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How computer can help BRAC, rural development organization in Bangladesh

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HOW COMPUTER CAN HELP BRAC,

RURAL DEVELOPMENT ORGANIZATION

IN BANGLADESH

Mémoire présenté par

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List of abbreviations.

B.R.A.C.: Bangladesh Rural Advancement Committee

D.E.A.D.B.: Demographic, Economic and Agricultural Data Base

R.C.T.P.: Rural Credit and Training Program

S.L.D.B.: Schemes and Loans Data Base

CONTENTS

Introduction: scope of this study.

This study is the result of a five months stay inside the Bangladesh Rural Advancement Committee (B.R.A.C.) in Dhaka, Bangladesh. This stay was carried out in response of a request from BRAC's managers to cast a report on their organization computer needs. Such an assignment is extremely vague and is made even more difficult in a developing country environment.

Being given total liberty in the performing of this task, I decided which sectors inside BRAC would be investigated. As a result, BRAC's action was favored against BRAC's administration. Acquiring an efficient tool for evaluating its rural development programs, and hence formalising its knowledge on rural Bangladesh, seemed to me the most productive investment BRAC could do in accordance with its statement of purpose.

The question therefore is whether BRAC needs computer help, and in case of a positive answer, how. This is the scope of this study. It is not a functional analysis. The problems were too loosely defined for such an approach. It rather is an attempt to show how a specific rural development organization in a developing country could take benefit from computer use in the core of its activities, its "raison d'être".

Chap 1. BRAC and its environment.

1.1. Introducing BRAC: history and action.

How best can BRAC be introduced, if not through its own words?

> " The Bangladesh Rural Advancement Committee (B.R.A.C.) is a non-governmental organization involved in various activities with the objective of contributing to the economic and social development of rural Bangladesh. Founded and run by Bangladeshi nationals, it began in a small way in February 1972, to rehabilitate refugees of the 1971 liberation war. BRAC has since grown into an organization with projects and activities in several districts. The scope of operations has evolved from rehabilitation to integrated rural development, and the design, testing and implementation of innovative approaches, techniques and methodologies for rural development. The focus of development has shifted from community approach to mobilisation and organization of the poor and disadvantaged sector of the population.
>
> In addition to the physical and operational growth of the organization, practical experience in the planning and implementation of rural development programs has enabled BRAC to foster the development of people and institutions so necessary for long-term and self-sustaining growth of rural Bangladesh. All sectoral programs such as agriculture, horticulture, pisciculture, animal husbandry, duck and poultry raising, nutrition, health care, family planning services and functional education are initiated and controlled by cooperative groups of disadvantaged people. In support of group activities, BRAC provides training, credit, and logistic assistance." [1] (*)

Let's deepen some features of BRAC's philosophy. Rural development is meant for the disadvantaged and by the disadvantaged. BRAC's development programs are designed with the objective of teaching the rural peasants self-reliance and solidarity. These two concepts are cornerstones in BRAC's methodology. This is why economic schemes must be developed through cooperative groups, and credit is only granted when

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(*) Numbers between brackets refer to the bibliography.

groups' own savings are able to make up for some portion of the needed capital (as it is explained in chapter 2). If, through self-designed and joint economic schemes, the rural poor is able somehow to improve his situation, he realises he can become the sole responsible for his fate. He starts viewing himself as an actor. Changes are within his range. Actual economic improvements are of less importance than the idea of improvement itself.

The implementation of such a policy obviously requires a complete and deep knowledge of Bangladesh rural scene. Areas must be carefully chosen in which programs will be launched. Evaluation of programs is seen as an essential function. Measurements of how selected areas evolve under BRAC's programs influence must be accurately carried out. Considering how large has BRAC's touched population grown (BRAC is now present in almost every district in Bangladesh), such an evaluation becomes a heavy task, requiring huge amounts of data to be collected. As BRAC's knowledge and experience are developing, large data gatherings are actually created to support further action.

As a sample of BRAC's activity, the following can be mentioned:

- Manikgonj project:

> " The approach in Manikgonj has been to promote rural development activities through formation of groups of the people themselves with a minimum of BRAC personnel. The role of BRAC is building rural institutions, and the creation and training of different cadres of rural workers. Disadvantaged members of the community are carefully identified and brought together in a process of conscientisation through group workshops and a specially designed Functional Education Course. They are then supported in undertaking income generating ventures and social action for their own benefit." [1]

Manikgonj project is also currently used is a testing ground for BRAC's other projects.

- Oral therapy program:

> " Diarrhoea is one of the major causes of death in rural Bangladesh. Recently, a new treatment for diarrhoea, called Oral Therapy, was devised. After a year of research and field studies, BRAC has developed a method of rural therapy, which is appropriate for rural Bangladesh, and a program which trains village women to use this method. During the first six months of the program, BRAC has trained over 22,000

village women to use Oral Therapy for diarrhoea treatment." [1]

BRAC is now involved in an evaluation process which aims at testing how Oral Therapy affected demographic results in trained areas. About 110,000 people in eight different thanas (*) were picked up as sample for a five surveys process (one baseline and four follow-ups staged every six months). For the first time in BRAC's history, the computation burden imposed use of computers from other organizations in Dhaka.

- Rural Credit and Training Program: Seen as the core of BRAC's action, RCTP is a long range and far reaching program which aims at providing cheap credit sources to rural landless populations. RCTP is fully explained in point 1.2.

As an organization, BRAC presently counts a thousand employees, most of them working in numerous field camps throughout Bangladesh. All of them are Bangladeshis. Most of them have university degrees. Being a private organization, BRAC is financed through private donations from West-European and American organizations, and contributions from some government development agencies which are granted on a program basis.

Thana: Bangladeshi administrative unit.

1.2. Rural Credit and Training Program.

1.2.1. History and objectives.

In 1977, BRAC found out from the various projects it was conducting, that a decisive obstacle to landless and poor peasants development was their lack of access to cheap credit. Traditional credit sources in rural areas have always been local money lenders who would grant loans at outrageous interest rates. The sole cheap credit source is to be found in official banks, but is not available to landless people for three main reasons:

a) A loan applicant must have collateral, i.e. some goods that will act as a guarantee against repayment failure. Such a collateral is basically constituted by land. Most rural poor families don't have land.

b) Applying for a loan requires forms filling, terms negociating... A certain level of education must be achieved to get a loan under these conditions, and such an education is seldom available in rural areas.

c) Bank loans take a long time for processing before being actually granted. Since most families need credit for emergencies (such as making up in food for a bad harvest), they usually cannot afford any delay.

BRAC felt a program should be started where credit would be made available in order to foster peasant development by granting them economic autonomy from traditional power structures: money lenders and landlords (who are often a same person). This autonomy objective is included into a broader perspective: the uprising of consciousness among landless and poor peasants. Rural Credit and Training Program was designed to achieve these goals. RCTP sets up groups of local peasants, gives them functional education. Groups then come up with proposals of economic schemes which will be financed through BRAC's loans. Some requirements have to be fulfilled:

- The whole group must benefit from schemes, and not just individuals.

- Money must be used for productive purposes. This involves training in such fields as management and accounting.

- Repayment must not be made difficult. The schemes must provide a secure way for repaying loans.

A group pressure on individuals is wanted in order to enhance solidarity. Loans are therefore granted through the group which is jointly held responsible for their repayment.

1.2.2. Daily working.

Each group of landless and poor peasants formed under RCTP's supervision appoints a 5 to 6 persons executive committee. (A group is called SAMITY, or society).

The samity shall have four funds:

I) Savings: this fund is fed by personal weekly contributions from each samity member. Every member has his own account. When he leaves the samity, he is repaid the totality of his savings.

II) Reserve: comes from contributions from every economic scheme on its profit.

Funds I and II can only be used for productive purpose. No consuming expense shall be allowed. Before a loan is granted to the samity, Savings and Reserve funds must raise 10% of the required amount. In the long run, the samity should be able to grant itself needed loans without further calls to RCTP.

III) Emergency: constituted as Reserve, it is used for emergency needs by individuals, such as a parent's death or a house collapse.

IV) General: sole fund which can be used for consumption expenses. It pays for the samity's administrative costs, and is fed by voluntary or collective works especially meant for it.

This financial system entitles the samity to supervise the management of economic schemes. It provides a first level of control. A second level is to be found in RCTP field branches. The samity as a whole is responsible before RCTP staff for all BRAC granted loans while individuals are responsible before their samity. If individuals fail to repay, the samity refunds BRAC and works an agreement with failed members.

Two kinds of loans can be granted:

a) Collective loans: granted to the whole samity for a single project which proves to be profitable for the

samity.

b) Team loans: within a samity, some members form a subgroup to launch a specific scheme. They would generally have some abilities or craftmanship in common. For instance, five carpenters join to produce boats, or three women come together for paddy husking. If the samity is convinced on the scheme profitability, a weekly allowance will be computed and the team starts working.

In a samity, there must always be at least one collective scheme. Usual distribution is 30% collective and 70% team. Collective schemes are more profitable to the samity and provide a better consciousness among all members. A samity must also undertake social actions aiming at putting pressure on local influential people (local government, money lenders, landlords...) to improve public services, work conditions...

1.2.3. RCTP's organization.

On the field, RCTP is divided into branches. Each branch is managed by a Branch Manager assisted by 4 to 5 Program Organizers (P.O.). A branch covers 16 to 20 villages; 13,000 to 15,000 people. In each village, 2 samities are set up: one male and one female.

When RCTP first arrives in a village, a two-part baseline survey is conducted, assessing the situation at RCTP's inception. The first part is demographic and involves all households. The second part picks up a 10% sample of households for an income and assets survey.

In 1982, 16 RCTP branches were opened. An extension to 20 branches is planned for 1985, then RCTP will stay at this level until the end of the 80's. Presently, only 8 branches have reached the stage of credit. Eight more are expected to do so by early 1984.

A word can be said about how RCTP approach of villagers is made. When a village is reached by RCTP, the Program Organizers (PO's) are first involved in data collections (baseline surveys). Through repeated visits, the PO's meet the villagers and initiate discussions concerning their daily life. Little by little, as the problems come up, the idea of setting up an organization, a samity, is introduced. It takes an average 5 months before the samity is actually set up.

About a year after the first village encounters, the stage of credit is reached. The delay is not fixed, and

varies depending on the level of consciousness reached by the samity. Evaluating this level is difficult, forcibly because villagers soon or later find out BRAC is going to grant loans, and long for it. A criterium which is often used is how well the samity's funds were set up and fed.

