a system is approached under the notion of the IDMS, the basic systems which Planning Room, General Affairs Department, Inhabitant Administration Department, Welfare and Health Department, Economy Department, Construction Department, etc. now maintain separately, would be incorporated into a unified system by way of arranging the factors and the functions common to all those systems. This will make it easy to utilize a large capacity random access memory, which will minimize the occurrence of double storage of data memory and reduce the repeat processing of source data and input data.

The IDMS is so to speak an "data base management file" which contains all necessary data

regarding every aspect required for the city office operations, and from which any information can be immediately output (immediately response) at any time and in any required form.

### 3. DATA RETRIEVAL AND STORAGE

The fundamental functions of the IDMS consist of the following five factors: ① Data collection ② Data storage ③ Data delivery ④ Data search ⑤ Data retrieval.

At first, when we collect such information as ① numerical data ② letter-figure data ③ communication with the inhabitants, all of which are required for better administrative service, four major data sources are to be considered.

They are,

- (1) Environmental data on human life
- (2) Environmental data on material, facilities, buildings, etc.
- (3) Income and expenditure data
- (4) Environmental data on inhabitant services (Security, health, etc.)

From the viewpoint of the system users in each field, information important to their interest becomes significant and valuable, only when it is outputted quickly and correctly.

The electronic terminals and equipment required for the information storage and retrieval may be listed as follows:

- (1) Numerical data processing equipment
  - ① keyboard printer ② CRT display ③ card reader-puncher ④ paper tape reader-puncher
  - ⑤ optical mark reader ⑥ magnetic mark reader
- (2) Letter (figure) data processing equipment
  - ① word processor ② Audio response type writer ③ Letter-Image Recognizing and processing equipment ④ Audio recognizing unit
  - ⑤ Audio synthesizing unit ⑥ X-Y plotter unit ⑦ Intelligent Copier
- (3) Communication
  - ① Data Communication equipment ② Facsimile and similiar image transmitter ③ Telephone Audience-participation program system
  - ⑤ On-Line real-time system
- (4) Data storage Equipment
  - ① Electronic data processing system ② Computer output microfilming (COM) system
  - ③ Personal Computer system

Secondly, with regard to data storage, we have to check fully to determine what kind of memory medium should be selected respectively for a simple numerical data system and for a particular system whose the data is combined alphabetically and by figure (drawing).

The latest EDP system provides us with digital processing of letters and figure (drawing) and I believe that it deserves our full consideration. It appears that systems based on computer output microfilming (COM) system have a few problems in their response time. A solution may be to build a combined system of electronic data processing system (EDPS) and a COMS.

Thirdly, the delivery of data means that the city authority lets the IDMS users know the latest data available to them.

Fourthly, the search for data means that the city serves to search out any data suitable

to any of the IDMS user's inquiry.

Fifthly, the retrieval of data means that the city serves to physically output data which is judged to be suitable to meet any IDMS user's inquiry.

Finally, in designing of the IDMS, it is desirable that the following items fully examined:

- (1) To what extent should IDMS be expanded?
- (2) In what way should the data for each specific field be reorganized?
- (3) What kind of control is required to maintain secrecy of confidential data?
- (4) In what may should priority be assigned to the data?
- (5) To what degree can the response time of the system be further shortened?
- (6) What is the proper method for selecting a memory medium, updating and processing the memorized data?
- (7) How should the correctness of the data be guaranteed?
- (8) Imposing strict regulating for input data
- (9) To what extent should a room for any additional data be retained?

