4970308
PN-AAU-776
IBN-44577
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GUIDELINES FOR ESTABLISHING INFORMATION SYSTEMS FOR THE PLANNING AND MANAGEMENT OF REGIONAL DEVELOPMENT

prepared by
NORTHERN SUMATERA REGIONAL PLANNING STUDY
(PROJECT LTA – 12)
June, 1981

FINAL REPORT

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DIRECTORATE GENERAL CIPTA KARYA, MINISTRY OF PUBLIC WORKS
GOVERNMENT OF INDONESIA

with the assistance of
THE UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
CONSULTANT TO THE PROJECT : PADCO INC.

PREFACE

This report has been prepared by the Northern Sumatra Regional Planning Study (Project LTA-12). The project, extending over a 34-month period which began in October 1978, is jointly-sponsored by the Government of Indonesia, through the Ministry of Public Works, and the United States Agency for International Development. The implementing agency within the Ministry of Public Works is the Directorate General of Housing, Building, Planning and Urban Development, Directorate of City and Regional Planning. The USAID consultant to the project was PADCO (Planning and Development Collaborative, International) Inc.

Overall project and general direction are the responsibility of the National Steering Committee, consisting of the Director General of Housing, Building, Planning and Urban Development (Cipta Karya), Ministry of Public Works; the Director General of General Administration and Regional Autonomy (PUOD), Ministry of Home Affairs; and Deputy V of the National Development Planning Body (BAPPENAS). On the project's Technical Committee serve the planning bureau heads of the Ministries of Public Works, Home Affairs, Agriculture, and Communications; the Director of the City and Regional Planning Directorate in Public Works and of the Regional Development Directorate General in Home Affairs; and the head of the Bureau of Physical and Spatial Planning in BAPPENAS. At the regional level, an Advisory Committee consisting of the chairman of the four provincial development planning bodies (BAPPEDAs) in the Northen Sumatra Region provided guidance to the project.

The broad objective of Project LTA-12 as described in the Project Paper is the creation of: "more effective institutional capacity for the planning, implementation and evaluation of development activities in Indonesia, which provide the base for increasing rural income and broadening participation in the development process." Specifically, and as originally conceived, the project's purpose was to assist in the establishment of coordinated provincial and regional planning programs for Major Development Region "A" (WPU-A), consisting of Aceh, North Sumatra, West Sumatra and Riau. As work on the project progressed, however, it became evident that, given the project's resources and the variations within the region, it would not be possible to provide high-impact and integrated assistance to all four provinces simultaneously and within the period of LTA-12. It also became apparent that it would first be necessary to strengthen the planning and

management functions in the individual provinces before interprovincial planning and management could be realized. At the same time, it was felt that urgent interprovincial projects in the Northern Sumatra Region, e.g., environmental stabilization, interprovincial transportation, and some aspects of training and research, could be handled by setting up special committees and working groups comprised of officials from existing governmental institutions.

In consideration of the above, a decision was made in March, 1980, to focus project activity in one province, with that province serving as a test case for the development of a planning and management model for the other three provinces in WPU-A. The province selected for this purpose was Riau, primarily because of that province's early expression of interest in being a focal point for LTA-12 activity coupled with the fact that GOI has assigned Riau a heavy role in transmigration schemes. A third reason for selecting Riau as the test province is the GOI's interest in expanding the province's economic base beyond oil.

Using Riau as a laboratory and model for replication since March of 1980, the project has had four projected outputs as follows:

(i) Recommendations for an improved system or annual planning and budgeting (APB). In fact, the project is concerned with the whole configuration of development planning, programming and budgeting/financing, but for the sake of convenience the terminology "annual planning and budgeting" is used most frequently in project documents.

(ii) The preparation of a medium-range strategic development framework (SDF) for Riau for the period 1982/83 - 1988/89, including guidelines for immediate action.[1/]

1/ Originally there was to be support also for the establishment of comprehensive long-range (20-30 year) planning, but it was agreed early in the project that, given the uncertainties inherent in long-range projections, the high discount rates to be applied to future benefits and costs, and data and staffing limitations, the Government's purposes could be best served by focusing attention on a medium-range (5-10 year) horizon. This does not preclude longer-range concerns for specific subsectors and variables for which this is appropriate,

(iii) A functioning information system.

(iv) Manpower development activities and recommendations.

All four of the outputs are intended to be mutually reinforcing elements for strengthening development planning and management capacity, effectiveness and efficiency in the provinces, with both the manpower development component and the information system looked upon as supporting elements for the other two outputs.

It is perhaps appropriate to point out in this preface that this project differs from earlier regional planning studies carried out in Indonesia is that every attempt was made to avoid a dominance of decisions by foreign specialists. With this in mind, the consultant group was designed to be small, with the intent of strengthening local capacity - in part by having to depend upon that local capacity, and in part through training and by transferring knowledge to the GOI counterpart officials affiliated with the project. As one means of putting this approach into practice, two officials from each of the four BAPPEDAs Tk. I in WPU-A were assigned to the LTA-12 core team and worked with the project throughout its duration. After the March, 1980 decision to concentrate project activities in Riau, this core Indonesian team, along with their foreign counterparts, worked extensively with the Riau BAPPEDA, and through the BAPPEDA, with the Kanwil-Kanwil, Dinas-Dinas and other agencies in the province.

During the latter half of the project period, LTA-12 personnel also carried out a limited amount of project activity outside of Riau, primarily in Aceh.

In addition to this Information Systems report, the project has produced four other major technical reports. These are:

(i) A Strategic Development Framework for Riau Province. 1982/83 - 1988/89, with Guidelines for Immediate Action.

(ii) Guidelines for Annual Planning and Budgeting at the Provincial and Subprovincial Levels of Government.

(iii) Technical Library Operations Manual for BAPPEDA Tk. I.

(iv) Manpower Development Recommendations for Key Development Agencies functioning at the Provincial and Subprovincial Levels of Government in the Northern Sumatra Region of Indonesia.

All of the project's five final technical reports are supplemented by technical memoranda, working papers and interim consultant reports.

In addition, there is the consulting firm's end-of-project report, which contains a review of project accomplishments and shortcomings together with recommendations for follow-up activity.

ACKNOWLEDGEMENTS

The Northern Sumatra Regional Planning Study (LTA-12) team has been composed of technical staff from central government agencies and the BAPPEDAs of the four participating provinces, together with the consultants to the project. This team has taken the principal responsibility for the work on all four of the project's thrusts, but since March, 1980, when activities were focused on the Province of Riau as a test case, the team has worked in close collaboration with the BAPPEDA Tingkat I Daerah Riau and has had a field office in Pekanbaru provided by the BAPPEDA.

The team wishes to take this opportunity to express its appreciation of the support it has received from the several government policy levels relevant for the project and the technical collaboration provided by the many agencies and individuals who have devoted time and execution of the work.

These agencies and individuals are too numerous to identify in detail but special thanks are due to members of the National Steering Committee, the National Technical Committee and the Provincial Advisory Committee. Thanks are due also to the officers and staff members of the Biro-Biro Pembangunan, Biro-Biro Keuangan and Dinas-Dinas Pendapatan Tingkat I who have participated in technical discussions and reviews, together with the officers and staff of the corresponding Tingkat II entities. The officers and staff of a number of sectoral Kanwil-Kanwil, Dinas-Dinas and other line agencies in Riau gave their time over extended periods and several of them played key roles in formulating the Project's findings and recommendations. The Bupatis and Camats in Riau have been invaluable in identifying local concerns and priorities and in facilitating the team's field work.

The project has benefited also from discussions held with a variety of individuals and groups in the private sector and from information provided by other teams working on projects in or relevant for Riau. In the latter category special thanks are due to the team working on the study of the water resources and potentially irrigable land of Riau and the IGS/DMR North Sumatra Project which has been investigating the geology and mineral potential of the Province. In both cases,

technical staff members of these projects gave unstintingly of their time in discussions with the LTA-12 team and made their own data and findings available even before their formal publication, thus expediting greatly the progress of the LTA-12 work.

The support and close interest of USAID officers and staff, at all levels and in all of the relevant sectoral and program divisions, together with the U.S. Consulate in Medan, have been invaluable at all stages of the project - in providing inputs for the technical work, in evaluating the project's progress and in providing sustained administrative backup.

GUIDELINES FOR ESTABLISHING INFORMATION SYSTEMS FOR THE PLANNING AND MANAGEMENT OF REGIONAL DEVELOPMENT

FOREWORD

The devolution of planning responsibilities to the provincial and subprovincial level requires that planners at these levels not only make decisions, but that they make informed decisions. The AID Development Assistance Program identified the inadequate base of "decision making" information as one of the primary institutional constraints to coordinated development efforts.[1] The Northern Sumatra Regional Planning Study (NSRPS) Project Paper sets out the overall objectives of the project, which are not treated in detail in this report. A critical supporting output to meet overall objectives related to improvement in planning is the "design of a comprehensive development data system followed by data gathering, analysis and application to the regional planning process".[2] The Project Paper identifies a second related goal of the project, the "development of a comprehensive provincial regional data base and data system... ".[3] Yet a third goal is one shared by all of the project activities, the upgrading of skills required for effective planning.

The Northern Sumatra Regional Planning Study proposed to achieve these goals by supporting improvements in data collection, storage, analysis and retrieval and by training the staff of planning agencies in skills necessary to carry on such improvements. Most of this support has taken the form of an effort to put in place operating "information systems" in each of the four WPU-A BAPPEDAs, finally focusing on BAPPEDA Riau. Additionally, there have been two major training sessions, one in June 1979 on general information concepts and another in October 1980 on data evaluation concepts. In addition, the September-October 1979 trip to Malaysia, Singapore and the Philippines provided the opportunity for comparing information systems of those nations.