As far as loans are concerned, BRAC tries to interfere as little as possible in proposals. Initiatives must come from samities. Peasants are best judges, they know what they most need. PO's are available for counseling, they will not be involved in the samity's daily business. Repayment schedule is worked out at the time the loan is granted and depends on the scheme profitability. Higher level in BRAC's hierarchy is entitled to decide to grant the loan as the concerned amount grows bigger.

1.3. Why computer?

In the preceding description of BRAC and its main program, RCTP, an emphasis was put on data which have to be collected for describing rural situations and performing surveys for program evaluation. Inside BRAC, this work is the task of Research and Evaluation Branch. Up to now, it had to be done entirely manually. As an example, a typical RCTP branch baseline survey currently requires a working power of about 100 men/days to compute the tables to be published in the final report. Considering a present employee staff of 10 people, there is an obvious risk of botlleneck as RCTP is growing, unless a hiring process is undertaken.

Even more, Research and Evaluation Branch was created to become BRAC's pool of consultants, standing as trustees of BRAC's knowledge. In the long run, it could perform surveys on behalf of other organizations. BRAC therefore has a potentially powerful tool for apprehending the whole complexity of Bangladesh rural world. Such an achievment cannot be done without an indigeneous computing centre .The needs are therefore existing; needs immediately coming out of what constitutes the core of BRAC's activity: its rural development programs. On a practical point of view, these needs are expressed mainly in terms of data bases. RCTP is an eloquent example: every stage of its implementation can be translated in terms of data sets which are an image of some situation at a given time. On these sets, statistical work is performed, whose results are compared to those corresponding to another situation. Programs are evaluated this way, and reassessed accordingly. At global levels, data storage needs are high: growing an expertise on Bangladesh rural situation requires a great deal of observations and surveys.

Classical application fields of computer science are not seen here as being very interesting to BRAC. There surely is a possibility for computer use inside the accounting section, or for stock management at BRAC's shop in Dhaka. But it was decided to put the stress on BRAC's action, and not on BRAC's administration. Indeed BRAC's action has an urgent need for mass-storage capacities and computation facilities. On the development of such tools depends BRAC's future, as it was explained earlier. Simultaneously, there is no emergency nor straightforward benefit in introducing computer inside the accounting section. Heads of this section did not see any foreseeable risk of work saturation. Accounting work is currently smoothly performed. Accounting employees are not overburdened. More generally, an increase in work load could easily be coped with through hiring of new employees. Manpower in Bangladesh costs much less than a computer installation and its daily activity. Clerical employees also are abundant on Dhaka market. Decision to favor BRAC's action was based upon these remarks as much as on personal beliefs.

While looking into BRAC's activity, RCTP presented some outstanding features. The wide range of fields which are concerned by RCTP's action (landless education, economic

development schemes, statistical surveys of rural villages) designates this program as an excellent sample of BRAC work. It was BRAC's intention when designing RCTP to develop it as the main structure of its activities. RCTP is therefore deemed to receive most of BRAC's ressources. This is why, throughout this study, RCTP is seen as the backbone of BRAC's computerisation.

In conclusion, BRAC needs computer for its rural development programs. The way this help can be implemented is explained in the next point. Considering the important role played by data gatherings throughout BRAC's action, the emphasis in this study was put on data structures, rather than on processings.

1.4. Outlines for a computer system.

RCTP's computer needs can only be loosely defined. It is very difficult to assess precisely which treatments are involved. Instead, an idea on the nature of work which is concerned in RCTP's activity can be shaped. This is done in point 2.2.4.1. Data handled through RCTP are the most important dimension to investigate. From RCTP's action, two main data bases are defined:

1) Demographic, Agricultural and Economic Data Base (D.E.A.D.B.): this data base gives an image of rural situation in which RCTP branches are working. It can be used to compute statistical reports that show how the situation was at RCTP inception, and through follow-up surveys, how this situation evolves under RCTP's influence. Mainly cross-tabulations and other basic statistical works are expected to be done on D.E.A.D.B.

2) Schemes and loans Data Base (S.L.D.B.): it ensures RCTP's follow-up. Built around schemes and loans, which are RCTP's pillars in villages, SLDB provides an evaluation tool of RCTP's effectiveness. It helps to cast reports on economic activities undertaken by village organizations.

Both data bases are described in detail in chapter 2. Their requirements are computed on a 20 RCTP branches basis, which is enough for BRAC's needs until 1990. In chapter 3, a discussion is made on which configuration could support these data bases with regards to BRAC's developing country environment.

Chap 2. Two data bases: D.E.A.D.B. and S.L.D.B.

2.1. Design principles.

The hereafter described data structures were designed from the questionnaire used in the various R.C.T.P. branches for the baseline surveys, and from the forms used in the Accounting Section to perform the final loan position.

In order to ensure portability on small scale computers, it was important to imagine a set of files that could be easily implemented, i.e. without extensive and sophisticated file management system. It therefore was decided to impose a certain amount of decisions which all files have to respect. These decisions are now explained:

2.1.1. All records within the same file have the same type.

By type of record, we mean the record general pattern which represents a real world entity in our set of files. By allowing only one type of record per file, we surely restrict ourselves. Indeed such organizations as "main type-subtypes" are forbidden. But considering the "search for feature" kind of access that is planned over this data base, "main type-subtypes" files offer an easy search only for those features which are explicitly recorded inside the file. All other features are more complicated to find. One type per file instead provides a standard way to find any required feature, and no feature is priviliged with regard to the others. Overall, such a system provides a big gain in processing simplicity.

2.1.2. All records must have fixed length, and this length is unique for a given record type.

Coupled with decision 1, this point implies that within a file, the record length is known beforehand, and is not subject to change during the data base life. When deciding upon this feature, the goal was to avoid uneasy access methods which would have caused run-time heavy and lengthy computations in input-output operations.

2.1.3. Save as much mass storage area as possible.

Since this application is most likely to be implemented on small computers, mass storage area can prove to be a crucial ressource. It is therefore wise to plan mass storage shortage from the very beginning.

Storage savings can be made in the way information is coded. In the following file descriptions, five coding systems are shown, that will hopefully prove how much storage area can be saved when careful attention is drawed upon coding. Let's now see through a simple example how these coding systems work.

Suppose we have a file of cars, and for each such car the following informations are recorded:

CAR: Trade Mark of car:
- TOYOTA
- MITSUBISHI
- HONDA
- DATSUN
- NISSAN
- OTHERS

Year of making: Value 0: 1970
to 20: 1990

Date of licence: Year: 0 to 20
Month: 1 to 12
Day: 1 to 31

Licence number: Value ranging from 000001 to 100000

Name of owner: 15 letters.

First coding system: International ASCII code where one character is coded upon one byte.

For the CAR record, we need:

Trade mark of car: Space must be big enough to record largest possible value which is MITSUBISHI: 10 BYTES.

Year of making: 2 BYTES.

Date of licence: 6 BYTES.

Licence number: 6 BYTES.

Name of owner: 15 BYTES.

TOTAL: 39 BYTES.

Second coding system: Let's now use a special code to record the values for Trade mark of car:

- Value 1: TOYOTA
- Value 2: MITSUBISHI
- Value 3: HONDA
- Value 4: DATSUN

- Value 5: NISSAN
- Value 6: OTHERS

If ASCII is once again used, we need:

Trade mark of car:	1 BYTE
Year of making:	2 BYTES
Date of licence:	6 BYTES
Licence number:	6 BYTES
Name of owner:	15 BYTES.
TOTAL:	30 BYTES.

Third coding system: SIXBIT code, where one character is coded upon six bits.

For the CAR record, we need:

Trade mark of car:	6 BITS.
Year of making:	12 BITS.
Date of licence:	36 BITS.
Licence number:	36 BITS.
Name of owner:	90 BITS.
TOTAL:	180 BITS.

Fourth coding system: We keep 8 bits to code alphabetic characters, but we consider numeric characters as digits. Since there are only ten digits, each one of them can be coded upon four bits. We shall call this system 4-BIT.

For the CAR record, we need:

Trade mark of car:	4 BITS.
Year of making:	8 BITS.
Date of licence:	24 BITS.
Licence number:	24 BITS.
Name of owner:	120 BITS.
TOTAL:	190 BITS.

Fifth coding system: For each information, we consider all possible values. To each such value, a binary configuration

is assigned, starting with 0, then 1, then 10, and so forth. If there are n values for a given information, the number b of bits required to store these values is computed according to the following formula:

$$b = \lceil \log_2 n \rceil$$

where $\lceil x$ means the lowest integer equal or bigger than x.

This system will be called BINARY.

For instance, six possible values exist for the information "Trade mark of car". According to the BINARY formula, we need

$$\lceil \log_2 6 = 3$$

bits to store these values. Indeed:

Value	will be coded as
1	000
2	001
3	010
4	011
5	100
6	101

Note that up to 8 possible values can be coded upon three bits.

For the CAR record, we need:

Trade mark of car: 3 BITS.

Year of making: 5 BITS.

Date of licence:
- year: 5 BITS.
- month: 4 BITS.
- day: 5 BITS.

Licence number: 17 BITS.

Name of owner: 75 BITS. (1 letter = 5 bits)

TOTAL: 113 BITS.

As a summary:

TOTAL	BYTES	BITS
ASCII(1)	39	312
ASCII(2)	30	240
SIXBIT	23	180
4-BIT	25	190
BINARY	15	114

From ASCII to BINARY, storage gain is done in a 2 to 1 ratio. Such a ratio shows how coding systems can affect storage area amounts. Nevertheless one should not forget that ASCII is standard on almost every device, and transcoding procedures are therefore supplied with them. With BINARY, coding and decoding procedures must be programmed by the application designer. It sounds as a very difficult task to perform. One could consider such procedures as being low level procedures which are automatically used by any input-output request. They would therefore stay perfectly transparent to the user. As far as programming is concerned, these procedures should not constitute a major burden. One could implement them using standard parametrised filters that would translate a given code into another one. Such a tool could easily be generalised to the point of having a procedure that not only translates codes but also can select records according to special conditions.

Another great feature about BINARY is that it leaves a possibility to add new codes to a single information. From the CAR example, Trade mark of car was coded with six different values. What if new values have to be accounted? Since in BINARY, three bits are reserved for this information, two new codes can be entered without changing anything in the file structure, and further codes addition would be coped with in a matter of new bits instead of bytes.

These four decisions affected the data structures that were designed in accordance with them in a particuliar way. Instead of having big files gathering an important amount of informations concerning many different concepts, the emphasis was put on many small files, each one of them devoted to a specific concept, with simple standard records. It will be the duty of the designed access system to find

its way through the data base in order to reach any user required information. The way such an information will be found must stay perfectly transparent to the user.