(See Fig. 2, Fig. 3)

	Male staff (%)	Fe-male staff (%)	Whole staff (%)	Age (%)							Service Length (%)		
				15 ~ 20	21 ~ 25	26 ~ 30	31 ~ 35	36 ~ 40	41 ~ 50	51 ~	5 ~ 10 yrs	5 ~ 10	10 ~
Planning	5.7	1.4	5.0	0	2.6	4.4	4.4	5.4	7.4	5.7	4.0	4.4	5.5
Leading, Controlling	4.5	1.3	4.0	1.8	3.6	2.3	2.9	3.4	7.0	7.8	4.8	2.5	4.6
Investigating	7.6	1.5	6.6	7.5	3.6	8.2	6.1	6.0	6.7	9.0	5.3	7.8	6.4
General work	52.2	74.7	55.9	70.3	63.1	60.0	60.6	57.4	43.8	42.3	57.3	60.3	53.2
National, Prefectural National Athletic Meet	2.3	1.9	2.2	1.3	5.0	2.5	1.7	1.2	1.8	1.4	3.0	3.1	1.5
Business Trip	3.2	1.1	2.8	0.3	1.1	2.7	2.3	2.2	4.2	6.5	3.4	2.0	3.1
Others	17.6	15.5	17.3	14.7	16.0	14.9	15.6	17.5	21.7	20.5	16.1	14.4	19.1

Fig. 2 Office Worker's Functional Approach

#### 4. THE OBSTRACTING FACTORS TO THE IDMS

A city in Saitama prefecture is about to utilize an "Image data processing" for the issuance of "a certificate of a seal-impression", which occupies same 40% of all the certificates that the city issues.

They try to include the issuance of seal-impression certificates in their IDMS by way of digitalizing all seal-impressions and they expect to shorten "waiting time" in the part of the inhabitants, and to issue the certificate at every remote branch office within fiscal year 1983.

Recently great progress has been made in the field of electronic technology, and technological innovation through the adoption of the LSI has made it possible to digitalize and process data in the form of letters, figure (drawing) and voice in office work. In local autonomous government, office work has been increasing in quantity as administrative services grow more complicated and embarrassed. Demand for office automation has increased and digital processing of administrative works has been promoted. From the viewpoint of the inhabitant, administrative service is expected to be an "adaptable system" that corresponds to the changing environment

Behavior	Male staff (%)	Fe-male staff (%)	Whole staff (%)	Age (%)						Service Length (%)			
				15 ~ 20	21 ~ 25	26 ~ 30	31 ~ 35	36 ~ 40	41 ~ 50	51 ~	~ 5 yrs	5 ~ 10	10 ~
1. write	22.9	34.1	24.8	30.8	27.3	27.8	26.4	25.3	19.6	16.3	27.0	28.5	22.2
2. calculate	6.0	9.1	6.5	5.2	8.0	7.9	7.0	6.4	4.6	4.1	6.6	8.0	5.8
3. compare	4.7	7.9	5.3	4.8	6.6	4.6	5.5	5.5	4.9	5.9	4.3	6.3	5.0
4. classify	1.7	4.6	2.2	2.3	3.7	2.1	2.6	2.2	1.6	1.9	2.5	2.7	1.9
5. carry documents, etc.	0.4	2.1	0.7	1.2	1.3	0.7	0.8	0.7	0.4	0.3	1.0	0.7	0.6
6. go out from the office	17.8	3.3	15.4	20.1	12.5	20.4	15.9	12.6	13.0	12.5	17.6	15.7	14.6
7. discuss with the inhabitant	3.4	4.3	3.6	1.3	2.4	2.8	3.0	3.5	5.1	6.9	2.4	2.8	4.3
8. communicate with other sections	3.7	1.4	3.3	0.2	1.2	1.6	2.8	5.1	5.7	4.5	1.3	1.8	4.6
9. copy, print, etc.	7.4	8.5	7.5	12.1	11.2	8.0	8.2	6.3	5.8	4.1	10.4	7.6	6.8
10. go to toilet, that private	1.5	2.9	1.8	2.2	2.5	1.7	1.7	1.8	1.6	1.4	1.8	1.9	
11. recess	8.6	10.4	9.0	9.3	9.6	8.8	9.5	8.9	8.5	8.5	8.6	9.2	9.6
12. wait for next bills, machine finish	0.2	0.7	0.3	0.5	0.6	0.4	0.3	0.1	0.3	0.1	0.1	0.5	0.2
13. discuss on job, telephone	6.6	3.4	6.1	2.0	3.5	4.0	5.1	7.1	9.4	10.8	4.4	4.6	7.4
14. morning meeting, conference, training	2.4	1.2	2.2	2.0	1.3	1.5	1.6	2.6	3.7	2.8	2.0	1.3	2.7
15. barber's, doctor's	0.1	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.3	0.4	0.0	0.1	0.2
16. miscellaneous	5.0	2.7	4.6	1.2	2.8	2.2	2.8	4.5	8.4	12.3	3.2	2.4	6.1
17. overtime	6.5	2.3	3.8	3.9	4.6	4.7	6.0	6.6	7.0	6.5	5.8	5.1	6.2