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[1] U.S. Agency for International Development, Indonesia. Project Paper for Northern Sumatra Regional Planning, 1977. p.6.

[2] Project Paper, p.8.

[3] Project Paper, p.9.

In November 1978, the International Statistical Programs Center of the U.S. Bureau of the Census agreed to provide nine man-months of expert assistance of the project's information systems work. A considerable portion of the assistance eventually provided was in the form of major contributions to the June I/S seminar and guidance to BAPPEDA Riau's early efforts to organize its information system. Additional assistance was provided through Census in the organization and presentation of the Data Evaluation Workshop in October 1980.

By July 1979, the BAPPEDA in Riau had committed adequate resources to go ahead with an information system. The BAPPEDAs of Aceh, Sumatera Barat and Sumatera Utara were each considering their own I/S budget proposals during January 1980. By the end of February it became clear that Aceh had agreed to a scaled down version of the original proposal, and early steps were undertaken for a small library which would not require additional budget authority. Sumatera Barat considered its existing system to be adequate, and Sumatera Utara was unable to proceed.

Riau Province by early 1980 had decided that a computer was needed to speed up information services. The then Governor had promoted the acquisition of a computer by the BAPPEDA, and in December 1980 a very powerful minicomputer was in place. The staff has been undergoing training from the vendor, and will soon undertake the automation of the BAPPENAS project monitoring system for Riau.

The Project has not felt the need to assist substantially with the development of Riau's computer services both because technical skills were already in place or could be purchased and because it was concluded that a functioning data system had to be in place before the computer could be effective. Project efforts were concentrated on data specification techniques tied to the project's main thrusts. At the same time, it was decided that existing data could not rationally be assessed without a basic library operation to control information already in print.

For this and other reasons developed in the body of this report, a basic library was concluded to be the appropriate first step towards an information system for Riau and for Aceh. Library systems are being implemented and staff being trained in the details of library operations in these two provinces. With guidance and support from LTA-12, these BAPPEDA libraries will be able to function for the most

part on their own by the end of the project, and will provide the core for the development of a more expanded information system after the project is concluded.

The Project Paper identifies as a project objective both provincial and regional planning information systems. The project, however, has concluded that regional systems would be premature. A large part of what has been lacking in the planning process to date is data/information at the detail level. A regional data management system will not be meaningful until each of the four provinces is in more complete control of data at the provincial level. An important additional issue treated by the project has been the WPU-A itself. It is not clear that the WPU-A is in fact a region in the sense that a major effort at coordinated inter-provincial planning would bring about large scale benefits to its citizens. The project concludes that such an effort at this time would divert attention, skills and other resources away from the development of individual provinces, where the need is more immediate.

The appendix addresses concerns on the part of planners who sense the constraints imposed on planning by the shortcomings in available data for planning and management of regional development. There is indeed some confusion, but as the appendix points out, the problem cannot be properly addressed within the scope of this project.

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SUMMARY OF FINDINGS

1. Perceptions of what an information system is are quite varied in Indonesia. Information systems are not yet well understood, frequently ineffective, and underutilized.

2. Systems are frequently selected or designed with no specific information objectives stated.

3. Systems are frequently selected or designed with no specific criteria stated.

4. A regional information system is premature.

5. The major information problem at the provincial level is the lack of detailed data requirement specifications by planners.

6. An only slightly less severe problem is the uneven quality of data collection and reporting, especially by Dinas[2]/Kanwil[2]. The Kantor Sensus dan Statistik does an impressive job, but is constrained by lack of funds and lack of control over provincial agencies' data collection activities.

7. The great bulk of data needed by planners is already available in printed form, but is frequently inaccessible due to the informal nature of procedures for handling of printed materials.

8. Approximately ten percent of the annual reports of provincial agencies, provincial finance/budget documents, and laws and regulations applying to the work of the BAPPEDA in Riau and issued in the past five years are unavailable to BAPPEDA planners. (Based on a census of BAPPEDA holdings and a sample of holdings of Biro Umum and six Dinas[2]).

9. Much time as well as data is lost in BAPPEDA Riau because data is scattered throughout analysts' offices.

10. There are some unclear aspects as to who is responsible for what in terms of data among planning agencies at the provincial level. This makes execution of coordinating functions within the province

quite difficult. The effect on coordinated data collection and reporting is severe, as it is with other planning tasks.

11. The existing sectorally-oriented structure of the BAPPEDA constrains process-oriented activities, including information management. Support and "systems maintenance" functions become undervalued and their role in the overall planning process becomes unclear.

12. There is little codification or standardization of data for planning. While codification and standardization may make some planning tasks easier, the annex points out some negative aspects which should be considered. Most immediate action in these areas was considered inappropriate for the project.

13. The development of infrastructure, particularly transportation, imposes a constraint on data collection. Access to remote areas of Riau is very costly. Many of these particularly high data collection costs accrue to the Kantor Sensus dan Statistik, though all data users are affected.

SUMMARY OF RECOMMENDATIONS

Solutions to several of the problems indicated in the "findings" and elsewhere mentioned in this report are outside the scope of the information supporting thrust of the project. The recommendations listed below have either been undertaken by the provinces with project support or are recommended for follow-on support. All are specific to the information support activity of the project.

1. A system has been proposed for reviewing data collection project proposals in Riau. This review would take place as a part of BAPPEDA's overall budget review, and would include a review of data collection instruments and data reporting in publications. Kantor Sensus and Statistik would provide a technical review which precedes the BAPPEDA overall review. This recommendation has been released in a separate consultant paper, A Coordinating Mechanism for Data Collection and Dissemination.

2. Information systems should be operating in each of the WPU-A provinces before an attempt is made to introduce regional systems. It is not clear that there is an immediate inter-provincial requirement, but it is quite clear that there is a need at the provincial level.

3. Major improvements in the information for planning should be achieved through improving the planning process itself. Improved analytic techniques are required, particularly techniques for specifying data requirements with more detail. These are outside the scope of the information activity of the project, but have been a major portion of the Annual Planning and Strategic Development Framework thrusts of the Project. These skills should be acquired or strengthened as recommended in the Manpower Development Report of the Project.

4. The functioning information system at the Provincial level should be a traditional library during the initial period of operation. The data base, at the beginning, should consist of published information and data sources, as well as the products of the BAPPEDA's own analytic efforts.

The library in Riau should add services as skills improve in the library and in the BAPPEDA itself. These are to be added according to the criteria and schedule indicated in the body of this report.

One of the additional services to be considered is computerization. The library is at present a manual system, but has been designed for converting to an automated system at low cost. The criteria for timing such a conversion are contained in the body of this report.

5. The provinces should each design a library for provincial government. These libraries would have broad data bases. This would permit more narrowly focused management information systems in BAPPEDAs as well as in other government organizati For a broad-based library to have this result, there would have to be a fairly substantial investment: a staff of at least fifteen and a collection of 50,000 to 100,000 items, depending on the province and their individual requirements.

SUMMARY OF INFORMATION SYSTEM OUTPUTS OF THE PROJECT

1. A functioning information system. This has taken the form of a technical library in BAPPEDA Riau.

The library in Riau is operating satisfactorily as the project draws to a close. There is a staff of four, reporting to the Sekretaris, who have been adequately trained in library processes. There are approximately 2,500 books, reports, journal issues and maps, all cataloged. Retrieval is through a card catalog which provides access by authors, titles and subjects. There is adequate space and equipment for several years' operation. The Riau library is sufficiently developed that BAPPEDA analysts can assess the printed data available to them and begin to identify gaps and inconsistencies. Already the retrieval problems created by informational materials being scattered throughout the BAPPEDA have been considerably reduced.

The Aceh library is not so far along, due mainly to constraints on consultant time and the changeover to a new BAPPEDA building. It has a staff of two, who have been given some training, but not enough to operate independently. Additional guidance will be required, possibly from the resources available in the existing Provincial Development Project.

2. Training in information system processes. This has taken three forms: 1) Seminars, workshops and study tours; 2) Training of Project team members; and 3) Training of BAPPEDA staff in library procedures.

1) Seminars, workshops and study tours have consisted of:
   - Java-Bali study tour for one project member and two BAPPEDA Riau staff (July-August 1979).
   - Foreign study tour to Malaysia, Singapore and the Philippines (September-October 1979). Included was the observation of information activities.
   - Workshop on Information System for Regional Planning (June 1979).
   - Data Evaluation Workshop (October 1980).

2) Training of project team members. This has been inadequate. With the exception of the items listed above, project team members have not been systematically trained in information systems work. Work on the SDF and AP has been very demanding during the last months of the project, and these are the project's main thrusts.

3) Training BAPPEDA staff in library procedures. This has been a major aspect of project I/S output, particularly in Riau. BAPPEDA Riau library staff now have technical skills that were previously unavailable in Riau. These staff can serve as the focus for training other WPU-A personnel. BAPPEDA Aceh staff have received a week-long training session, but this is not yet adequate. There is a need for follow-on training, possibly through PDP resources or with BAPPEDA Riau assistance.

3. A Provincial socio-economic profile, as called for in the Project Paper. This has for Riau been integrated into the SDF, and takes the form of the demographic and provincial economy sections. Each of the other sections of the SDF similarly includes a data profile which supports the analysis and recommendations.