2.2. First data base: Demographic, Economic and Agricultural (D.E.A.D.B.)

2.2.1. General approach.

R.C.T.P. uses a ten pages questionnaire to collect data for its baseline surveys. This questionnaire is divided into two parts. The first part is called "Demographic" and is filled for all households in the area subject to a R.C.T.P. branch. The second part, called "Income, Assets and Agriculture" is only filled for a 10% households sample.

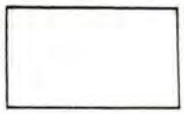
This questionnaire reaches almost every aspect of the daily rural life of a bangladeshi household. It handles data about everything which is relevant to a complete survey in rural areas. As such, this questionnaire uses a lot of concepts, closely linked together, which form the backbone of the data structure. Although R.C.T.P. does only baseline surveys in its different branches, it should be beneficial to consider the possibility of follow-up surveys. These surveys would indeed provide a mean of checking whether the people which are reached by this program take benefit from it, according to the goals of R.C.T.P. To that extent, it might be wanted to compare present situations in the villages with what they used to be at the time of R.C.T.P. inception in their area. In that sense, D.E.A.D.B. can be very helpful, and has been designed with this possibility of follow-up surveys in mind.

Before describing each file, a first general approach is hereby given:

- R.C.T.P. branches are working in villages where several households live.
- A household has several members. Some members are earning members.
- A household may have had several births or deaths during the past year.
- A household may cultivate plots which it does own or not, and vice-versa.
- A household may own or control ponds.
- A household may have debts.
- A household may possess animals.
- 10% of households have an economic description.
- A household may have undertaken land transfers.

This broad description can be formally edited with the help of a flowchart. We use here the symbols defined by the Access Model developed in the University of Namur:

Rectangle:

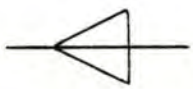


designates a "record type" (what we earlier called a concept). The record type name appears inside the rectangle.

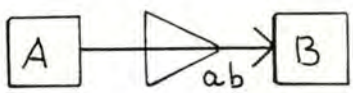
arrow:

Between two record types, an arrow shows an "access path" from a first record type called "origin" towards a second record type called "target". An access path is a logical link, expressing a relationship between two record types, which can be stated after observing real world behavior. The arrow also expresses a logical sense within the path. It shows that target records can be reached from origin records through the path, but the opposite cannot be assumed. Some access paths are given a name which then appears alongside the arrow.

Triangle:



not to be confused with arrow, the triangle expresses access paths connectivity. It tells how many target records and how many origin records can possibly be linked by one given path. The triangle broad size shows several records can be in relation through a path, while the triangle summit tells only one record is possible. For instance:



means that several records of record type A can be origin of a single access path 'ab', but only one record of record type B can be target on a single access path. Absence of triangle tells only one record on each arrow side is possible for a given access path.

Crossing line:

indicates that the record type on which arrow side it appears is compulsory, i.e. any record of the designated record type must always be

linked by the crossed access path. If the crossing line appears above several access paths, any record of the designated record type must always be linked by at least one of these access paths.

Fig 1 shows the importance of HOUSEHOLD record type. It really is the central notion in D.E.A.D.B. All other concepts are linked to this one. In order to stay in accordance with the three design decisions, each record type was grouped into a separate file. D.E.A.D.B. is therefore made up from eleven different files whose description is hereafter given.

Note that in Fig 1, no specific sense was given to the access paths. This was done so as not to overburden the drawing. One must not conclude that only access paths from HOUSEHOLD record type towards other record types which gravitate around it are planned. Such a system would obviously grossly restrict the possible uses. It is indeed the intention to provide every access path with its reverse, and this is done in the way D.E.A.D.B. is described with its records identifications.

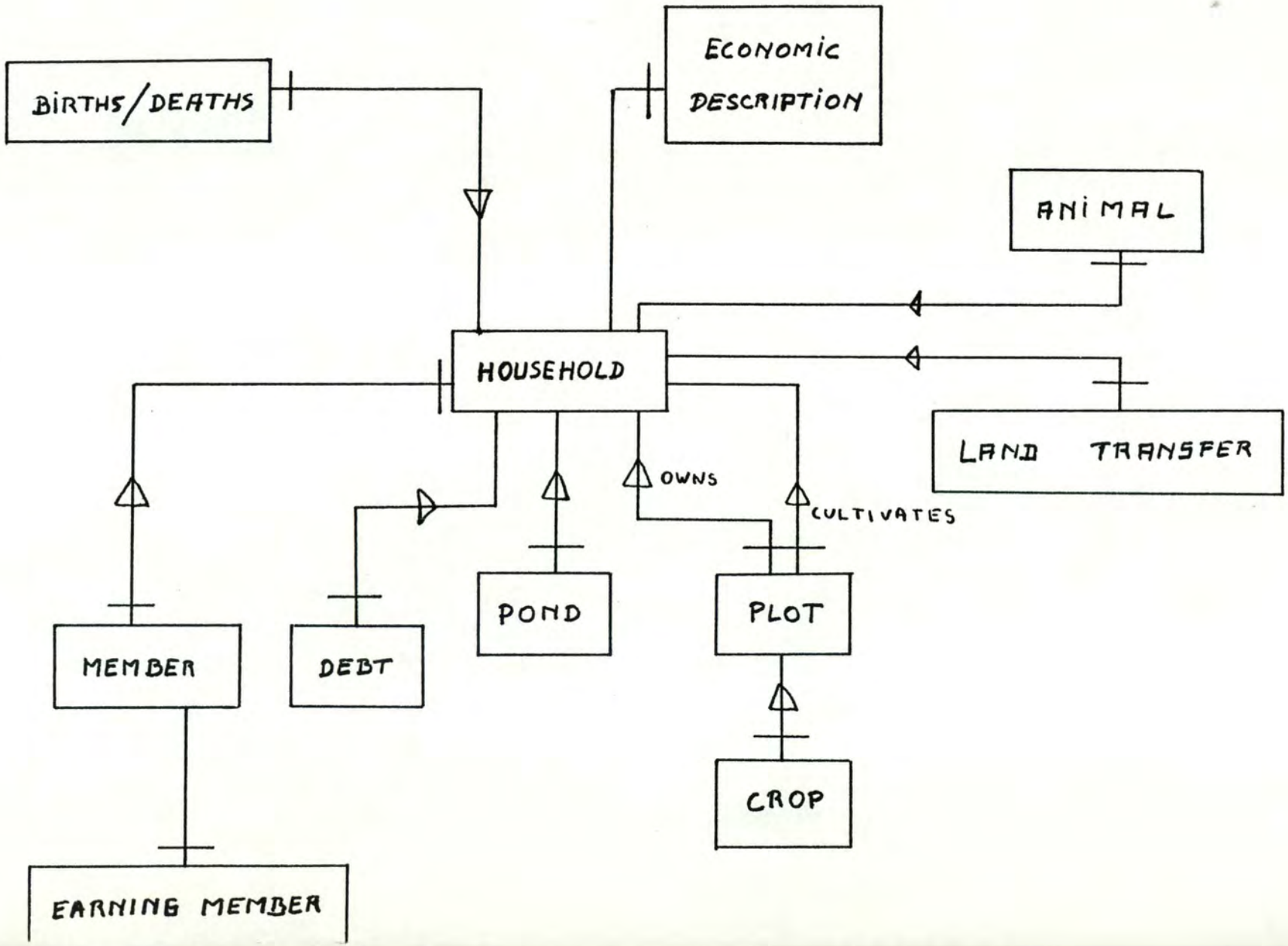

BIRTHS/DEATHS
ECONOMIC DESCRIPTION
ANIMAL
HOUSEHOLD
LAND TRANSFER
OWNS
CULTIVATES
MEMBER
DEBT
POND
PLOT
CROP
EARNING MEMBER

Fig. 1

2.2.2. Files Description.

For each file, every information will be described with three characteristics:

- Format : tells how the information looks like, i.e. from how many characters or digits it is made up.

- Range: tells what are the limits into which the information has a valid value.

- Specification: gives a rapid definition of the information, the possible code which is used, and special values.

A. HOUSEHOLDS.

This is the corner stone file of D.E.A.D.B.

A.1. IDENTIFICATION: A household is identified by a 7-digits number that locates it within its village and within the R.C.T.P. branch on which it depends.

A.1.1. BRANCH #:

- Format: 2 digits.
- Range: from 1 to 32.
- Specification: R.C.T.P. Branch number.

A.1.2. VILLAGE #:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: village number within R.C.T.P. Branch.

A.1.3. HOUSEHOLD #:

- Format: 3 digits.
- Range: from 1 to 999.
- Specification: household number within the village.

A.2. SURVEY NUMBER

- Format: 1 digit.
- Range: from 0 to 1.
- Specification: code:
  - 0: baseline
  - i: follow-up survey i

A.3. HOUSEHOLD HEAD:

- Format: 15 letters.
- Range: All letters from latin alphabet included space character.
- Specification: name of head of household.

A.4. INTERVIEW DATE:

A.4.1. DAY:

- Format: 2 digits.

- Range: from 1 to 31.
- Specification: Day of interview during the month.

A.4.2. MONTH:

- Format: 2 digits.
- Range: from 1 to 12.
- Specification: Month of interview.

A.4.3. YEAR:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: last two digits of interview year.

A.5. RELIGION:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
  - 0: muslim
  - 1: hindu
  - 2: others

A.6. DEBTS:

- Format: 1 digit.
- Range: 0 or 1.
- Specification: if a household is in debt, one or several debts records will exist for that household. This fact will be reported here.
  - 0: household not in debt
  - 1: household in debt

A.7. LANDHOLDING: different categories of land holdings are recorded.

A.7.1. TOTAL LANDHOLDING:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: area in hundredths of acre.

A.7.2. ARABLE LANDHOLDING:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount of agricultural land possessed by a household,in hundredths of acre.

A.7.3. FALLOW:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area of fallow landholding in hundredths of acre.

A.7.4. HOMESTEAD:

- Format: 3 digits.
- Range: fron 000 to 999.
- Specification: area of homestead in hundredths of acre.

A.7.5. OWN CULTIVATED LAND:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: area of own cultivated land in hundredths of acre.

A.7.6. MORTGAGED OUT:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area of land mortgaged out in hundredths of acre.

A.7.7. LEASED OUT:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area of land leased out in hundredths of acre.

A.7.8. SHARE CROPPED OUT:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area of land shared cropped out in hundredths of acre.