Fig. 3 Office Worker's Motion Study (%)

of social life.

By using the words "inadaptable system" I mean a system that leads the inhabitant to an undesirable conduct when they try to correspond to the changing environment of social life. Of course, the IDMS must be an "adaptable system".

The adaptable system should be an active system that works in line with a planned target through a rational method even if the environment worsens. It should be capable of adopting itself to a changing environment.

- (1) "To work actively in accordance with any change in the social life environment" means that every office worker should always have the sense of perceive data which would meet the needs of the inhabitants and should improve their sense of perception to such "inhabitant needs".
- (2) "To bring about a new desirable condition" means that he should decide actively and Communicate Positively with those concerned when he utilizes such "inhabitant needs data".

In order that a city office worker may use the IDMS efficiently and economically, he must first recognize the necessity and significance of the following points:

- (1) To improve his ability of perceiving the necessity of the IDMS
- (2) To make a drastic office work audit
- (3) To promote communications
- (4) To encourage team-work
- (5) To foster self education and training

And it is advisable that such software be built that allows him to work with a productive, co-operative, economical and with a sense of psychological, social content.

## 5. OFFICE AUTOMATION (OA)

As described in chapter 4, and local autonomous government (or a city) must certainly be an "adaptable system" for the inhabitants.

What then is the "system"? And what are the elements that make up a "group"? A "system" is defined as "a group entity of which several elements, maintaining an optimal inter-relation between themselves, attain a certain mutually agreed upon target".

The group target may be (1) the Declaration of the Fundamental Rights for the citizen and (2) the mayor's pledge or his basic policy.

Several elements mean (1) Plan (2) Do (accomplish) and (3) See (observe check)

These consists of their sub-elements (perception, communication and processing) as shown in Fig. 4.