GUIDELINES FOR ESTABLISHING INFORMATION SYSTEMS FOR THE PLANNING AND MANAGEMENT OF REGIONAL DEVELOPMENT

INTRODUCTION

SOME PROBLEMS WITH THE TERMS

Throughout the project's life the team and BAPPEDA staff have not adequately understood what is meant by a data system or by an information system. This is not surprising and should not be a cause for dismay. "Information" has been become an "in" word. Its meaning has become diffuse and unclear. The Project Paper uses the terms "data" and "information" interchangeably, though perhaps the intent was to develop "data management" systems. The contributed papers for the Seminar on Information Systems for Regional Planning[4] as well as the activities visited by the Java-Bali study team[5] demonstrate the wide scope of perceptions of what an information system is.

Data and Information

Although many users do not distinguish between "data" and "information", it is sometimes useful to do so. Generally, information is data which have been given meaning. For most purposes this distinction is not important, except that data carries a connotation of being more "raw" or more disaggregated. For purposes of style, the terms will be used interchangeably in this report.

Information

"Information" is a very broad term, as has been suggested above. In its broadest sense, an information system could include anything from an alarm clock to an organized filing cabinet, or a computerized cash flow system, or a public relations office, or a national computerized bibliographic retrieval system. All of these fall within the scope of the term "information", either in popular usage or in academic usage.

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[4] Proyek Studi Pengembangan Regional Sumatera Bagian Utara. Seminar Sistim Informasi untuk Perencanaan Daerah, Pekanbaru, 6-7 Juni 1979; Laporan. Volume II. 1980.

[5] Planning and Development Collaborative International. "Bimonthly progress report for the Northern Sumatra Regional Planning Study, LTA-12;" no. 6, Appendix C. 1980.

The task for the project and for the planning agencies it supports is not to make a formal definition of the term, but to specify the scope of what is to be included in the system. At the Technical Team/ Regional Advisory Committee meeting of 9 July 1980, it was agreed that the information system was to specialize in development, policy formulation, decision-making, and monitoring. This subject scope is very wide indeed. The section of the report on system design goes into more detail on the process of narrowing the subject scope. Information to be included in the system depends very much on the needs of the users. The system must be tailored to those needs.

System

"System" has been interpreted by the project to mean activities that are arranged with a sense of order and method. Often, the word is popularly used to mean simply a process, a way of doing something, or the organization in which something is done. Every organization, including the WPU-A BAPPEDAs, already has an information system. The goal of the project has been to take the existing way of doing things and make it more systematic, or more rational.

There are two special uses of the term "system" that are sources of trouble. The first is the use of the word for the organization in which a process is contained. In fact, whole processes can rarely be contained in a single organization efficiently. Often, the links between processes are ignored or their importance undervalued. The second sense of the term to be discouraged is the special case of "systems analysis" when this term is misused to mean a particular array of devices or machines which perform some part of the information process for a particular organization.

A good working definition of "information system" might be: the orderly and methodological flow of activities needed to meet organizational information requirements.

REVISED PROJECT GOALS

The broad objective of the Northern Sumatra Regional Planning Study Project has been to improve living conditions for the population of the region, and especially for the region's rural poor. The objective of the information systems component of the project has been to improve the data base upon which development planning decisions are

made and to improve the institutional capacity of provincial planners to use this data base. These broad objectives have not changed.

Some of the project's goals have changed as the staff assessed the environment in which they were working. Not all that had been set out in the Project Paper could be accomplished. (See the Project Paper, p. 62-63 for a full description of project "data development" goals). The original goal was the "creation of a functioning planning information system and a comprehensive socio-economic data base". Specific outputs were delineated, including provincial socio-economic profiles, a regional profile, and a standardized alphanumeric development data classification system.

Certain aspects of these goals were overly optimistic. The level of detail or level of disaggregation is an important concept to be considered in planning and especially information for planning. Planning must be based on specific data items. In the early months of 1980, the project concluded that it must address information for planning at the provincial level before adequate systems could be established at the regional level. Resources were concentrated for the most part in Riau and to a lesser extent in Aceh, but it soon became apparent that the information system could not be comprehensive.

BAPPEDA Riau narrowed its subject scope when it selected a "management information system" (MIS), instead of a more comprehensive data base system. (For the distinction, see the Technical paper of 31 March 1980: "The nature of a provincial information system; some points to consider in assessing its feasibility.") Riau's MIS was placed in the Pusat Informasi dan Pengolahan Data (PIDA), designed in October-November 1979. The MIS was to focus on five classes of data: budget/finance, personnel, village development, facility/equipment inventory, and project monitoring.[6]

Unfortunately, this well-intentioned narrowing of the scope of the system turned out to be inappropriate for two important reasons. First, it shifted emphasis from data for planning to data for administration. Administrative data are certainly needed. They are

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[6] Badan Perencanaan Pembangunan Daerah Propinsi Daerah Tingkat I Riau. Pusat Informasi dan Pengolahan Data, Riau (PIDA). 1980.

particularly amenable to computer manipulation. But they are not so high a priority in terms of meeting the project's overall objectives of planning to improve conditions of the rural poor. The project felt it necessary to redirect the focus to those data that more directly contributed to substantive aspects of planning, rather than to provincial administration.

Also, the mandate of the Technical Team/Regional Advisory Committee required a much broader subject coverage than the Riau MIS would have provided as originally conceived. This guidance was taken very seriously by the project. The Committee's June 1980 recommendation was tied to another of the goals of the regional study from the inception of the project: the information systems component was to be integrally tied to and supportive of the main project thrusts.

Finally, it became apparent that the existing data base simply did not support rudimentary planning. The basic data base of published sources would have to be developed within the provinces before more sophisticated systems were attempted.

The project turned to more realistic information system goals at this point in the study. It was decided to promote small, inexpensive libraries with fairly broad data bases. Hopefully, these libraries will sort out and make retrievable the wide range of data already available, and function as the core of a broader information system to be developed as this sorting out progresses.

A FUNCTIONING INFORMATION SYSTEM

Methodological Notes

The purpose of this section is to further explain the systems that have been designed for BAPPEDA Riau and particularly the process by which these systems were selected. Most of the points have been made in the various technical memoranda and operations manuals submitted by the project.

GENERAL NEEDS ASSESSMENT

The first task of the I/S team was to assess the information environment, including:

1. A review of the objectives of the planning process;
2. An understanding of the planning process and especially the data collection, storage and reporting aspect as it relates to each other aspect;
3. An understanding of the quality and quantity of skills available for implementing information-related activities;
4. An understanding of the organizational, administrative and legal environment in which these activities take place;
5. A review of the existing information apparatus; and
6. Constraints on system improvements.

The first four steps were rather routine and do not require extensive comment in this report. A few comments on skills appear in the section on "manpower constraints" below.

The review of existing information apparatus produced several important findings. The Java-Bali tour and the foreign tour disclosed the wide range of information systems being implemented. There was also considerable evidence of a poor match between user needs and system services. There was frequent failure to consider system benefits in relation to system costs.

Most importantly, data collected, analyzed and disseminated at the provincial and sub-provincial levels were found to be very uneven. There were obvious, inexplicable and unresolvable conflicts. Data issued by two agencies on the same subject did not match. Provincial totals did not aggregate to national totals. Methodologies were generally left undescribed and documentation was inadequate. Time series analysis was frequently not possible; but where attempted,

showed sharp rises and declines. Prices were often not deflated meaningfully Data series important for provincial planners were not available. Data which was collected was left unanalyzed, analyzed only superficially, or published well after the need for the data had passed. Units of measure were regularly omitted from tables, table headings changed inexplicably, and sources were rarely cited.

The state of data management at the provincial and subprovincial level clearly required the close attention of the project. Actually, the situation is no worse than in many developing countries and better than in quite a few. Problems with data for planning came as a surprise to no one. Provincial officials are the first to recognize the problem. They readily point out that the data they must use to make decisions is known to be unreliable, and they know the impact this has on development in their provinces.

The shift to Riau gave the project the opportunity to examine the data of one province in more adequate detail. Especially useful in this respect was the October 1980 Data Evaluation Workshop.[7] The paper contributed by the Kantor Sensus and Statistik shows both the severity of the data problem and the awareness among officials of its nature. The skills to address the data collection and analysis situation are present in the Province, though perhaps in insufficient quantities.

Constraints on System Improvements: Organizational

A major conclusion to be drawn from the review of the data management/information systems environment is that there are several important constraints on the implementation of improved systems, classifiable as follows:

1. Organizational constraints;
2. Fiscal constraints;
3. Manpower constraints.

Organizational constraints appear at the national, regional and provincial levels and at the links between these levels. At the

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[7] Badan Perencanaan Pembangunan Daerah Propinsi Daerah Tingkat I Riau and Northern Sumatra Regional Planning Study Project. Data Evaluation Workshop, Pekanbaru, 13-16 October, 1980; proceedings. Medan, June 19

national level, many officials have not yet accommodated themselves to the need for a certain amount of devolution. The Kanwils are frequently constrained in their ability to coordinate with provincial offices by the demands placed at the Director General or Departmental level. Budget, for the most part, still comes from the center, and this is said to limit the freedom of action for coordination at the provincial level.

At the inter-provincial level, as has been said, the costs of organization are felt to be greater than the increment of utility to be gained, at least in the immediate future.

At the provincial level, the BAPPEDA is constrained in several ways. One is the lack of a library with a broad data base to support general government at the provincial level. This forces the BAPPEDA to meet the slack with a broad data base instead of a more efficient narrowly focussed management information system. The project recommends the establishment of such a library as a follow-on.

A second organizational constraint on information for planning is diffusion of planning activities among several provincial agencies. Key coordinating responsibilities, in addition to executing responsibilities, are charged to BAPPEDA, Biro Pembangunan, Biro Keuangan, Dinas Pendapatan, and the Secretariat in the Office of the Governor. The nature of the relationship between these units, at least in Riau, is such that they are not likely to join together as planning organizations and share an expensive information system. Other recommendations of the NSRPS address the relationship between these planning agencies, but the I/S component has chosen to work for the most part with the BAPPEDA itself, while recommending a provincial government library for future consideration.