A.8. ECONOMIC DESCRIPTION:

- Format: 1 digit.
- Range: 0 or 1.
- Specification: if the household is part of the 10% selected households sample for income, assets and agriculture survey, this fact is reported here.
  - 0: household not part of 10% sample
  - 1: household part of 10% sample

A.9. FAMILY PATTERN:

- Format: 1 digit.
- Range: from 0 to 4.
- Specification: code:
    - 0: single
    - 1: nuclear
    - 2: extended
    - 3: joint
    - 4: others/ unspecified

A.10. HOUSEHOLD SIZE:

- Format: 2 digits.
- Range: from 0 to 31.
- Specification: how many members form this household. Assumed maximum of 31.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
A.1.1.	2	12	8	5
A.1.2.	2	12	8	7
A.1.3.	3	18	12	10
A.2.	1	6	4	4
A.3.	15	90	120	75
A.4.1.	2	12	8	5
A.4.2.	2	12	8	4
A.4.3.	2	12	8	7
A.5.	1	6	4	2
A.6.	1	6	4	1
A.7.1.	4	24	16	14
A.7.2.	4	24	16	14
A.7.3.	3	18	12	10
A.7.4.	3	18	12	10
A.7.5.	4	24	16	14
A.7.6.	3	18	12	10
A.7.7.	3	18	12	10
A.7.8.	3	18	12	10
A.8.	1	6	4	1
A.9.	1	6	4	1
A.10.	2	12	8	5

FILE A: HOUSEHOLDS.

TOTAL	BYTES	BITS
ASCII	62	496
SIXBIT	47	372
4-BIT	39	308
BINARY	28	219

B. MEMBERS.

B.1. IDENTIFICATION: Members will be identified within their household by the adjunction of a serial number which will count how many members form the household.

B.1.1. HOUSEHOLD IDENTIFICATION: same as A.1.

B.1.2. SERIAL NUMBER:

- Format: 2 digits.
- Range: from 00 to 31.
- Specification: member serial number within his/her household.

B.2. SURVEY NUMBER: same as A.2.

B.3. NAME OF MEMBER:

- Format: 15 letters.
- Range: all letters from the latin alphabet, space character included.
- Specification: member's first name.

B.4. RELATIONSHIP TO HEAD OF HOUSEHOLD:

- Format: 2 digits.
- Range: from 00 to 40.
- Specification: code:
    - 00: household head,
    - 01: wife of household head.
    - 02: husband of household head.
    - 03: son
    - 04: daughter
    - 05: father
    - 06: mother
    - 07: brother
    - 08: sister
    - 09: daugther-in-law
    - 10: son's son
    - 11: son's daughter
    - 12: daughter's son
    - 13: daughter's daughter
    - 14: son-in-law
    - 15: brother-in-law
    - 16: sister-in-law
    - 17: sister's son
    - 18: sister's daughter
    - 19: sister's husband
    - 20: brother's son
    - 21: brother's daugther

- 22: brother's wife
- 23: wife relation
- 24: husband relation
- 25: mother relation
- 26: father relation
- 27: servant
- 28: jaigir
- 29: employee
- 30: step brother
- 31: step sister
- 32: step son
- 33: step daughter
- 34: step father
- 35: step mother
- 36: second and other wives
- 37: unspecified grand child
- 38: guest
- 39: adopted or his/her relation
- 40: others/ unspecified

B.5. SEX:

- Format: 1 digit.
- Range: 0 or 1.
- Specification: code:
  - 0: male
  - 1: female

B.6. AGE:

B.6.1. YEARS:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: exact number of years.

B.6.2. MONTHS:

- Format: 2 digits.
- Range: from 00 to 13.
- Specification: exact number of months, 13 if unknown.

B.7. MARITAL STATUS:

- Format: 1 digit.
- Range: from 0 to 5.
- Specification: code:
  - 0: single
  - 1: currently married
  - 2: widow/ widower
  - 3: divorced
  - 4: separated
  - 5: others/ unspecified.

- 2: agriculture/ day labour
- 3: fishing
- 4: business
- 5: service
- 6: technical work
- 7: household work
- 8: others/ unspecified

B.12. OTHER SKILL:

- Format: 1 digit.
- Range: 0 or 1.
- Specification: code:
  - 0: no other skill
  - 1: other skill

B.13. CHILDREN: If member is a woman, the following informations are recorded:

B.13.1. CHILDREN LIVING WITH HER:

B.13.1.1. SONS:

- Format: 2 digits.
- Range: from 00 to 14.
- Specification: number of sons living with her, assumed maximum is 14.

B.13.1.2. DAUGHTERS:

- Format: 2 digits.
- Range: from 00 to 14.
- Specification: number of daughters living with her, assumed maximum is 14.

B.13.2. CHILDREN LIVING ELSEWHERE:

B.13.2.1. SONS:

- Format: 2 digits.
- Range: from 00 to 14.
- Specification: number of sons living elsewhere, assumed maximum is 14.

B.13.2.2. DAUGHTERS:

- Format: 2 digits.
- Range: from 00 to 14.
- Specification: number of daughters living elsewhere, assumed maximum is 14.

B.8. CAN THIS MEMBER READ OR WRITE:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
    - 0: illiterate
    - 1: can read
    - 2: can read and write

B.9. EDUCATION:

- Format: 2 digits.
- Range: from 00 to 19.
- Specification: code:
    - 0: none
    - 1: class I
    - 2: class II
    - etc...
    - 9: class IX
    - 10: SSC/ Alim
    - 11: HSC/ Fazil/ Kamil/ Tital
    - 12: BA/ B Sc/ B Com
    - 13: BA/ B Sc/ B Com (Hons)
    - 14: MA/ M Sc/ M Com
    - 15: Diploma
    - 16: GT/ PTI
    - 17: B Sc Engineer
    - 18: B Ag
    - 19: MBBS

B.10. MAIN OCCUPATION:

- Format: 2 digits.
- Range: from 00 to 12.
- Specification: code:
    - 0: none
    - 1: absentee farmer
    - 2: cultivation
    - 3: day/ cultivation labour
    - 4: business
    - 5: service
    - 6: technical work
    - 7: household work
    - 8: student
    - 9: children
    - 10: fishing
    - 11: unable to work
    - 12: others/ unspecified

B.11. SUBSIDIARY OCCUPATION:

- Format: 2 digits.
- Range: from 0 to 8.
- Specification: code:
    - 0: none
    - 1: farming

B.13.3. TOTAL CHILDREN NOW DEAD:

B.13.3.1. SONS:

- Format: 2 digits.
- Range: from 00 to 14.
- Specification: number of sons now dead, assumed maximum is 14.

B.13.3.2. DAUGHTERS:

- Format: 2 digits.
- Range: from 00 to 14.
- Specification: number of daughters now dead, assumed maximum is 14.

B.14. EARNING MEMBER:

- Format: 1 digit.
- Range: 0 or 1.
- Specification: code:
  - 0: this is an earning member.
  - 1: this is not an earning member.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
B.1.1.	7	42	28	22
B.1.2.	2	12	8	7
B.2.	1	6	4	4
B.3.	15	90	120	75
B.4.	2	12	8	6
B.5.	1	6	4	1
B.6.1.	2	12	8	7
B.6.2.	2	12	8	4
B.7.	1	6	4	3
B.8.	1	6	4	2
B.9.	2	12	8	5
B.10.	2	12	8	4
B.11.	1	6	4	4
B.12.	1	6	4	1
B.13.1.1.	2	12	8	4
B.13.1.2.	2	12	8	4
B.13.2.1.	2	12	8	4
B.13.2.2.	2	12	8	4
B.13.3.1.	2	12	8	4
B.13.3.2.	2	12	8	4
B.14.	1	6	4	1

FILE B: MEMBERS:

TOTAL	BYTES	BITS
ASCII	53	424
SIXBIT	40	318
4-BIT	34	272
BINARY	22	170

C. BIRTHS/DEATHS.

This file records births or deaths events that occured during the preceding year inside every household. The same record is used for either birth or death event. In order to plan possible follow-up surveys, a field is provided to store the line number of all mentioned persons in this file.

C.1. IDENTIFICATION: births and deaths records will be identified by the adjunction of a serial number to the normal household identification. This number will count how many births and deaths occured for a given household.

C.1.1. HOUSEHOLD: same as B.1.1.

C.1.2. SERIAL NUMBER: same as B.1.2.

C.2. SURVEY NUMBER: same as A.2.

C.3. EVENT:

- Format: 1 digit.
- Range: 0 or 1.
- Specification: whether this is a birth or a death record. Code:
  - 0: death record
  - 1: birth record

C.4. MOTHER'S SERIAL NUMBER:

- Format: 2 digits.
- Range: from 00 to 31.
- Specification: Serial number of baby's mother if this is a birth record. If mother is dead, or if this is a death record, use value 00.

C.5. SERIAL NUMBER OF BABY OR OF DECEASED:

- Format: 2 digits.
- Range: from 00 to 31.
- Specification: Serial number of the person who is concerned by this record. If this person never had any line number (baseline survey, or born and dead in-between two surveys), use special value 00.

C.6. SEX OF BABY OR OF DECEASED:

- Format: 1 digit.
- Range: 0 or 1.
- Specification: code:
  - 0: male
  - 1: female

C.7. IS BABY STILL ALIVE:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
  - 0: dead
  - 1: alive
  - 2: not applicable (death record)

C.8. AGE OF DECEASED:

C.8.1. YEARS:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: number of years. Special values:
  - 90: 90 years old and above
  - 99: not applicable (birth record)

C.8.2. MONTHS:

- Format: 2 digits.
- Range: from 00 to 13.
- Specification: number of months, special value:
  - 13 : unknown number of months

C.8.3. DAYS:

- Format: 2 digits.
- Range: from 00 to 32.
- Specification: exact number of days, special value:
  - 32: unknown number of days

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
C.1.1.	7	42	28	22
C.1.2.	2	12	8	7
C.2.	1	6	4	4
C.3.	1	6	4	1
C.4.	2	12	8	7
C.5.	2	12	8	7
C.6.	1	6	4	1
C.7.	1	6	4	2
C.8.1.	2	12	8	7
C.8.2.	2	12	8	4
C.8.3.	2	12	8	6

FILE C: BIRTHS/DEATHS:

TOTAL	BYTES	BITS
ASCII	23	184
SIXBIT	18	138
4-BIT	12	92
BINARY	9	68

D. ECONOMIC DESCRIPTION OF HOUSEHOLDS:

For 10% of households, a record will be entered in this file. In file A (HOUSEHOLDS), a value of "1" will be recorded for information A.7. (ECONOMIC DESCRIPTION) for every household which is part of this 10% sample.

D.1. IDENTIFICATION: same as A.1.

D.2. SURVEY NUMBER: same as A.2.

D.3. HOMESTEAD:

D.3.1. OWNERSHIP:

- Format: 1 digit.
- Range: from 0 to 4.
- Specification: type of homestead ownership, code:
  - 0: own land
  - 1: rented
  - 2: rent free
  - 3: others land/ government land
  - 4: others/ unspecified

D.3.2. NUMBER OF DWELLINGS IN THE HOUSE:

- Format: 2 digits.
- Range: from 00 to 31.
- Specification: Number of dwellings, assumed maximum is 31.