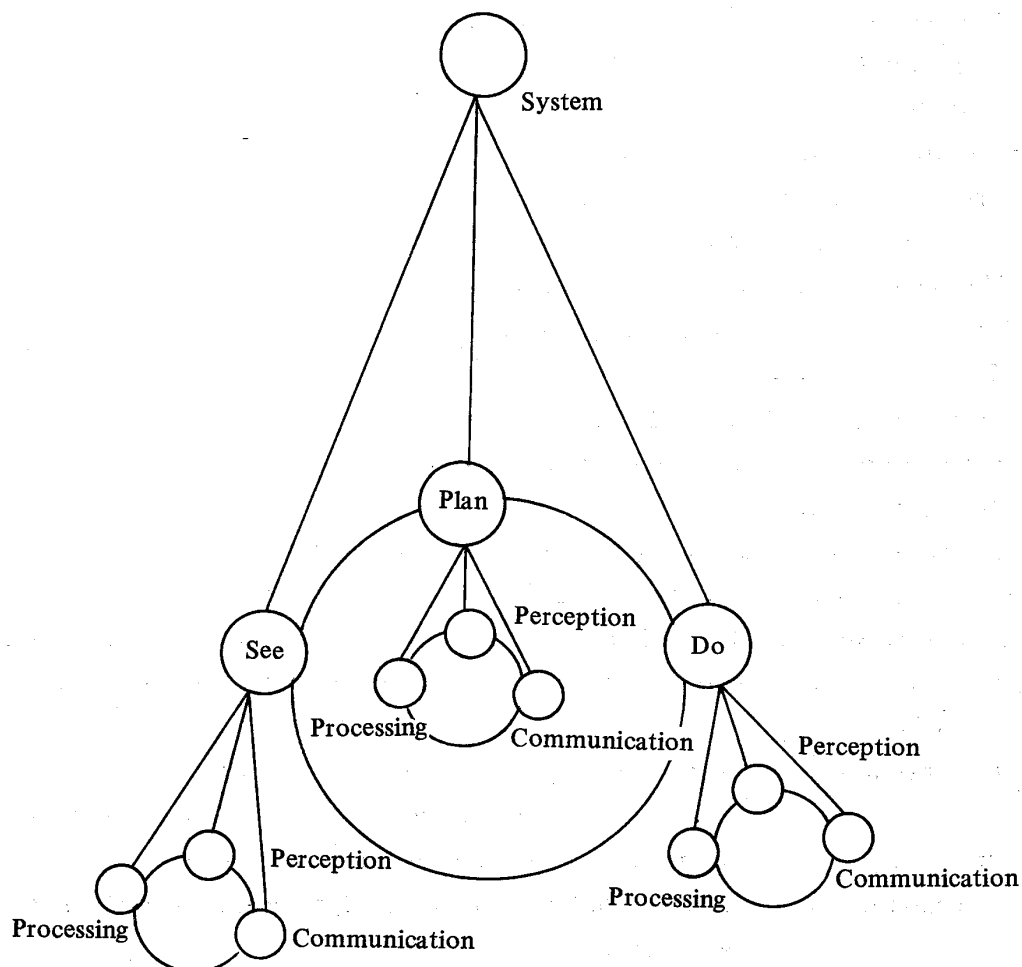


Fig. 4

In other words, the sub-elements of planning (Plan) are ① to perceive, ② to communicate and ③ to process, the data for planning.

Those implementing (Do) and controlling (See) are identical.

Therefore, the following would apparently be the main problems in the preparation of office automation:

- (1) The reporting system
  - ① Attaching great importance to determine where information arises.
  - ② Maintaining promptness and correctness in data processing
  - ③ Attaching great importance to the flow of data from the data center.
- (2) A concentrated office data processing organization
  - ① Making a systematic arrangement of the various data processing methods.
- (3) A time lag of information
  - ① The ability to perceive the information
  - ② A program to shorten the route through which the information is concentrated (that is communication) and a preparation for preventing any late or out-of-time action.
- (4) Distortion of information in route
  - ① Attaching great importance to the originality of the data.
  - ② Concurrent and immediate delivery of information to all fields concerned.  
(promotion of the on-line data processing)
- (5) A system of planning, implementing and controlling
  - ① Cultivation of better human relationships
  - ② Acceleration of task management
  - ③ Data control system
- (6) Prevention of delay communication
  - ① An upward flow of information from lower workers to superiors.
  - ② To implement collection, billing and calculating at the point where information arises.
  - ③ To recheck posting in the ledger, making an entry in the book, impressing the seal as a checker, and transmitting the data.
  - ④ To prevent delay during that period.
  - ⑤ Direct data collection at the data center.  
(Establishment of the inhabitant data center)
  - ⑥ Decision making
  - ⑦ Proper feed-back of the data to all fields concerned.

Office automation cannot always be solved only by introduction of EDP equipment.

It can only be attained by making a detailed analysis, checking up and planning regarding the data perceiving ability, the data transmitting ability and the data processing ability respectively in each field.