Organizational constraints operate in the BAPPEDA itself. There is very little flexibility in provincial organizational structure for the introduction of a significant new operation such as the information system. During the period 1979 to 1981, the structural arrangement of the BAPPEDA was further confused by the status of KEPRES 27 1980 and the ministerial level decision which implemented it. Among other changes, the KEPRES introduced a fifth bidang for research. Both BAPPEDA Riau and BAPPEDA Aceh had planned to make these the organizational location of their information systems, but the final structure of the BAPPEDAs which resulted from this decision makes it quite difficult.

In addition, the BAPPEDAs are for the most part organized by subject (sector) and in part by function. As it stands, the various aspects of the information collection, storage and dissemination functions are spread across the BAPPEDA. Imaginative management can overcome most organizational constraints, so these problems are not viewed as being fatal.

Fiscal Constraints

The lack of money is perhaps the most frequently cited constraint on improvements in data collection and dissemination. Provincial officials are normally quick to identify additional funding as a cure to many problems. The total availability of money, however, should be considered to be a "zero sum game". Each increment in funding for one service is a decrement for another perhaps equally worthy service. Large increases in total funding for improved data management should be accompanied by very strong justification, including a justification that this use of public funds creates more benefit than any other conceivable use.

In the Northern Sumatra provinces, large increments would be difficult to justify. Significantly improved impact per unit of existing budget authority can be achieved by improved management of public funds already used for data/information purposes. Most of the project recommendations on information systems do not require large infusions of money but are in fact designed to reduce expenses over time through improved data management. Indeed, if both costs and benefits are considered in their broadest senses, the only justification for a more systematized information process is to reduce costs per unit of benefit. If a particular information system cannot be shown to have a benefit cost ratio equal to or better than any other system, it should be rejected.

Manpower Constraints

This section addresses the quantity and quality of skills available to do information systems work and to profitably use an information system. The assessment of the existing situation in the region permits some generalizations. The following are generalizations and do not apply to all individuals with equal force:

1. Both system users and system staff are relatively unprepared in research methods and in project selection and evaluation techniques;
2. There is little tradition of reading. Correlated to this is minimal experience with libraries and little systematic use of printed materials to convince or to support a decision;
3. A strong preference exists for dealing with concepts of form rather than content;
4. There is a strong preference for working at very high levels of generality; and
5. There has been no education or training in the broader aspects of information theory or librarianship.

For an information system to succeed there must be an appreciation of its need. It is not enough that a BAPPEDA wants more information, more accurate information, or faster information. It must also have a firm understanding of project selection and evaluation techniques and of research methods in order to know what to include in the system, and in order to be able to analyze the data purposefully. For the most part, deficiencies in this area can be corrected through education and training. This has been a major part of the manpower training effort of the project and must continue to be addressed at local and national levels. The upcoming LGT II project should be an important move in this direction. As BAPPEDA leaders and other provincial planners improve their skills in these areas, a greater appreciation of specific information requirements will result.

The lack of background in information theory and librarianship can also be improved with education and training. Managers and users require some general training, but the most pressing need is for the I/S staff themselves. NSRPS has made considerable investment in training the library staff at BAPPEDA Aceh and particularly BAPPEDA Riau, but this training has been limited to very practical instruction for implementing a particular library system. There has been only coincidental education in information theory or the broader aspects of librarianship.

The computer facility in BAPPEDA Riau has been careful to train its staff in a particular computer configuration, but has apparently not been able to devote much time to broader considerations of informati system principles. Theoretical considerations are not the highest

priority, but all information professionals should acquire a sound theory over time, if the two major components of the I/S organization are to function coherently. Improved interaction between the computer facility and the library as well as between the PIDA and the BAPPEDA should be based on a sound theoretical framework. Changes in the system should also be so based, if the costs of trial-and-error changes are to be avoided. For the most part, the broader education in such a framework has not yet been provided.

While the first and fifth problems listed on page xiv may be addressed directly through education or training programs, the others may be amenable to change more slowly.

The nature of handling the complex file structures necessary for a data base that is quite broad in scope but at the same time capable of responding to highly detailed questions requires:

1. The willingness to read publications containing data or information;
2. The ability to organize very detailed data items for storage and later retrieval; and
3. That attractive delivery formats do not take precedence over the meaningful content of an item.

These characteristics, as well as an appreciation for the importance of the concept of cost effectiveness, may seem relatively unimportant, but the project firmly holds that these characteristics must be present in the I/S staff and in its user community if proper system development is to take place in the contemporary world.

Organizational, fiscal and manpower constraints were of course operating on the information systems environment before the I/S team began its review. Organizational constraints in Riau are if anything more severe as the project draws to a close than at the beginning, principally because of complexities in the implementation of KEPRES 27 1980. The amount of money available for information systems development in Riau has been impressive. Important steps have been undertaken to improve its management, and it is felt that these steps will have lasting impact.

SYSTEM SELECTION/DESIGN

After the information-related needs of a province are evaluated, something must be done to bring about the necessary improvements. This has been the main part of the work of the project's I/S component. It was not possible to design and implement the self-contained comprehensive system to meet the original goals of the Project Paper. The section which follows documents the choices made for the scope, size, and range of services of the system which was implemented.

System Objectives

To meet the overall project objectives, a set of objectives for the I/S itself were developed:

1. Relevance;
2. Flexibility;
3. Support for coordination;
4. Timeliness;
5. Stability;
6. Efficiency.

The first five are aspects of effectiveness. Efficiency is of course a measure of effectiveness per unit of cost. In defining costs and benefits it is important to stress that both include more than just money. Costs include the use of scarce natural resources, the use of skilled manpower, entrepreneurship, risk assumption, organizational disturbance, reductions in employee productivity, to list a few. Benefits as well should be considered broadly, to include all positive impacts. Benefit/cost analyses have non-money as well as money components. The planner must use judgment in weighing the relative value of a particular cost or a particular benefit. This judgment must include an assessment of short-term costs, long-term costs, short-term benefits and long-term benefits. Most information systems have high start-up costs, while benefits increase with time. With information systems, the cost component of the benefit/cost ratio is often quantifiable, while the benefit component rarely is. It is one of the reasons that information systems tend to be underfunded.

Relevance

The system must be relevant to planning needs. While this may seem obvious, it is not so easy to achieve. Relevance is achieved when there is a close match between data requirements and services provided. There is a certain circularity in the process of specifying

data requirements. Good information is needed to create a rational development process, and a rational development process is needed to adequately define information requirements for the information system. Improvements must come concurrently. Improved data specification requires:

1. That the planner/data user knows the objectives of development;
2. That the planner knows how to select development projects and knows how to monitor and evaluate them;
3. That the planner can select appropriate criteria for project selection, monitoring and evaluation;
4. That the planner identifies appropriate indicators of social and economic change and develops measures for recording those indicators;
5. That each of the above are developed and reported to the information system in adequate detail.

If these conditions are met, information from a properly operating information system will be relevant in that it will meet the specific data requirements of planners/users of the system.

At present, planners in Riau are not sufficiently speci ic or systematic in stating their data requirements. Part of the project effort has been to enhance this capability, particularly with its main thrusts, SDF and AP. An efficient I/S with relevant services will develop as these programs have impact on provincial planning.

An important means of improving relevance is good systematic communication between I/S staff and system users. At least a portion of the I/S staff must be sufficiently broadly educated to be able to communicate with planning staff about the broad scope of sectoral data requirements. This quality is essential for the "user interface" professional described in the PIDA project proposal.

Flexibility

Planning requirements change over time, and the information system must change also, in order to remain relevant. The library system being implemented is a simple one, relative to the scale of the need. The data base is not nearly complete, and the services are relatively few. The system will expand in several ways, particularly size of the data base and number of services. The system was designed to accept this growth, and can absorb a hundredfold increase without undertaking expensive changes in record-keeping systems.

The manual has been designed for inexpensive updating, and the staff know how to update it.

Though the information system starts as a traditional library and provides retrieval at the "publication" level of specificity, the system will smoothly accept a shift to retrieval at the "table" level and at the "single data item" level. (These terms are explained beginning page 18.)

In addition, the overall flow of the library system as well as individual records were designed to be converted to computer in the future. It is not likely that such conversion will be justifiable before two to three years.

• Support for Coordination

Coordination is frequently cited as one of the main constraints on development, and this would seem to be a correct analysis. However, it is not enough to cite problems. Solutions must be found. A comprehensive information system is a coordinating mechanism with great potential, and at a relatively low cost. The small scale libraries provide the opportunity to assess exactly what data are available and what are not.

However, much greater assistance to coordination is required. This is especially true of data collection and reporting. Part of this support will come as the library begins to supply additional services. Additionally, there is the project recommendation for "A Coordinating Mechanism for Data Collection and Dissemination" (26 March 1981). This provides for a review by Kantor Sensus dan Statistik and by BAPPEDA of data collected and reported by provincial agencies.

In most important respects, coordination is a type of centralization. Control functions can be centralized, or whole systems can be centralized in a single organization. BAPPEDA was designed to collect planning functions in a single organization, while the "coordinating mechanism" referred to above collects controls into a single place. Information systems in general and libraries in particular work to the extent that they create economies of scale. Many of these come when information activities are collected into a single organization. This point is developed in some detail in the Technical Memorandum of 15 June 1980.