D.3.3.: IS THERE A DRAWING ROOM:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
  - 0: no
  - 1: yes
  - 2: not applicable

D.3.4. STRUCTURE OF MAIN HOUSE:

- Format: 2 digits.
- Range: from 00 to 12.
- Specification: code:

roof	wall

- 0: tin tin
- 1: tin cement/ straw
- 2: tin cement
- 3: tin soil
- 4: tin/ bamboo/ straw tin
- 5: tin/ bamboo/ straw cement
- 6: tin/ bamboo/ straw soil
- 7: straw tin/ cement
- 8: straw soil
- 9: straw straw
- 10: tin bamboo/ tin/ cement
- 11: cement cement
- 12: others/ unspecified

D.3.5.: HOMESTEAD AREA:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area in hundredths of acre, special values:
  - 990: 9.90 acres and above
  - 999: not applicable/ unspecified

D.4. ASSETS: number of each asset possessed either solely or jointly.

D.4.1. BEDSTEAD:

D.4.1.1. SOLE:

- Format: 1 digit.
- Range: from 0 to 9.
- Specification: number of this asset possessed solely.

D.4.1.2. JOINT:

- Format: 1 digit.
- Range: from 0 to 9.
- Specification: number of this asset possessed jointly.

D.4.2. LOOM:

D.4.2.1. SOLE: same as D.4.1.1.

D.4.2.2. JOINT: same as D.4.1.2.

D.4.3. SPADE:

D.4.3.1. SOLE: same as D.4.1.1.

D.4.3.2. JOINT: same as D.4.1.2.

D.4.4. PLOUGH:

D.4.4.1. SOLE: same as D.4.1.1.

D.4.4.2. JOINT: same as D.4.1.2.

D.4.5. HUSKING PEDAL:

D.4.5.1. SOLE: same as D.4.1.1.

D.4.5.2. JOINT: same as D.4.1.2.

D.4.6. OIL CRUSHING MACHINE:

D.4.6.1. SOLE: same as D.4.1.1.

D.4.6.2. JOINT: same as D.4.1.2.

D.4.7. BOAT:

D.4.7.1. SOLE: same as D.4.1.1.

D.4.7.2. JOINT: same as D.4.1.2.

D.4.8. RICKSHAW:

D.4.8.1. SOLE: same as D.4.1.1.

D.4.8.2. JOINT: same as D.4.1.2.

D.4.9. CART:

D.4.9.1. SOLE: same as D.4.1.1.

D.4.9.2. JOINT: same as D.4.1.2.

D.4.10. FISHING NET:

D.4.10.1. SOLE: same as D.4.1.1.

D.4.10.2. JOINT: same as D.4.1.2.

D.4.11. COCONUT TREE:

D.4.11.1. SOLE: same as D.4.1.1.

D.4.11.2. JOINT: same as D.4.1.2.

D.4.12. DATE TREE:

D.4.12.1. SOLE: same as D.4.1.1.

D.4.12.2. JOINT: same as D.4.1.2.

D.4.13. MANGOO TREE:

D.4.13.1. SOLE: same as D.4.1.1.

D.4.13.2. JOINT: same as D.4.1.2.

D.4.14. JACKFRUIT TREE:

D.4.14.1. SOLE: same as D.4.1.1.

D.4.14.2. JOINT: same as D.4.1.2.

D.4.15. BAMBOO CLUB:

D.4.15.1. SOLE: same as D.4.1.1.

D.4.15.2. JOINT: same as D.4.1.2.

D.4.16. COW/ BUFFALO:

D.4.16.1. SOLE: same as D.4.1.1.

D.4.16.2. JOINT: same as D.4.1.2.

D.4.17. CALF:

D.4.17.1. SOLE: same as D.4.1.1.

D.4.17.2. JOINT: same as D.4.1.2.

D.4.18. GOAT/ SHEEP:

D.4.18.1. SOLE: same as D.4.1.1.

D.4.18.2. JOINT: same as D.4.1.2.

D.4.19. DUCK/ HEN:

D.4.19.1. SOLE: same as D.4.1.1.

D.4.19.2. JOINT: same as D.4.1.2.

D.5. INCOME

D.5.1. SALES OF DOMESTICALLY PRODUCED POULTRY BIRDS:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount in takas.

D.5.2. SALES OF POULTRY BIRDS AND ANIMALS PRODUCTS: same as D.5.1.

D.5.3. SALES OF FRUITS AND VEGETABLES: same as D.5.1.

D.5.4. SALES OF TREES: same as D.5.1.

D.5.5. REMITANCES SENT BY RELATIVES OUTSIDE: same as D.5.1.

D.5.6. ALMS: same as D.5.1.

D.5.7. OTHERS: same as D.5.1.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
D.1.	7	42	28	22
D.2.	1	6	4	4
D.3.1.	1	6	4	3
D.3.2.	2	12	8	5
D.3.3.	1	6	4	2
D.3.4.	2	12	8	4
D.3.5.	3	18	12	9
D.4.1.	2	12	8	8
D.4.2.	2	12	8	8
D.4.3.	2	12	8	8
D.4.4.	2	12	8	8
D.4.5.	2	12	8	8
D.4.6.	2	12	8	8
D.4.7.	2	12	8	8
D.4.8.	2	12	8	8
D.4.9.	2	12	8	8
D.4.10.	2	12	8	8
D.4.11.	2	12	8	8
D.4.12.	2	12	8	8
D.4.13.	2	12	8	8
D.4.14.	2	12	8	8
D.4.15.	2	12	8	8
D.4.16.	2	12	8	8
D.4.17.	2	12	8	8
D.4.18.	2	12	8	8

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
D.4.19.	2	12	8	8
D.5.1.	4	24	16	14
D.5.2.	4	24	16	14
D.5.3.	4	24	16	14
D.5.4.	4	24	16	14
D.5.5.	4	24	16	14
D.5.6.	4	24	16	14
D.5.7.	4	24	16	14

FILE D: ECONOMIC DESCRIPTION:

TOTAL	BYTES	BITS
ASCII	83	664
SIXBIT	63	498
4-BIT	42	332
BINARY	38	299

E. DEBTS.

Whenever a household goes into debts, one or several debt record(s) will be entered in this file, and a value of "1" will be recorded for infomation A.5. (DEBTS) in file A.

E.1. IDENTIFICATION: debts records will be identified by the adjunction of a serial number to the normal household identification. This number will count how many different debts were undergone by a given household.

E.1.1. HOUSEHOLD: same as B.1.1.

E.1.2. SERIAL NUMBER: same as B.1.2.

E.2. SURVEY NUMBER: same as A.2.

E.3. SOURCE OF DEBT:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
  - 0: relative/ friend
  - 1: money lender
  - 2: institution

E.4. AMOUNT OF DEBT:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount in takas.

E.5. NATURE OF DEBT:

- Format: 1 digit.
- Range: from 0 to 3.
- Specification: code:
  - 0: cash
  - 1: crop
  - 2: crop + cash
  - 3: others/ unspecified

E.6. CONDITION OF DEBT:

- Format: 1 digit.
- Range: from 0 to 2.

- Specification: code:
  - 0: interest free
  - 1: mortgage with interest
  - 2: with interest

E.7. UTILIZATION OF DEBT:

E.7.1. PRODUCTION:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount in takas, part of debt used for productive expenses.

E.7.2. CONSUMPTION:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount in takas, part of debt used for consumption expenses.

E.7.3. PRODUCTION AND CONSUMPTION:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount in takas, part of debt used both for production and consumption expenses.

E.7.4. OTHERS:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount in takas, part of debt used for other purposes.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
E.1.1.	7	42	28	22
E.1.2.	2	12	8	7
E.2.	1	6	4	4
E.3.	1	6	4	1
E.4.	4	24	16	14
E.5.	1	6	4	2
E.6.	1	6	4	2
E.7.1.	4	24	16	14
E.7.2.	4	24	16	14
E.7.3.	4	24	16	14
E.7.4.	4	24	16	14

FILE E: DEBTS:

TOTAL	BYTES	BITS
ASCII	33	264
SIXBIT	25	198
4-BIT	17	132
BINARY	14	108

F. PLOTS.

Households own or cultivate plots. The relationship between plots and households will be divided into two parts:

1) all plots which are cultivated by a given household, whether it owns them or not

2) all plots which are owned but not cultivated by a given household.

A plot is either owned or cultivated by a household, and appears as such in this file.

F.1. IDENTIFICATION: plots will be identified by the adjunction of a serial number to the normal household identification. This number will count how many plots are owned and/or cultivated by a given household.

F.1.1. HOUSEHOLD: same as B.1.1.

F.1.2. SERIAL NUMBER: same as B.1.2.

F.2. SURVEY NUMBER: same as A.2.

F.3. STATUS:

- Format: 1 digit.
- Range: from 0 to 1.
- Specification: code:
  - 0: plot is cultivated by household
  - 1: plot is owned but not cultivated by household

F.4. PLOT AREA:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area of plot in hundredths of acre.

F.5. NUMBER OF CROPS:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: number of crops normally produced in a year on this plot.

F.6. NATURE OF RELATION:

- Format: 2 digits.
- Range: from 00 to 12.
- Specification: which is the relationship between household and plot; if STATUS = 0, codes 0 to 5 record the nature of ownership; if STATUS = 1, codes 6 to 12 record the reason for not cultivating this plot:
    - 0: own cultivated land
    - 1: share cropped in
    - 2: leased in
    - 3: mortgaged in
    - 4: share cropped in by mortgage out
    - 5: others
    - 6: share cropped out
    - 7: leased out
    - 8: mortgaged out
    - 9: fallow arable land
    - 10: non arable fallow land
    - 11: river erosion
    - 12: others

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
F.1.1.	7	42	28	22
F.1.2.	2	12	8	7
F.2.	1	6	4	4
F.3.	1	6	4	1
F.4.	3	18	12	10
F.5.	2	12	8	7
F.6.	2	12	8	4

FILE F: PLOTS:

TOTAL	BYTES	BITS
ASCII	18	144
SIXBIT	14	108
4-BIT	9	72
BINARY	7	55

G. CROPS.

Crops are cultivated on plots. One plot can be divided into several sub-plots, each one of them being able to produce several crops a year.

G.1. IDENTIFICATION: crops will be identified by the adjunction of a serial number to the normal plot identification on which they are cultivated. This number will count how many crops are cultivated on a given plot.

G.1.1. PLOT:

G.1.1.1. HOUSEHOLD: same as B.1.1.