- ① Perception ——— a process to retrieve and perceive data.
- ② Communication — a process to convey the data (conveyance, correspondence)
- ③ Processing ——— a process to convert the data in a new style.
- ④ Information ——— these including numerical, alphabetical (sentence), figure (drawing), and voice.

I think that administrative work is a “conduct for conveying information” which arise in



the basic course of Plan (planning), Do (implementing) and Checking (controlling and observing) in administration activities.

The information means ① numerical data, ② letter (sentence) data, ③ figure (drawing) data, ④ voice data, while a conduct of conveyance is equal to communication.

From the above-mentioned point of view, office automation attempts to make the system more efficient.

Judging from (Figure 4), it is true that an attempt to computerize only the processing step which is nothing but a part of each sub-element (perception-communication-processing) in the basic step of plan-do-see, will not provide good-results. System efficiency cannot be expected if a portion (processing step) of the sub-elements in the basic step is electronically processed.

We insist that the most important theme for office automation is to put the perception process and the communication process in each basic step on EDP and to deal with the items that are hard to computerize.

In the event that we develop office automation in the Ōtu city office, we will have to consider the following points:

- (1) The work must be analyzed to process the numerical, figure (drawing), sentence and audio data in each department and to devise way to improve efficiency and productivity.
- (2) Based on such an analysis in each field, preparation of work manuals must be accelerated thoroughly (recheck based on the previous report of the work analysis) in every field.
- (3) Task management must be implemented through which the content of the job and the behavior of every individual worker can be determined.
- (4) The unbalance of work distributed to each section and every individual worker should be rechecked.
- (5) As the work manual is prepared, examination of EDP equipment should start.
- (6) The filing system must be examined.

① Why to file — Purpose, policy and condition.

② Where to file — The place of custody, the custody period, the custody unit.

③ Who is to file — We need to determine the person in charge.

(department-sie, section-sie, and individual-wise)

④ What to file — Bills, documents, ledgers, contracts, drawings, materials, literatures, reports, photographs, designs and formats.

⑤ When to file — To file not with a job unit but with a task unit.

⑥ How to file — To establish a standard for filing method in arrangement, coding and displaying.

(Note) Particularly the 5H1W filing method must be taught to every office worker (checking of the individuals's filing control)

⑦ Promotion of communication between individuals, between organizations, between inhabitant and city official, and between inhabitants.

(Note) According to the report on the Ōtu city office work Analysis, 36.1 percent of all the office workers engage in communication information.

(Examine the Audience-participation program system)

- ⑧ Acceleration of EDP in collecting, acquiring, stocking and retrieving the inhabitant data.
- ⑨ Office organization, job and authority regulation, company by-laws, personnel arrangement.
- ⑩ Office layout and working environment.
- ⑪ Office work auditing.

As described in the previous report, the essential point in implementing office automation is to grasp both the fundamental philosophy of the office work and to develop knowledge of data control.

Success will be determined only through "cooperation" and "understanding" on the part of every department concerned, and through accumulating of the "knowledge" and "opportunity" for EDP. This will be attained when every office worker harmoniously perform the following actions:

- (1) to know (increase knowledge)
- (2) to sense (perceptive ability, improve the mind)
- (3) to act (decision making ability, a new orientation to the conduct)

## 6. THE PROBLEMS WITH THE EDPS IN OTU CITY

### (1) Entrusting the EDP to outsiders

#### ① The advantages

It is true that we have had several chances to introduce a computer, but as a matter of fact the city has continued to deal with the EDPS in the form of trusting it to an outside EDP service center.

On merit, office work has developed continuously and we have experienced no difficulty and no expenditures in the transition period due to the change of method.

Furthermore, in the daily progressing fields of EDP, keeping abreast with the EDP specialist group in the service center.

#### ② The disadvantages

Our annual expenditure for entrusting the EDP business now amounts to approximately 250 million yen and this expenditure will inevitably increase owing to the possible expansion of EDP utilization in the future.