Information collected centrally provides increased potential for coordination in the province. One of the policies of the library is to extend many (though not all) of its services to other agencies of the provincial government. Publication of the holdings or accessions of the library will be of great value to other agencies in assessing their own data bases.

Timeliness

Improved timeliness is a product of improved system management and of raising system costs. Certainly all possible effort should be made to improve management. Staff in the library are being taught a philosophy of professional service. This includes the need for rapid response to users. However, there are limitations to the role of this type of management in improving timeliness. Additional speed in the long term can be achieved only by increasing the costs of system operation.

The most significant single technique is the acquisition of informational materials in anticipation of the user actually stating his request. Precision (and therefore efficiency) can be achieved by acquiring data on demand. But ordering the data-carrying vehicles such as books and reports is very often a slow process. The additional speed gained is often worth the cost of a few extra books or reports acquired.

Two steps need to be undertaken to improve timeliness:

1. Acquire a certain set of data-containing publications in anticipation of user need; and
2. Initiate a BAPPEDA-wide project of requiring in written form the specification in sufficient detail of data required for project analysis, specifically for:
   a) general or recurring analytic tasks in each sector,
   b) specific projects, and
   c) project monitoring and impact evaluation.

Step one above requires library staff with broader education and experience within BAPPEDA (or at least provincial government). It also requires the accumulation of a somewhat broader data base, at a higher cost.

Step two above requires that specific development objectives be delineated, that specific criteria for project selection be provided, and that specific indicators of social and economic conditions and changes be listed. This becomes the framework for specifying data requirements. The library staff would then match these requirements against the data held in printed form in the library, and report back to BAPPEDA staff that which is not available in print. BAPPEDA would then be able to decide what can be achieved by analysis of existing data and what must be sought by primary data collection.

Stability

Stability consists of several aspects, including minimizing organizational disturbances resulting from staff problems, sharply changed organizational objectives, or major changes in funding level, among others. They are grouped under the term "stability" because these kinds of rapid changes drive up the costs of the system, frequently unnecessarily.

Much of the success of an information system comes from economies of scale derived from its record-keeping system. Changes in record systems, particularly the acquisitions and cataloging systems, are extremely expensive. Sharp changes in the criteria for addition or deletion from the data base can be expensive also. Instability is the result of poor management, but is often brought on specifically by changes in the people who manage. The information system can cushion itself from unfavorable changes in management by providing all users with timely, accurate, objective, neutral data. In addition, stability can be improved by seeking a broad base of support from a variety of agencies who have a strong interest in maintaining the system. The information system will want to maximize support through close coordination with key user groups and data input sources. Both the computer utility and the library must be aware of this need and must pursue such contact with users through formal mechanisms. The primary point of contact in the library will be the user services (reference) professional.

Efficiency

At several points in this report efficiency has been identified as an important system objective. Benefits of a project must exceed costs. In addition, a choice must be at least theoretically equal to or better than any other alternative.

Most system inputs (staff costs, equipment, space in buildings, energy consumed, communications and transportation costs, as examples) are measurable and can even be converted to money measures. Most system outputs cannot be given money values. It is sometimes possible to get a sense of scale of positive and negative outcomes even though precise costs are not known. What are the costs of (for example):

- a transmigration site in the wrong place, where crops cannot be grown;
- a road built but not used;
- a road not built but needed;
- a PUSKESMAS too far to get to and too expensive to use;
- a new plywood factory in an area exhausted of timber; or
- a rubber plantation that cannot ship its rubber.

If either success or failure in a project becomes noticed, how can one know what portion of the failure (or success) was due to the quality of the data ?

As a substitute for measuring benefits, information systems usually measure incidence of usage: number of users, number of questions answered and the time required to answer them, number of books (etc.) circulated. There is an assumption that these measures reflect positive impacts of the system, that development benefits would increase as the outputs of the development information system increase.

The cost of most major inputs, however, can be known; and a system should be designed and operated knowing what the cost structure is for the full set of alternatives. The array of services, the organizational structure, staffing levels and skills, the size of the data base, the responsiveness to user inputs, the flexibility, the timeliness of the system all are basically tied to input costs. Efficiency is the single most important systems objective, and the benefit/cost ratio the most important criteria for selecting a system design. Where benefits cannot be quantified, a measure of cost effectiveness is useful.

Selected Aspects for Comparison of Alternatives

This section concerns the choices made for the BAPPEDA Riau system. It considers a selected set of aspects of information systems and various alternative choices for these aspects. These are compared, using the six objectives described on page 11. An outline of these aspects follows, to facilitate reading of the section:

A. System "size"
   1. Subject scope
   2. Level of service
      a. Who is to be served, in what order
      b. Level of disaggregation of data
      c. Publication status of the data
      d. Speed of service
      e. Centralization
B. Organizational
   1. Location
   2. Structure
C. Staffing
D. System procedures, including aspects of sub-system choices
   1. Acquisitions
   2. Cataloging
   3. Circulation.

SIZE : Subject Scope

Subject scope can be characterized as broad, narrow, or somewhat in between. As has been pointed out, it was originally intended that the system be narrowly targeted, focussing on five or six outputs. The intent was precision, or a high relevance at low cost. However, it was necessary to broaden the scope, for the reasons indicated at several points in this report. This broader scope adds flexibility, reduces simplicity, is neutral to speed, increases relevance in the short term but sacrifices it in the long term, and is neutral to stability. The broader scope is less efficient in the short run but more so in the long run. Start-up costs are higher but economies of scale reduce longer term costs. The deciding factors were the short term gain in relevance and the long term gain in economy. Had there been a provincial library with a broad data base, the choice for BAPPEDA would have been the narrowly targeted management information system.

SIZE : Level of Service : Level of Disaggregation

Most data needed for planning is provided by journals, reports, books, or other printed formats. Retrieval of data has traditionally been possible at the bibliographic level, which is to say the retrieval tools permit the user to locate a book or report. The retrieval tools

basically do not permit retrieval of the specific tables or data items within the item. The user must then examine and evalute the material to decide if the data contained are relevant or of adequate quality.

The next more disaggregated level of data delivery is the table level. Tables, whether they be from books or specifically prepared, are delivered to the user. The retrieval terms must be far more precise and users must have a more precise concept of what data is needed. It is very difficult to scan or "browse" through hundreds of tables.

The most specific level of disaggregation is the data item. In this format, variables are extracted from tables and presented on user demand. These data items are mixed and matched with items from throughout the data base, and are independent of the tables which contained them. A variable from one table can be compared with a variable from another. This system requires a computer to make almost any data base feasible. It also requires a staff of lexicographers to define a vocabulary which will permit such precision in retrieval. If the computer system design and programming has been adequate, users do not need to be particularly precise in submitting retrieval terms. They must, however, be expert to use disaggregated data in a meaningful way. Almost all existing information retrieval systems at the data level either strip out references which permit evaluation or they are very narrow in their coverage and the user knows what he is getting. The costs of analyzing data for input into the system, of creating a retrieval vocabulary, and of keying in data to the computer is more than the present budget of the BAPPEDA. Such costs can be justified only if they are widely shared, and this is not yet possible in Riau. Equally important, data in Riau cannot be used if they are stripped of the means for comparing and evaluating them. The priority in Riau is to make the data better first.

NSRPS strongly recommends beginning with a system that delivers data at the bibliographic level at first. This is because of the high money cost of alternatives, the high cost in terms of scarce skills, and the severe problems with the quality of existing data. Bibliographic systems are less flexible in the long run that other approaches. They are far more simple. If table-level or data-level systems work smoothly, they would be faster. Relevance is neutral among the three alternatives. The bibliographic system is much more stable, principally because its minimal cost and tolerance for incremental funding practices promotes stability.

SIZE : Level of Service : Speed of Service

Speed of service is an important objective for users. Much data has no value at all if it is too old, and data is normally more valuable the more recent it is. As has been suggested, increased speed is a function of improved operational management and of providing additional resources to the system.

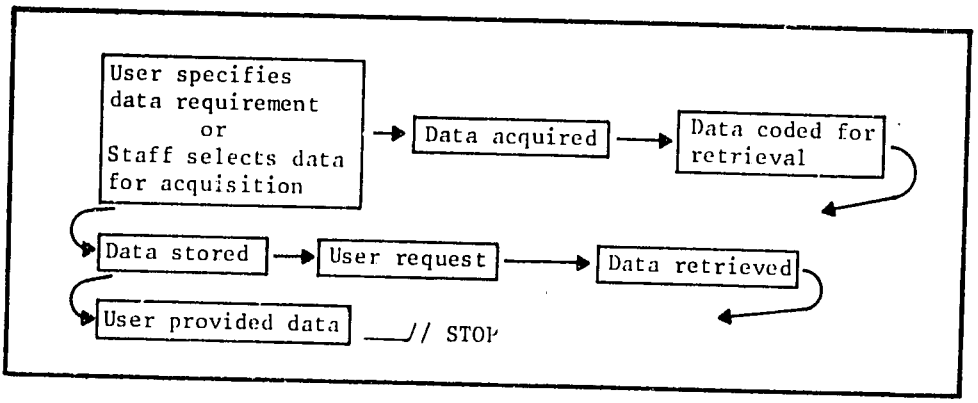
Information delivered at the bibliographic level is slower than at the data-item level, assuming the computer system works. However, data-item systems must be rejected because of their costs. The amount of speed gained does not justify the added costs. In addition, such a system is far slower than a bibliographic level system if the computer is not working properly.

Table level systems are slower than bibliographic systems during the input processes, but faster when data is actually retrieved. At the present time and for the near future, the level of skills available for these input processes means that the user will be a net loser. Table-level service should wait until data can be more precisely specified and until the system is large enough to benefit from increased economies of scale.