G.1.1.2. PLOT SERIAL NUMBER: same as F.1.2.

G.1.2. CROP SERIAL NUMBER: same as B.1.2.

G.2. SURVEY NUMBER: same as A.2.

G.3. NAME OF CROP:

- Format: 2 digits.
- Range: from 00 to 27.
- Specification: code:
    - 0: aus paddy
    - 1: broad casted aman paddy
    - 2: transplanted aman paddy
    - 3: irrigated paddy
    - 4: wheat
    - 5: kheshari
    - 6: lentils
    - 7: gram
    - 8: mustard
    - 9: turmeric
    - 10: sugar can
    - 11: jute
    - 12: kawon
    - 13: radish
    - 14: brinjal
    - 15: chima
    - 16: lin seed
    - 17: cabbage
    - 18: sesamum
    - 19: jab
    - 20: rye
    - 21: ground-nut

- 22: onion
- 23: chillies
- 24: potatoes
- 25: sweet potatoes
- 26: water melon
- 27: others

G.4. QUANTITY OF CROP:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: production in tenths of maund.

G.5. AREA OF LAND:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area of land devoted to this crop inside the plot, in hundredths of acre.

G.6. FERTILIZER USE:

- Format: 1 digit.
- Range: from 0 to 3.
- Specification: code:
  - 0: no fertilizer use
  - 1: chemical fertilizer
  - 2: organic fertilizer
  - 3: both chemical and organic

G.7. IRRIGATION:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
  - 0: no irrigation
  - 1: mechanical irrigation
  - 2: manual irrigation

G.8. PESTICIDE USE:

- Format: 1 digit.
- Range: from 0 to 1.
- Specification: code
  - 0: no use
  - 1: use

G.9. SHARE CROPPING INFORMATION:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: if the plot on which this crop was grown was share cropped, what was this household's own share of production? Amount in tenths of maund.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
G.1.1.1.	7	42	28	22
G.1.1.2.	2	12	8	7
G.1.2.	2	12	8	7
G.2.	1	6	4	4
G.3.	2	12	8	5
G.4.	3	18	12	10
G.5.	3	18	12	10
G.6.	1	6	4	2
G.7.	1	6	4	2
G.8.	1	6	4	1
G.9.	3	18	12	10

FILE G: CROPS:

TOTAL	BYTES	BITS
ASCII	26	208
SIXBIT	20	156
4-BIT	14	104
BINARY	10	80

H. PONDS.

Households possess or control ponds which they mainly use for fish production.

H.1. IDENTIFICATION: ponds will be identified by the adjunction of a serial number to the normal household identification. This number will count how many ponds are controled or possessed by a given household.

H.1.1. HOUSEHOLD: same as B.1.1.

H.1.2. SERIAL NUMBER: same as B.1.2.

H.2. SURVEY NUMBER: same as A.2.

H.3. AREA OF POND:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area of pond in hundredths of acre.

H.4. NATURE OF OWNERSHIP:

- Format: 1 digit.
- Range: from 0 to 3.
- Specification: code:
  - 0: sole
  - 1: joint
  - 2: lease
  - 3: others/ unspecified

H.5. DID EVER RELEASE FISH:

- Format: 1 digit.
- Range: from 0 to 3.
- Specification: code:
  - 0: released fish last year
  - 1: released fish before last year but still available
  - 2: released fish before last year but no more available
  - 3: never released fish

H.6. INVESTMENT:

- Format: 3 digits.

- Range: from 000 to 999.
- Specification: household's investment in this pond, in takas.

H.7. RETURN:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: amount of money obtained by selling fish from this pond last year, in takas.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
H.1.1.	7	42	28	22
H.1.2.	2	12	8	7
H.2.	1	6	4	4
H.3.	3	18	12	10
H.4.	1	6	4	2
H.5.	1	6	4	2
H.6.	3	18	12	10
H.7.	3	18	12	10

FILE H: PONDS:

TOTAL	BYTES	BITS
ASCII	21	168
SIXBIT	16	126
4-BIT	11	84
BINARY	9	67

I. EARNING MEMBERS.

Within a household, some members are contributing to the incomes. They are then known as earning members. Informations about earning members are only asked to the 10% households sample. If an earning member exists, the value "1" is entered for information B.13. in MEMBERS file. Note that one member can have several earning activities. This is why more than one record can exist in this file for a given earning member.

I.1. IDENTIFICATION: earning members records will be identified by the adjunction of a serial number to the normal member identification. This number will count how many earning activities a given member has.

I.1.1. MEMBER: same as B.1.

I.1.2. SERIAL NUMBER: same as B.1.2.

I.2. SURVEY NUMBER: same as A.2.

I.3. RELATIONSHIP TO HOUSEHOLD HEAD: same as B.3.

I.4. NATURE OF ACTIVITY:

- Format: 2 digits.
- Range: from 00 to 13.
- Specification: nature of earning activity, a distinction is made between earning activity in services/ day labour (codes 0 to 6) and business (codes 7 to 13).
  - 0: day labourer
  - 1: service
  - 2: rickshaw pulling
  - 3: agriculture labour
  - 4: masonry/ carpentry
  - 5: deed writing
  - 6: others/ unspecified (services/ day labour)
  - 7: seasonal busines
  - 8: handicrafts
  - 9: grocery
  - 10: brokery
  - 11: hawkery
  - 12: firewood
  - 13: others/ unspecified (business)

I.5. YEARLY EARNINGS:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: yearly earnings from this activity, in takas.

I.6. DURABILITY:

- Format: 1 digit.
- Range: from 0 to 1.
- Specification: code:
  - 0: temporary activity
  - 1: permanent activity

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
I.1.1.	9	54	36	29
I.1.2.	2	12	8	7
I.2.	1	6	4	4
I.3.	2	12	8	6
I.4.	2	12	8	4
I.5.	4	24	16	14
I.6.	1	6	4	1

FILE I: EARNING MEMBERS:

TOTAL	BYTES	BITS
ASCII	21	168
SIXBIT	16	126
4-BIT	11	84
BINARY	8	65

J. LAND TRANSFERS.

Part two of R.C.T.P. questionnaire records all land transfers which occured during the two last years preceding the survey. This questionnaire surveys all possible land transfers for every 10% household. But it is quite obvious that a single household only had a few transfers, if any, during that period of time. If we were to reserve storage area for all possible land transfers for every household, a lot of critical storage ressource would be wasted. LAND TRANSFERS is therefore structured in a peculiar way. One record of this file will account for one land transfer. If one considers there are few chances a given household had more than one transfer during the surveyed period of time, one shall admit this is an optimal way to save storage area. In order to distinguish between different records concerning the same household, a serial number is introduced.

J.1. IDENTIFICATION: land transfers records will be identified by the adjunction of a serial number to the household normal identification. This number will count how many land transfers were undertaken by a given household during the surveyed period of time.

J.1.1. HOUSEHOLD: same as B.1.1.

J.1.2. SERIAL NUMBER: same as B.1.2.

J.2. SURVEY NUMBER: same as A.2.

J.3. NATURE OF TRANSFER:

- Format: 2 digits.
- Range: from 00 to 10.
- Specification: code:
  - 0: inherited
  - 1: received as gift
  - 2: khas land leased in
  - 3: mortgaged in
  - 4: purchased
  - 5: others in
  - 6: bequeathed
  - 7: given
  - 8: mortgaged out
  - 9: sold
  - 10: others out

J.4. TYPE OF LAND:

- Format: 1 digit.

- Range: from 0 to 4.
- Specification: code:
    - 0: arable land
    - 1: homestead land
    - 2: fallow land
    - 3: pond
    - 4: others/ unspecified

J.5. QUANTITY OF LAND:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: area of transfered land in hundredths of acre.

J.6. YEAR OF TRANSFER:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
    - 0: interview year
    - 1: interview year - 1
    - 2: interview year - 2

J.7. REASON OF TRANSFER:

- Format: 1 digit.
- Range: from 0 to 3.
- Specification: code:
    - 0: to buy food or medecine
    - 1: to spend on wedding ceremony
    - 2: to repay debt
    - 3: others/ unspecified

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
J.1.1.	7	42	28	22
J.1.2.	2	12	8	7
J.2.	1	6	4	4
J.3.	2	12	8	4
J.4.	1	6	4	2
J.5.	3	18	12	10
J.6.	1	6	4	2
J.7.	1	6	4	2

FILE J: LAND TRANSFERS:

TOTAL	BYTES	BITS
ASCII	18	144
SIXBIT	14	108
4-BIT	9	72
BINARY	7	53

K. ANIMALS.

Households possess animals which are born, live, and die, or which are acquired one way or the other, or which leave the household one way or the other. This file accounts for all animals motions inside the households which are part of the 10% sample.

K.1. IDENTIFICATION: animals records will be identified by the adjunction of a serial number to the household normal identification. This number will count how many different types of animals are possessed by a given household.

K.1.1. HOUSEHOLD: same as B.1.1.

K.1.2. SERIAL NUMBER: same as B.1.2.

K.2. SURVEY NUMBER: same as A.2.

K.3. NAME OF ANIMAL:

- Format: 1 digit.
- Range: from 0 to 8.
- Specification: code:
  - 0: cows/ buffalo
  - 1: goats
  - 2: sheep
  - 3: ducks
  - 4: hens
  - 5: pigs
  - 6: dogs
  - 7: cats
  - 8: others/ unspecified

K.4. NUMBER AT BEGINNING OF YEAR:

- Format: 2 digits.
- Range: from 0 to 99.
- Specification: number of animals.

K.5. SOLD OUT: same as K.3.

K.6. DEAD: same as K.3.

K.7. STOLEN: same as K.3.

K.8. SLAUGHTERED: same as K.3.

K.9. BEQUEATHED: same as K.3.

K.10. GIVEN: same as K.3.

K.11. PURCHASED: same as K.3.

K.12. NEW BORN: same as K.3.

K.13. INHERITED: same as K.3.

K.14. RECEIVED: same as K.3.

K.15. NUMBER AT END OF YEAR: same as K.3.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
K.1.1.	7	42	28	22
K.1.2.	2	12	8	7
K.2.	1	6	4	4
K.3.	1	6	4	4
K.4.	2	12	8	7
K.5.	2	12	8	7
K.6.	2	12	8	7
K.7.	2	12	8	7
K.8.	2	12	8	7
K.9.	2	12	8	7
K.10.	2	12	8	7
K.11.	2	12	8	7
K.12.	2	12	8	7
K.13.	2	12	8	7
K.14.	2	12	8	7
K.15.	2	12	8	7

FILE K: ANIMALS:

TOTAL	BYTES	BITS
ASCII	35	280
SIXBIT	27	210
4-BIT	18	140
BINARY	16	121

2.2.3. D.E.A.D.B.: Global storage needs.

Figures about data storage volume required by each record type were given after each file description. These figures were evaluated in four different coding systems: ASCII, SIXBIT, 4-BIT, BINARY.