In the meantime, as for the style of utilizing the EDP, we are certainly at a stage of to consider and prepare an on-line data processing system in addition to the present batch processing system.

Generally speaking, the EDP centers, the software companies and the facility management companies cut costs by employing younger programmers and if the EDP centers are confronted with financial difficulty in the near future, we might be obliged to pay a much higher fee to them. This might be mere conjecture, but it cannot be ignored at this time.

### (2) The problems in introducing a computer

#### ① The advantages

If the introduce computer runs smoothly and maintains good operation, it would be an ideal style of EDP. Under the intrusting method, it is difficult for us to try a new EDP system,

but under the computer introducing method, it becomes possible.

This is a great advantage, it will enable us to deliver information that will strongly assist us in making decisions, as well as the general EDP which is said to mechanize manual work.

② The disadvantages

A difficult problem at first is, how to transfer safely and correctly the entrusted EDP work. As a solution, I think that we should start our own EDP in parallel with the entrusted EDP, and after we comes to feel confident with it. We can transfer or receive the entrusted EDP. During the period of transition, we will have to bear an extra expense and will also have to secure cooperation from the trustee EDP center.

Furthermore we cannot neglect possible problems which would arise after the computer is introduced. Supposing that we use the trustee EDP centers. They accomplish even the most complicated EDP work in compliance with our request, it we agree to pay an additional expense. However when we create the EDP work ourselves in the city office, there maybe several cases where the EDP work doesn't run well and I am afraid that this would cause problems in the field of personnel management in the city office.

Therefore, I think that while the entrusting method is simple in concept, the computer introducing method would cause problems both in the transfer of EDP and in operation after the computer is introduced.

## 7. CONCLUSION

Based on the reports on the first and second investigation, I have reported what items we should consider in establishing a data control system in the future----- particularly, the inhabitant data management system (IDMS)-----in Ōtu city. In this connection, I have referred to preparation for Data Base Management through the IDMS, the new trends toward the data open (disclosure) system and recent office automation, and data retrieval and data stock as a prerequisite to transfer to the OA. It is apparent that all these can not be solved only by the use of the EDP.

As for the use of EDPS, the main problem at this time is what would be the advantages and the disadvantage of the "entrusted system" and of the "computer introducing system" which we referred to in the previous chapter.

That was the starting point of this report. I hope that this report will provide suggestions for preparing a future EDP system.

Finally, we wish to extend our hearty thanks to the staff of Ōtu city, Miss Isuzu Kakiuchi of the Iyo Bank, Ltd. for their cooperation.

## References

1. "A study of Hospital Information system". The memoirs of the faculty of engineering Fukuyama University, Volume 1, written by Masayuki Takebe.
2. "Systems Engineering Approach on the Cost of Data Processing for Administrative business, Part 1". The memoirs of the faculty of Engineering Fukuyama University, Volume 2, written by Masayuki Takebe.
3. "Systems Engineering Approach on the Cost of Data Processing for Administrative business, Part 2". The memoirs of the faculty of Engineering Fukuyama University, Volume 3, written by Masayuki Takebe.

4. "A Study of Audience-participation program System in Ōtu city, Part 3". The memoirs of the faculty of engineering Fukuyama University, Volume 4, written by Masayuki Takebe, Yoshinori Sato and Hikojiro Kadowaki.
5. Principles of Data Processing with Computers, by Robert G. Van Ness. The Business Press Elmhurst, Illinois, U.S.A.
6. Digital Logic and Computer Operations, by Robert C. Baron and Albert T. Riccirilli. McGraw-Hill Book Company, U.S.A.
7. Introduction to Computer Science and Data Processing, by Schmidt Meyers. Holt, Rinehart and Winston Inc.
8. Principles of management and Organizational Behavior, by Justin G. Longenecker. Charles E. Merrill Book, Inc.
9. Programming in Basic for Personal Computer, by David L. Heiserman. Prentice-Hall, Inc.