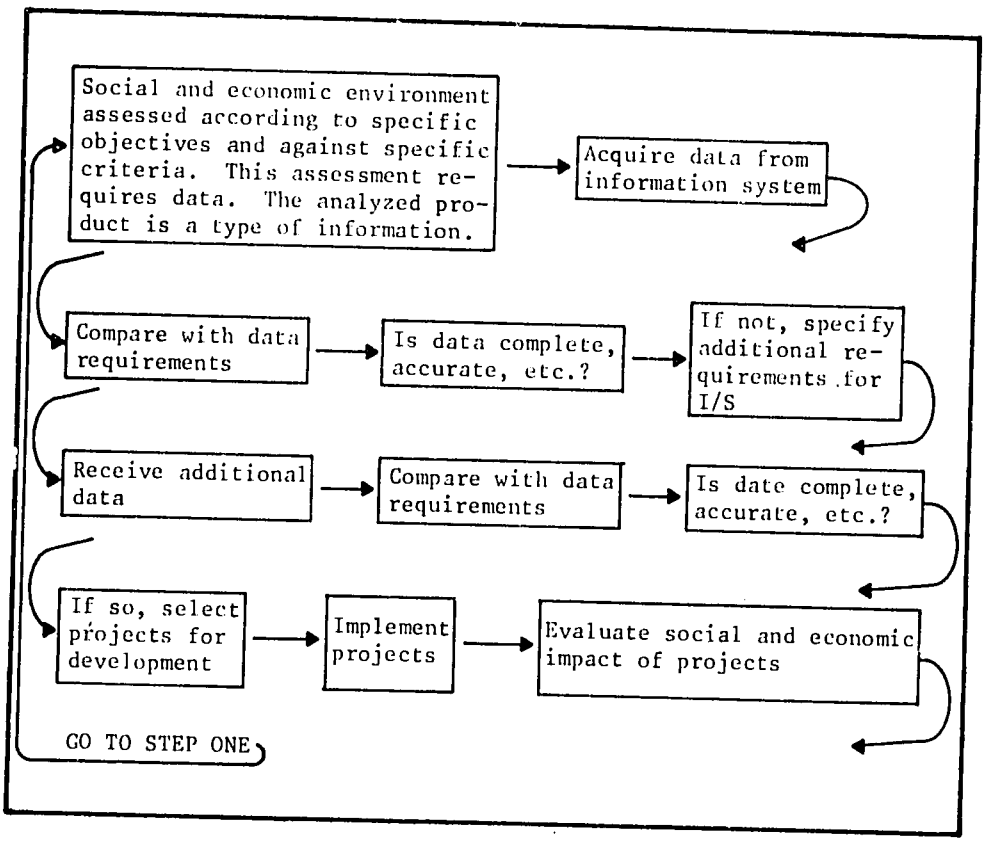
The library system itself must be sensitive to the need for increased speed and improve its management practices. Speed is increased when a broader data base is acquired at least in part in anticipation of user need. This raises system costs. A careful selection policy coordinated with BAPPEDA staff will increase system speed while minimizing cost increases. This is built into the library operations manual. Additional comments on management aspects of more rapid service are found in the operations manual.

SIZE : Level of Service : Centralization

This section is concerned with who should perform which activities in the information systems flow. An information system is not a closed system which can be contained in a single organizational element. This flow can be looked at from several perspectives. From the point of view of a single information-providing organization, the flow might be:



A more general system flow shows the information organization supporting the larger planning process:



At this more general level, it becomes clear that the information system itself performs only a part (though a very large part) of the information flow. Both charts are quite general in that they do not show exactly who does what. In a traditional library with a card catalog, who manipulates the catalog, who goes to the shelf to retrieve an item, who scans and selects the right table from a report ?

Some of these tasks are best centralized into the I/S organization, some are not. Whether a particular "information" function belongs in the I/S depends on the same set of criteria that have been used elsewhere in this report. The most important is efficiency. The operations manual defines the location of most important aspects of the information flow. In general terms, however, those aspects which require a detailed knowledge of development in a specific sector should not be concentrated in the I/S at present. Sectoral experts are scarce enough in the BAPPEDA wihtout diluting their skills in the information system organization.

Most particularly, the BAPPEDA staff should specify data requirements and should evaluate data received. BAPPEDA staff should do any primary data collection and should undertake any cooperative efforts with other provincial agencies in achieving standardization of data and coordination of its collection and reporting. All of this must be done by specialists in subject areas, not by generalists. Only very large information systems could justify starting to add sectoral specialists.

The I/S organization should do those tasks that benefit from economies of scale. Particularly such tasks as classification, materials acquisition, and materials storage are appropriate. These should be centralized into the information organization. There are grey areas: who should manipulate the catalog, for example. Some of these areas are grey because perceptions of costs and benefits are not shared by everyone. Many users, for example, do not realize how important it is for them to scan the catalog themselves in order to find related materials.

ORGANIZATIONAL LOCATION AND STRUCTURE

Organizational location of the I/S within the BAPPEDA is based on the same criteria as system size considerations. Unfortunately, the stability aspects of organizational location sometimes take precedence over other objectives in many bureaucratic systems. Some government structures are relatively inflexible. Managers sometimes are given little or no room to use organization as a management tool. Organizational structures sometimes are oriented to meeting the needs of incumbents rather than agency objectives.

In the case of the Riau information system, the location of the PIDA and its two components has been quite confused by the implementation of KEPRES 27 1980. These aspects of organization have been developed in the section on constraints on system improvements. The outcomes of the organizational choices made by BAPPEDA Riau are still somewhat obscure. At present, the staff are quite low level, the highest being a golongan 2C, and there are no professionals. If this low level is necessitated by the position in the BAPPEDA, the I/S will not achieve what is expected of it. The project is advised, however, that additional higher level staff can be acquired.

The structure of the information system itself is also somewhat unresolved. The computer utility was originally scheduled to operate at the same level as the library and statistical/analytical processing units. At present and for the near future the contribution of the computer to information for planning is minimal, although as a tool for processing financial records, personnel records and equipment/structure inventories there is near term potential. The statistical/analytical processing units are yet unstaffed and the plans of the BAPPEDA at this writing are not known. The library unit is proceeding on schedule. It is structured in a fairly classic way, along functional lines. This should remain the case, unless sectoral specialists are added in the coming years.

STAFFING

Most staffing decisions are simply a matter of implementing other systems design choices in a cost-effective manner. Comments about staffing requirements have been made at several points in this report. The basic staff requirements for the library and for the analytic element of PIDA were developed in October 1979. These staffing recommendations provide for a data analyst, a librarian, two library technicians, and a library clerk. The statistical/analytical unit is not yet active, presumably due to budget limitations. Despite the broadened data base in the library, additional staff are not needed in terms of numbers. The staff should, however, be upgraded.

Because of the scarcity of sectoral and analytic skills and the clear requirement for personnel who are specialists and not generalists, the project now feels that the analytical/statistical unit is premature. There is no immediate capacity to do primary data gathering

or to technically evaluate other primary data. These skills should be added to the BAPPEDA as soon as possible, but not necessarily in the PIDA itself.

In the library unit, the number of staff (four) is adequate for the present. The project has provided the staff in Riau considerable training in library processes, and these tasks at present are being performed quite adequately. There is not as of this writing the professional that is required, however. A person trained in information systems work is not likely to be available, although there is a library program at Gajah Mada University. A broadly educated person capable of communicating with sectoral specialists is needed for purposes of data acquisition decision-making and coding decision-making particularly. This coordination is necessary if the system is to operate successfully in the long run.

Staffing standards for libraries in government agencies have been established by the Pusat Dokumentasi Ilmiah Nasional within the Lembaga Ilmu Pengetahuan (LIPI). The standards include task descriptions, titles by golongan, and education and experience requirements. It is understood that these standards are difficult to meet immediately in a rather remote province, but an effort should be made to do so over time.

The library staff have not been broadly educated in library theory or widely-used techniques. They have been trained in a particular, somewhat simplified system. Though an effort has been made to explain some of the "whys", this is not possible to do extensively without a theoretical framework. It was not possible for the project to train staff to operate an actual system and at the same time provide a broad theoretical base. Therefore, the library staff needs this broader education, perhaps at Gajah Mada. This training should be undertaken by each staff member one at a time, beginning as soon as possible.

SYSTEM PROCEDURES

SYSTEMS PROCEDURES : Acquisitions

Systems procedures are explained in detail in the library operations manual, accompanied with comments about the reasons for specific choices. A few important points will be highlighted in this report.

There are two aspects of the acquisitions process which should be considered. The first is the selection of materials for the data base (and the related concept of selection of materials to be discarded from the data base). As has been mentioned, selection is to be based on detailed specification of data requirements by BAPPEDA planners. This is to be augmented by some selection on the part of the library staff itself, in anticipation of user requirements. The process is one of close cooperation and communication between library staff and data users.

It is primarily the job of the BAPPEDA analysts to specify data needs and of the library staff to determine the format and source of the best possible data to meet that need. In the early months of operation the library staff will not have the experience or accumulated records which will make this efficient, but as these develop there will be an economy of scale achieved which is one of the major sources of savings from centralized acquisition operations.

The second acquisitions aspects which should be clarified is the records keeping system itself. Basically, ordering publications is a very routine operation which requires only careful record-keeping and good follow-up procedures. Checking in the receipt of publications, however, is a unique library procedure in that the record of receipt functions also as a retrieval device. It is very important that the system be precisely related to the classification-coding system, and especially that authors, titles and classification codes match exactly those of the card catalog. This procedure minimizes the complexity of a record-making system which must identify single pieces of information and make them retrievable for a period of years and even decades.