Estimating global storage needs for the whole D.E.A.D.B. is uneasy. One has to rely on average figures computed over all already published R.C.T.P. branches baseline surveys, and assume these figures still apply when considering a planned twenty branches extension. The results which are hereby mentionned were casted from eight R.C.T.P. baseline reports.

BRANCHES	NUMBER OF HOUSEHOLDS	NUMBER OF PEOPLE	AVERAGE PER HOUSEHOLD
MONOHARDI	2,515	13,034	5.18
SHIBPUR	2,671	13,660	5.11
GHIOR	2,419	13,336	5.51
NARSINGDI	2,944	15,550	5.28
GAZARIA	2,060	11,789	5.72
PABNA	2,567	15,376	6.0
ATGHORIA	1,828	11,031	6.03
BORAIGRAM	2,578	13,660	5.3

For each record type, an average number of records was estimated, and storage volume was accordingly computed. A projection on twenty branches was done from the global figures obtained for one branch. File by file, the following methods were adopted:

A. HOUSEHOLDS: average number over the here above 8 branches was computed and yielded 2.447 households.

B. MEMBERS: The same process as for file A gives an average of 13,430 per branch.

C. BIRTHS/ DEATHS: BORAIGRAM and GAZARIA were picked up as computation base. Average births rate and deaths rate were computed, and yielded 488 births and 130 deaths for 13,430 people, which gives 618 records in file C.

D. ECONOMIC DESCRIPTION: 10% of 2447 households yield 245 records for file D.

E. DEBTS: Few informations could give an idea of how much debts are surveyed in a R.C.T.P. branch. It was therefore decided to chose 100 debts as an average figure, computed from BORAIGRAM.

F. PLOTS: Weighted average over BORAIGRAM, which was given a weight of 53.68%, and GAZARIA, which was given a weight of 46.32%, shows 860 plots as number of records.

G. CROPS: Estimating an average of crops was uneasy. In BORAIGRAM and GAZARIA, an estimated number of crops was computed by dividing each crop total area by the average plot area. Results were 1,574 crops for BORAIGRAM and 1,329 crops for GAZARIA. Weighted average (53.68% for BORAIGRAM and 46.32% for GAZARIA) gives 1,460 crops records in file G.

H. PONDS: As for DEBTS, few information could tell right away how many ponds were surveyed in BORAIGRAM and GAZARIA. An estimated figure of 100 was computed from BORAIGRAM.

I. EARNING MEMBERS: Weighted average over Boraigram and GAZARIA gives 207 records for file I.

J. LAND TRANSFERS: Same process as for file I gives a weighted average of 103 records for file J.

K. ANIMALS: Weighted average over BORAIGRAM and GAZARIA gives 375 records for file K.

The uneasiness in computing how many records are to be found in DEBTS and PONDS files is due to a lack of information. Even if the estimated figures prove to be wrong, their small importance compared to giant files such as HOUSEHOLDS and MEMBERS (which together make up for 80% in storage needs) put them in a marginal position. Even a manyfold error on those two files would not affect significantly global storage needs.

Summary of D.E.A.D.B. storage needs per record type, in byte:

FILE	ASCII	SIXBIT	4-BIT	BINARY
HOUSEHOLDS	62	47	39	28
MEMBERS	53	40	34	28
BIRTHS/ DEATHS	23	18	12	9
ECONOMIC DESCR.	83	63	42	38
DEBTS	33	25	17	14
PLOTS	18	14	9	7
CROPS	26	20	14	10
PONDS	21	16	11	9
EARNING MEMBERS	21	16	11	8
LAND TRANSFERS	18	14	9	7
ANIMALS	35	27	18	16

In the following tables, which summarise storage needs for one branch, all figures are labeled in BYTES, unless stated otherwise.

FILE	NUMBER RECORDS	ASCII	SIXBIT	4-BIT	BINARY
HOUSEHOLDS	2,447	151,714	115,009	95,433	68,516
MEMBERS	13,430	711,790	537,200	456,620	295,460
BIRTHS/DEATHS	618	14,214	11,124	7,416	5,562
ENONOMIC DESCR.	245	20,335	15,435	10,290	9,810
DEBTS	100	3,300	2,500	1,700	1,300
PLOTS	860	15,480	12,040	7,740	6,020
CROPS	1,460	37,960	29,200	20,440	14,600
PONDS	100	2,100	1,600	1,100	900
EARNING MEMBERS	207	4,347	3,312	2,277	1,656
LAND TRANSFERS	103	2,163	1,648	1,133	824
ANIMALS	375	13,125	12,500	6,750	6,000

TOTAL	ASCII	SIXBIT	4-BIT	BINARY
1 BRANCH	974,528	751,568	610,899	410,148
20 BRANCHES	19,490,560	15,031,360	12,217,980	8,202,960

Rough global figures:

1 BRANCH	1 MB	0.8 MB	0.7 MB	0.4 MB
20 BRANCHES	20 MB	15 MB	13 MB	8 MB

MB = MEGA-BYTES (1 MB = 1,000,000 BYTES).

The global results need comments. One can see how storage savings can be done through proper coding methods. From ASCII to BINARY, savings are done in a 2.5 to 1 ratio. Each branch has a global storage need of 0.4 MB with BINARY, which is of course an important amount, but lays within range of micro computers. New double side double density diskettes can accomodate such a memory amount.

Such a gain in storage capacity does not go without liabilities. BINARY is not standard, and transcoding must be programmed. Special interfaces subroutines can be designed, which are easy to implement and would not increase significantly system loads.

Indeed, if these subroutines are written in assembly language, and made transparent to users, they necessitate very few CPU time. In the meantime, the use of BINARY allows less than half as much storage as ASCII to be used. For an equivalent information request, BINARY requires half as much data tansfers. In conclusion, a system using BINARY coding procedures demands half as much CPU ressource as a data system using ASCII.

2.2.4. Using D.E.A.D.B.

2.2.4.1. Justification of D.E.A.D.B.

The normal process when designing a data base supposes to define first which kind of accesses will be done on data, and then build files accordingly. Data bases are not built to allow only a few accesses or enable a small number of processings. They would then be utterly rigid, with no updating possibility as needs are changing.

Hence it is not possible to design an R.C.T.P. data base that can process every possible question BRAC's researchers may wonder one day. Instead, one can analyse which uses are normally made from RCTP data, or will most probably be made in the future, infer which access types allow such uses, and design data bases in which such accesses are realised. Likewise, the purpose of this point is to find out which types of accesses are involved in most foreseeable uses BRAC is expected to need, and show D.E.A.D.B. is perfectly fit for them.

In annex, a list of tables is given. These tables are published in the reports that sanction R.C.T.P. baseline surveys. Computations of cross-tabulations and frequencies are involved in every table. For each such task, special sets of informations are defined, and each element of these sets is accessed sequentially and cooperates to the global computation.

For instance:

T.1. Distribution of households by arable landholding and type of land purchased

T.2. Distribution of households by arable landholding and amount of annual income earned from business

Table T.1 crosses informations related to plots with informations related to land transfers, while table T.2 crosses informations related to plots with informations related to earning members and economic description of households. For T.1., a first set gathers informations concerning land purchased by a household part of the 10% economic sample. A second set gathers informations concerning plots owned by a household part of the 10% sample. Both sets are then cross-tabulated.

If we were to compute table T.1., the search would

proceed as follow:

```
> For every HOUSEHOLD mentionned in an ECONOMIC DESCRIPTION record:
! > Get every LAND TRANSFER related to this HOUSEHOLD
! ! If NATURE OF TRANSFER is PURCHASE
! ! > Remember which TYPE OF LAND is concerned
! > Get every PLOT related to this HOUSEHOLD
! ! If PLOT is OWNED by this HOUSEHOLD
! ! > Get its AREA and add it to the sum of already selected PLOT
! ! ! AREAS for this HOUSEHOLD
```

In the various cross-tabulations and frequencies computations, there is a concept which is located at the junction of all other concepts: there are the households. All informations are eventually related to a household, through this household can all informations be reached. Accesses needs can be summarised as such: sets of informations are defined from a central gateway being the households, whose elements are reached wholly and sequentially to contribute to a global computation.

This conclusion remains valid as further uses are assumed. BRAC is very interested in comparing RCTP branches together, and also in following RCTP branches evolution. Situations in other areas or at other times are also measured through basic statistical work. The same types of accesses are involved.

In conclusion, RCTP present and future uses require the setting up of data bases offering all facilities for easy mass search for informations centered on the household concept. Such data bases will be very little used as interrogation bank. It is not necessary to provide accesses to a specific record, but rather primitives for selecting sets of informations.

D.E.A.D.B. structure allows such accesses to be easily implemented. Ten peripheral files are located around the households file. The IDENTIFICATION keys system enables easy accesses from households towards peripheral files by simply concatenating new components to the household identification. Likewise, truncation of ending parts in identification keys in peripheral files provides a way back to the households. Reversed paths are therefore automatically present in the way the keys are built. The households file can also play a role of intermediary, allowing any information inside D.E.A.D.B. to be connected with any other information in different files. The household identification acts as the above-mentionned gateway.

2.2.4.2. Data entry.

The huge amounts of data to be entered for setting up D.E.A.D.B. require entry procedures that would be both errors-optimizing and time-saving.

A first system would be to write checking programs that test data as they are entered. Such a system provides the best guarantees against errors, but is much too time-consuming, considering how large are the files.

A second system would be to write programs which will check entire files after they had been entered. Data entry time is saved, but the time spent in correcting detected errors manually annihilates this gain.

A third system, much simpler, requires double entry. Each file is entered twice, by two independant persons. A very simple program is then written to check whether records are the same in both copies. Whenever a difference is detected, an error can be assumed. Such a system realises a good compromise. Since it is very unlikely that both data entry persons make the same error in the same record, it can be assumed all errors will be detected. Furthermore, no difficult program is to be written. Finally, data entry time is not longer than in the second system. This third solution should be advocated.

2.2.4.3. Report printing.

A first use of D.E.A.D.B. could be to automatically compute and print the tables which form R.C.T.P. branches baseline reports. A list of these tables is given in Annex. A menu could enable the possible user to chose a specific table, a group of tables, or the whole report at once.

In order to compute these tables, D.E.A.D.B. files need only to be built sequentially (as long as they are sorted in ascending values of their IDENTIFICATION item). Indeed, desired tables involve whole files, requiring to access every record inside them. For instance, table T.1. here above implies to access every record in file HOUSEHOLD and every record in file LAND TRANSFERS. These accesses can be undertaken simultaneously, both files progressing in parallel.