SYSTEMS PROCEDURES : Classification Coding for Retrieval

Classification/coding schemes are frequently chosen without appropriate consideration for their performance characteristics. Poor choice is a major cause of information system failure. Once a system has been chosen and implemented, it is enormously expensive to change. The following aspects should be considered:

1. Subject retrieval. Many libraries in Indonesia have developed library systems which do not provide retrieval by subject. The project takes the view that users do not normally know the exact author or title of a needed publication. They may not even know it exists.

The information system must be able to respond to subject inquiries. In Riau, subject access is provided by a controlled vocabulary through a card catalog medium. It is possible that some would feel that it is the planner/analyst's job to determine in what publication his data is to be found. However, this should be centralized in the library for reasons of efficiency.

2. Subject coverage must be matched to data requirements. The Dewey Decimal Classification (DDC) and Universal Decimal Classification (UDC) are very popular systems in Indonesia, but both are quite general in coverage, suited to public or small university libraries. The BAPPEDA libraries are much more specific in subject scope and strongly tied to Indonesian governmental structure and programs. The Dalam Negeri system that was chosen was oriented to public administration in an Indonesia context.

3. The retrieval vocabulary must be matched to user needs. There are two important aspects here: language and the use of technical terms. The Project saw little point in a scheme with an English language retrieval vocabulary. Dewey is available in abbreviated form in Indonesian, but does not permit retrieval at a sufficient level of specificity in that abbreviated system.

The Dalam Negeri system is strong in its use of technical terms in matters of government and sectoral development, not strong in many technical areas such as economics, research methods, and "academic" subjects. DDC and UDC are very strong in all technical areas (but in English), yet completely inadequate for Indonesian government matters.

4. The retrieval vocabulary is to be matched to the size of the system and to the level of specificity needed for retrieval. Coding is designed for one purpose only, to facilitate retrieval. This is an expensive process and becomes more so as the system grows. Very small systems require simple retrieval devices, while very large systems require complex coding schemes. The system chosen had to be adequate not only for the present, but had to be flexible and provide for growth. Decimal schemes such as Dalam Negeri, DDC or UDC can all accomodate this growth as long as the retrieval vocabulary can be made more specific.

These adjustments are quite simple with the Dalam Negeri system, but very risky with the DDC and UDC systems, where much of the benefit is derived from more central control of the classification.

5. The system must be flexible. Systems change. They grow, they change subject focus, and user sophistication changes. Because complete overhaul of a system is extremely expensive, it is necessary to install a system which can adapt gradually. Decimal systems are highly modular. As the system grows, they can respond with increased specificity and retrieval vocabulary can be altered at a low cost. The decimal arrangement permits interfiling new but related materials. The Dalam Negeri system is flexible also in that local changes can be made (an aspect of "system maintenance") quite easily. The classification books have been put in a loose-leaf format and changes are simply entered in ink in each book.

6. Who pays design and maintenance costs? Economies of scale justify centralized design and maintenance of classification systems. The project could have designed a highly specific, flexible, appropriate system in Indonesian. However, it would have required hundreds if not thousands of man-hours and would have displaced the necessary training in the actual operating system. The Dalam Negeri system is not a perfect system. It lacks a degree of coherence, which makes classification somewhat difficult. But acquiring and using this system is a shared cost, borne mostly by Dalam Negeri at the Center. Its relatively minor inconsistencies are a small price to pay for the opportunity to split the costs, both for design and for maintenance.

SYSTEMS PROCEDURES : Circulation

Circulation is a rather mechanical task. A circulation system is not only a control device intended to encourage or require users to return materials. It is also a part of the overall record system. It is designed to answer the question: Where is the data that is needed? When that data is outside the library, it must still be retrievable. The act of recording circulation is an annoyance to all but the most public-spirited users. The system is designed to reduce the time the user must wait to a minimum and still provide adequate retrieval of records for internal library purposes.

The BAPPEDA system is described in the library operations manual. The process permits retrieval of a record by user name, by date charged, and by the classification code (call number). Users do not have a formal time to return materials. It is presumptuous of libraries to tell users how long it takes to do their work. At the same time, it is naive to expect that materials will be returned as soon as the user is finished with it, or that a few will not be stolen. A compromise system has been designed which alerts users to the materials which they have charged to them, and requests their return if no longer needed. This may be a difficult system to try in an Indonesian environment, and is viewed as experimental. If it does not work, a more usual control system will have to be imposed.

HIGHLIGHTS OF THE BAPPEDA RIAU SYSTEM

The system designed for BAPPEDA Riau to begin with is essentially a traditional library. It has been chosen not because it is traditional but because it meets most closely the immediate needs of the BAPPEDA. Also, it provides the framework on which to expand services. The system permits a sound assessment of the data now available, and will permit the identification of data gaps. It is oriented to collecting, storing and disseminating published data. Control over published data must precede other data collection efforts if costs are considered at all.

The library has a data base or "collection" consisting of about 2500 books, reports, journal issues and maps. All material assembled at the time of this writing have been cataloged. It should be remembered that the function of a library is not to have a large number of books on its shelves, but to provide access to specific sets of data required for planning. It is the access that is the key to the system. It is quite satisfactory for a needed item to be stored in a BAPPEDA office, or in the Biro Umum, or in the Kantor Sensus dan Statistik - or wherever. It is only important that the planner can locate and use the data in the time he needs. The BAPPEDA library is not a provincial library, but it is to interact with other libraries and information centers in other provincial and center offices. One of the most powerful tools in a library is a list of the data in other information centers.

Library service during the initial months will be basically limited to the identification, the locating, and the provision of published materials to users. This is a rather minimal level of service, but this must operate smoothly before service can be expanded. One of the findings as materials were assembled and cataloged in the library is that the collection of journal issues, quarterly and annual reports, and census/statistics data from BPS is most incomplete. A survey of annual reports from provincial agencies (a rich source of data for planning) shows that a "run" from the year 1976 to 1980 averages 1.2 issues. If complete, it would normally have five. Crucial data sources like the 1971 Census of Population, the 1973 Census of Agriculture, and Statistik Indonesia (all important data sources from BPS) are incomplete.

This is not said to be critical but to illustrate the fact that collecting the published data sources is a very large task. It is the immediate priority.

Services to Follow

As the library gets control of the available published data in the next few months, it should begin to expand its services beyond this initial minimal level. The first step is to aggressively make users aware of the contents of the data base. The medium for doing so is described in the library manual. Basically, it consists of a computer printout of new additions to the collection. As the library grows larger and as it establishes links with other information systems, it should initiate a current awareness service. This would be derived from the computer file and would be oriented to the stated requirements of individual users. This is often referred to as "selective dissemination of information".

At about the same time the staff feels the published literature is basically under control, the library should start some simple processing tasks. These would include bibliographies or lists of data sources on particular topics. Such lists would identify data items or tables, including information such as level of subject detail, variables, and geographic or temporal scope.

As this sort of processing proves successful, the next step is to provide retrieval at the table level. This should not be undertaken until BAPPEDA data consumers have carefully specified data requirements in written and preferably published form for major sectors at least. The library should have identified gaps in published data and made all effort to fill them.

At about the same time, the library should undertake to computerize its operations, in order to make table-level manipulation economical. This becomes feasible when the published materials collection is approximately 50,000 volumes, depending on use volume and relative capital-labor costs. Major automation steps would include automation of the selective dissemination of information process, the "card" catalog, the ordering and check-in system records, and parts of the circulation system records. These steps should not be undertaken under any circumstances before the staff has at least three years experience.

These added services are dependent on the related growth, improvements in planning skills, and upgrading of staff. In addition, these improvements must be sensibly scheduled. Table-level retrieval cannot precede computerization at any reasonable cost.

RELATIONSHIP TO OTHER INFORMATION CENTERS : The Province

It is important to consider the BAPPEDA library in relation to the other information institutions in the province, the region, and the center. Major institutions in Riau Province include the provincial library, the library in the Biro Umum, and the Kantor Sensus dan Statistik, for the purposes of the BAPPEDA. The provincial library is mentioned only because of its stated mission. In fact, it performs few information related functions, and does not have any immediate potential for providing the broad data base for the Province that would supplant the BAPPEDA's need for its broadened data base.

The Biro Umum also does not have a broad data base as its mission. In fact, such a library would be nearly as large as the Biro itself, if it were to try to meet the province's general data requirements. The Biro Umum, however, is an excellent example of an institution with which the BAPPEDA should cooperate closely.

Particularly, there would be a reduced need to duplicate materials, especially those that are expensive. The BAPPEDA often has a call for the legal materials, and cooperation displaces the need to acquire and store in the library at BAPPEDA.

The Kantor Sensus dan Statistik, while not a library, is in fact an information dissemination organization. This office is responsible for a large part of the primary data collection in Riau, and coordinates the collection to a certain extent of much it does not collect itself. The basic information problems in Riau are not information flow failures so much as collection of the wrong data or of meaningless data at the point of primary data collection. It is not KSS that is responsible for these data collection problems. KSS is one of the more technically skilled agencies in Riau and its statistical products, collected under some severe constraints, are relatively good. Data collected by the other provincial agencies have many problems, and it is the collection of this data that is the priority information problem for the province. The NSRPS paper on data collection cooperation referred to earlier addresses this problem, and hopefully provides an important part of the solution. The Kantor Sensus dan Statistik should continue to be responsible for the bulk of the primary data collection, and for technical coordination among provincial agencies doing data collection. The BAPPEDA would be responsible for coordinating <u>what</u> data are to be collected, by whom, and would impose controls on data publication. Budget spent on upgrading staff in both organizations, in terms of new staff and in terms of new skills, would be mony extremely well spent.

<u>RELATIONSHIP TO OTHER CENTERS</u> : Inter-provincial

There is an existing organization designed to provide information services for planners at the regional level. The Pusat Informasi dan Dokumentasi at Bukittinggi is an example of a system that is quite well designed. There is some question as to how effective it has been, since it reports quite low levels of use. The Project feels that while the PUSIDO was quite well thought out in terms of its information services, there is no real market for its product. A part of the evidence is the distribution among the provinces of the usage of the PUSIDO. By far the largest user over the years has been

Sumatera Barat. This is not especially surprising considering the location, which is quite inaccessible from Medan or Banda Aceh, and rather so from Pekanbaru. The PUSIDO prepares a number of useful information products, and is in fact quite a good example of a library/documentation center at the level at which it is funded. It does not, however, displace the need for the same sorts of functions to be performed within the BAPPEDAs and responsive to local planning problems.

RELATIONSHIP TO OTHER CENTERS : The Central Government

One of the greatest aids to provincial data control would be a national bibliographic center. There is an immense amount of data that is collected and reported throughout Indonesia, but then lost to most users. This constitutes a great waste of scarce resources. Next to local data collection procedures, this is the largest data control problem in Indonesia. While it is outside the scope of the Project to make recommendations at the national level, provinces would benefit enormously from a central bibliographic retrieval device such as the catalog of the British Museum, Bibliotheque Nationale, and the U.S. Library of Congress' National Union Catalog. It might even be feasible to do computerized retrieval such as is available in the West, if the Central government wished to use its telecommunications network for this purpose. These suggestions have not been investigated thoroughly by the Project, but the need becomes evident as a result of its work in Riau and in Aceh. If funds were available, the library at LIPI would be quite qualified to do this work, or perhaps the Perpustakaan Nasional.

APPENDIX

During the life of LTA-12, there has been some interest in the possibility of producing standardized or codified sets of concepts and data items. In fact, many tasks of planners would be much easier if planning data could be standardized or codified.

However, there are major problems both theoretical and practical which limit progress in these areas. The first problem is that there are different interpretations of what is meant by "standardization" and by "codification" and there are different objectives implied by different usages.

STANDARDIZATION

Generally what is sought is the adoption of concepts, data definitions, design elements, service levels, etc. which all agencies involved can agree to use in planning and management of development. A planner who wants standardization may mean any or several of these aspects. For each of them, however, a uniformity is intended which facilitates communication among planners. Another level of meaning is added when a standard is associated with desirability - when it becomes something to aim for, instead of (or in addition to) being simply a convenience.

Examples of the first level of meaning include:

- household income categories;
- road classifications;
- settlement units (SKP, WPP, SWP etc.).

Examples of the second level of meaning include:

- minimum adequate standards (such as for water consumption);
- maximum permissible levels (such as for air pollution).

PURPOSES

There are expected benefits from standards, and there are also costs and risks. The expected benefits include:

a) Facilitated planning and programming in the central government, in the provinces, and elsewhere. It is hoped that skills required would be reduced, as well as time and costs of planning;

b) Facilitated comparisons of existing conditions and of proposals for development in different locations;

c) Reduced construction and maintenance costs for infrastructure and equipment; and

d) Improved equity to be derived from uniform facilities and services.

LIMITATIONS

Each of the above benefits is achieved at a cost and each incurs significant risks. Setting aside for the moment consideration of the cost of developing the standards, it is useful to look at some of the attendant risks. Two classes of risk are particularly important:

a) Important differences among areas are lost. This results in dangerously misleading interpretations of conditions in individual locations, in false comparisons of conditions between locations, and in failure to consider different conditions at different times. Frequently the result has been programs and projects inappropriate for specific local conditions (as in the case of irrigation and transmigration projects in Riau).

Examples: The number of schools at accepted physical standards is an inadequate indicator of the quality of education; household income levels may signify different things, in terms of real well-being, in different places or in the same location at different times; per capita consumption levels of specific goods and services, for example housing, will vary with any of a number of factors in different locations, including such things as population densities; the "same" unit costs for, say, road construction may signify efficiency in one location and great inefficiency in another.

b) Expected savings from reduced requirements for skills, from reduced costs of planning, and from reduced construction and maintenance costs may in fact not be achieved. This is particularly true when the cost of developing the standards is included in the costing equation and when the risk of failure is also included.

The creation of standards is an abstracting process, and information is always lost in such a process. The more abstract the standard, the more information about local conditions is lost. The less abstract the standard (in other words the more sensitive) the less the objectives of standardization will be achieved. The ideal, of course, is to use a standard while carefully considering individual local variations from that standard. However, the skill required to do this is greater, not less, than if there were no standard. The hoped for cost savings may not be realized.

THE TASK OF STANDARDIZATION

For some specific planning purposes, standardization of concepts or data items may be theoretically appropriate. If so, an effort should be made to determine if it is practically appropriate by looking at what is actually involved in creating the standards. The tasks required include, among others:

a) Analysis of existing non-standardized concepts;

b) Technical analyses to identify standardized concepts which will in fact simplify planning and management and thereby reduce costs. Standards requiring elaborate definitions and procedures may be incomprehensible or simply more costly to use than existing non-standard concepts. These technical analyses must be performed by skilled specialists in each sector or activity;

c) Technical analyses to identify standardized concepts which can be applied in different places and at different times and still have the same (or nearly the same) significance for policy and planning purposes. (Note the comments in paragraph (a) on Limitations). Again, these technical analyses must be performed by skilled specialists in each sector or activity.

d) Extensive negotiation to get all of the potential user agencies at each level of government and outside of government to agree on the standardized concepts and on data which would be useful to all of them. Where complete agreement cannot be reached, a thesaurus must be prepared to reconcile different concepts, units of measure, and data presentation formats.

e) A formal process for evaluating and updating within sectors. The significance of a facility or service level, of an income or cost level, may change over time. This can be caused simply by inflation, but also by changes in the context or condition of users, of beneficiaries, or of providers. The value of standardized items or units of measure may change. Also, new concepts or data may become available which require updating of a standard.

CODIFICATION

Codification is the representation of data classifications, standards and other concepts by short symbols, typically numeric or alphanumeric. The purpose of coding is to simplify and accelerate the manipulation of data within and retrieval of data from information systems. This applies whether the system is manual or automated.

Different types of coding are needed for different purposes. Codes may be designed for machine processing, for human processing, or both. Codes designed for efficient machine processing cannot be read by humans, while codes which can be read by humans rapidly drive up the costs of machine processing. Other factors affecting the type of code structure needed include:

a) The need to compare related data items (and hence the need for a subject-classified coding scheme);

b) The size of the data base to be coded;

c) The scope of subject coverage where a classified scheme is needed;

d) The level of abstraction required given the trade-off between cost of manipulation of the code and the amount of information lost;

d) Other trade-off preferences, including such as capital/labor cost, and who benefits/who pays.

TASKS OF CODIFICATION

Codification, if it is to achieve the desired benefit, requires careful and normally lengthy procedures, including such steps as the following:

a) Identification of the purposes of codification, with the specific users, uses and procedures for the use of data spelled out operationally;

b) A determination of whether standardization and/or coding is desirable;

c) Analysis of existing codification schemes;

d) Selection and testing of possible codification schemes for the specific purposes at hand;

e) Preparation of instructions for the immediate and continuing use of the selected codification scheme :

f) Training staff and users in the use of the scheme;

g) Codification of the data currently available; and

h) Establishment of procedures for evaluation and updating of the selected codification scheme.

ACTIVITIES OF NSRPS IN STANDARDIZATION AND CODIFICATION

For LTA-12 to have committed the resources necessary to create standard planning concepts and data items for the wide array of sectors and activities would have prevented accomplishing many of its other objectives. Even so, it would not have been able to achieve many of the objectives expected from efforts to standardize and codify. These are very large tasks indeed.

The project has not attempted a systematic inventory of minimal data requirements for all aspects of the planning and management of regional development, and it has not attempted codification of all data at the level of individual data items. The following were principal factors:

a) There was insufficient time and staff skills;

b) It would have been premature without several years of experience with SDF work and annual planning and budgeting;

c) There was a desire to avoid the dangers of standardization, and to avoid perpetuating difficulties already encountered as a result of excessive standardization; and

d) Elaborate codification would be premature prior to basic decisions on minimal data sets needed.

Sector specialists have, however, identified and used minimal data sets needed for their work. SDF and AP reports have identified data requirements for some sectors and recommended immediate action to acquire and maintain necessary data (for example, the transportation recommendations).

The technical library in BAPPEDA Riau uses a codification scheme which permits rapid retrieval by subject at the bibliographic level (see the body of the main report). It does not readily permit retrieval at the data table or single data item level, and is appropriate for a general planning data base rather than for data bases specific to individual sectors or activities.

FOLLOW ON ACTIVITIES

Follow on activity in Riau and in the extension of LTA-12 experience to other provinces should include:

a) Basic data listing - based on the SDF and APB systems which are eventually adopted;

b) Systematic inventorying and evaluation of relevant existing data or information and of existing standardization and codification systems;

c) Acquisition of relevant data/information for BAPPEDA Riau technical library; circulation of copies or of inventories to other provincial libraries or user groups;

d) Surveys or other data collection activities to fill identified data gaps (in collaboration with Kantor Sensus dan Statistik, Kanwils and Dinases in each of the provinces, as well as other agencies if needed);

e) Establishment of evaluation and updating procedures for each standards system or codification systems; and

f) Establishment of a program for standardization and continued codification.