When computing these tables, it will be necessary to use a working file so as not to duplicate lengthy processing. This file will summarise landholding informations which are needed for most tables. Storage area must be made available when this application is run.

WORKING FILE LANDHOLDING:

For each household part of the 10% sample (i.e. households for which information A.7. yields value "1"), landholding classification is computed and recorded.

1. IDENTIFICATION: normal household identification.

2. OWNED ARABLE AREA:

2.1. AREA:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: amount of agricultural land possessed by a household. It can be computed by summing up the area of all plots related to this household, for which STATUS is equal to "1", or for which STATUS is equal to "0" and NATURE OF OWNERSHIP is equal to "0".

2.2. NUMBER OF PLOTS:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: number of plots which fulfill conditions listed in point 2.1.

3. OWNED OPERATED LAND:

3.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: amount of operated land owned by a household. It can be computed by summing up the area of all plots related to this household, for which STATUS is equal to "0" and NATURE OF OWNERSHIP is equal to "0".

3.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of plots which fulfill conditions listed in point 3.1.

4. LAND SHARE CROPPED IN:

4.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: amount of land share cropped in by a household. It can be computed by summing up the area of all plots related to this household, for which NATURE OF OWNERSHIP is equal to "1".

4.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of plots which fulfill conditions listed in point 4.1.

5. LAND SHARE CROPPED OUT:

5.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.

- Specification: amount of land share cropped out by a household. It can be computed by summing up the area of all plots related to this household, for which NATURE OF OWNERSHIP is equal to "6".

5.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of plots which fulfill conditions listed in point 5.1.

6. LAND MORTGAGED IN:

6.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: amount of land mortgaged in by a household. It can be computed by summing up the area of all plots related to this household, for which NATURE OF OWNERSHIP is equal to "3".

6.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of plots which fulfill conditions listed in point 6.1.

7. LAND MORTGAGED OUT:

7.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: amount of land mortgaged out by a household. It can be computed by summing up the area of all plots related to this household, for which NATURE OF OWNERSHIP is equal to "8".

7.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of plots which fulfill conditions listed in point 7.1.

8. LAND LEASED IN:

8.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: amount of land leased in by a household. It can be computed by summing up the area of all plots related to this household, for which NATURE OF OWNERSHIP is equal to "2".

8.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of plots which fulfill conditions listed in point 8.1.

9. LAND LEASED OUT:

9.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: amount of land leased out by a household. It can be computed by summing up the area of all plots related to this household, for which NATURE OF OWNERSHIP is equal to "7".

9.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of plots which fulfill conditions listed in point 9.1.

10. OPERATED LAND:

10.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: total amount of land operated by a household (whether it owns it or not). It can be computed by summing up the area of all plots related to this household, for which STATUS is equal to "0".

10.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of plots which fulfill conditions listed in point 10.1.

11. LAND UNDER IRRIGATION:

11.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: amount of land under irrigation operated by a household. It can be computed by summing up the area of all crops related to this household, for which IRRIGATION is equal to "1" or "2".

11.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of crops which fulfill conditions listed in point 11.1.

12. LAND UNDER FERTILIZER:

12.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.
- Specification: amount of land under fertilizer operated by a household. It can be computed by summing up the area of all crops related to this household, for which FERTILIZER is equal to "1","2" or "3".

12.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of crops which fulfill conditions listed in point 12.1.

13. LAND UNDER PESTICIDE:

13.1. AREA:

- Format: same as 2.1.
- Range: same as 2.1.

- Specification: amount of land under pesticide operated by a household. It can be computed by summing up the area of all crops related to this household, for which PESTICIDE is equal to "1".

13.2. NUMBER OF PLOTS:

- Format: same as 2.2.
- Range: same as 2.2.
- Specification: number of crops which fulfill conditions listed in point 13.1.

As it is showed in the following tables, an additional 16K (ASCII) to 7K (BINARY) memory size will be needed to build LANDHOLDING working file while computing the needed baseline tables.

LANDHOLDING WORKING FILE:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
1.	7	42	28	22
2.1.	3	18	12	10
2.2.	2	12	8	7
3.	5	30	20	17
4.	5	30	20	17
5.	5	30	20	17
6.	5	30	20	17
7.	5	30	20	17
8.	5	30	20	17
9.	5	30	20	17
10.	5	30	20	17
11.	5	30	20	17
12.	5	30	20	17
13.	5	30	20	17

TOTAL	BYTES	BITS	245 RECORDS (BYTES)
ASCII	67	536	16,415
SIXBIT	51	402	12,495
4-BIT	34	268	8,330
BINARY	29	226	7,105

2.2.4.4. Interrogation system.

It would be sad to limit the number of possible tables to be computed. Through its extensivity of recorded data, D.E.A.D.B. could be a powerful description tool of Bangladesh rural situation and its evolution. A complete interrogation system, able to cross-tabulate any user's required data, could help B.R.A.C. achieve a high level of expertise.

This application only is an extension of report printing. Instead of having a limited amount of well-defined accesses, this interrogation system should be able to locate any user's required informations. Therefore capacities must be developed which are able to:

- offer a way for the user to designate any specific data within D.E.A.D.B.
- access user's required data in a way that stays transparent to him
- enable data segmentation, i.e. enable user to define classes on data, on which cross-tabulations will be computed
- print tables in such a way that is convenient to the user, i.e. allow the user to decide how tables appear on paper.

The two last functions can possibly be achieved by a cross-tabulation package. In that case, it would only be needed to design a system that would feed this package with a file containing only the data which have to be cross-tabulated. The interrogation system would then act as an interface between D.E.A.D.B. and the cross-tabulations package. Its functions would be:

- accept a user's demand concerning specific informations
- check whether this demand is valid (respect of demands formal rules, existence of demanded informations)
- get demanded informations and perform transcoding if another coding system than ASCII is used
- pass demanded informations to cross-tabulations package in a format which is compatible with its requirements.

In order to ensure system performance when searches will actually be proceeded, it would be more convenient

if all files were built sequential-indexed. Access keys would be for each file its IDENTIFICATION item which was described as the first information recorded in every record.

2.2.4.5. Follow-up Surveys.

The interest of launching follow-up surveys was pointed out before describing D.E.A.D.B. files. Although R.C.T.P. presently does not undertake such surveys, it is felt they should not be disregarded. D.E.A.D.B. can facilitate their implementation in two ways: printing questionnaires which will only gather informations which are subject to change, and automatic updating of each survey data base.

Printing questionnaires for follow-up surveys require to pick for each already existing household all informations which identify it, and all informations which are subject to change. Questionnaires would be personnalised for already existing households, and the interviewer would just need to ask questions about what changed from the last survey. For new households, normal questionnaires can be used.

Updating D.E.A.D.B. can also be done very easily according to this principle. Modifications files, i.e. files containing only informations needed to update D.E.A.D.B., would be processed to create a new data base. Each survey would then have its own D.E.A.D.B. image. This procedure saves a lot of coding time, as well as it ensures coherence between two surveys.

2.3. Second data base: schemes and loans data base (S.L.D.B.)

2.3.1. General Approach.

R.C.T.P.'s main objective aims at providing cheap credit to landless communities so that they become more independant from traditional credit sources. Groups of landless peasants (Samities) are set up, and loans are collectively granted to them to finance join economic schemes which will hopefully increase rural incomes, and foster consciousness among landless classes.

Credit is therefore R.C.T.P.'s "raison d'être". Loans are B.R.A.C.'s tool for action in rural areas. But loans don't stand alone, they support economic schemes which are planned and implemented by villages samities. These two concepts, schemes and loans, form two pillars on which the whole of R.C.T.P. is based.

Loans and schemes importance is again emphasised in R.C.T.P. evaluation process. Indeed, how best can R.C.T.P.'s achievments be measured if not through villages schemes rentability and loans efficiency? B.R.A.C.'s researchers proceed that way: they go into the villages, meet branches employees, interview villages samities leaders. Data are gathered and compared with expected results. Differences are then analysed.

Schemes and Loans Data Base (S.L.D.B.) was designed to facilitate this evaluation process. It gathers informations about R.C.T.P.'s real work in rural villages, and offers an easy access to relevant informations in B.R.A.C.'s head office. Making informations available in Dhaka will hopefully help to optimize trips in rural areas, which are the biggest time consuming activity. Also, S.L.D.B. can be used in the same way as D.E.A.D.B., i.e. as basis for reports computations and interrogation system. All design decisions which were taken for D.E.A.D.B. also apply for S.L.D.B. Files descriptions are done the same way too.

As a first general approach, S.L.D.B. can be described as follow:

- In every village reached by a R.C.T.P. branch, one or several landless organizations (Samities) are set up
- A samity has normal members and leaders.
- Each scheme involves several members (more than one)
- Each member may be involved into one or several schemes.

- Loans are granted to schemes. One scheme can receive several loans, but a loan is always granted to one and only one scheme.

- Loans have a repayment schedule and actual installment payments.

We use again the Access Model as formal description tool. (Fig 2). Schemes and members are linked through a complex access path. Its connectivity is expressed by a diabolo symbol (⋈). It means one member record can be related to several scheme records, and one scheme record can be related to several member records, through a single access path. Implementing such a path is uneasy. The flowchart has to be changed in order to show an access model which facilitates this implementation. (Fig 3). A new record type SCH-MEM is created which stores relevant data to a specific scheme-member link.

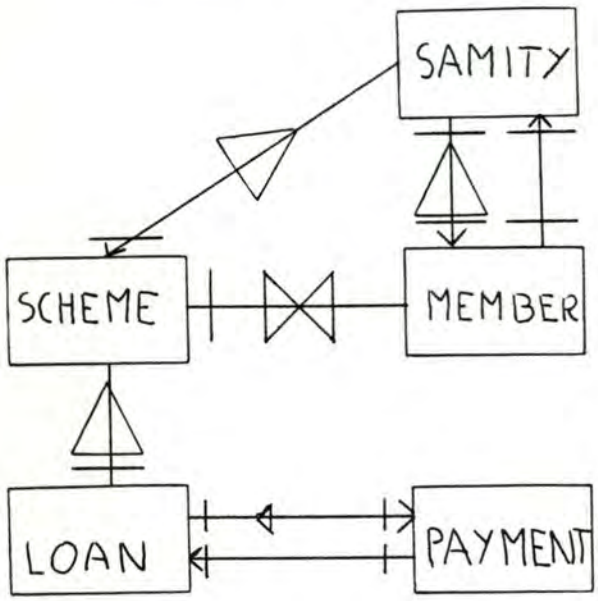


FIG. 2

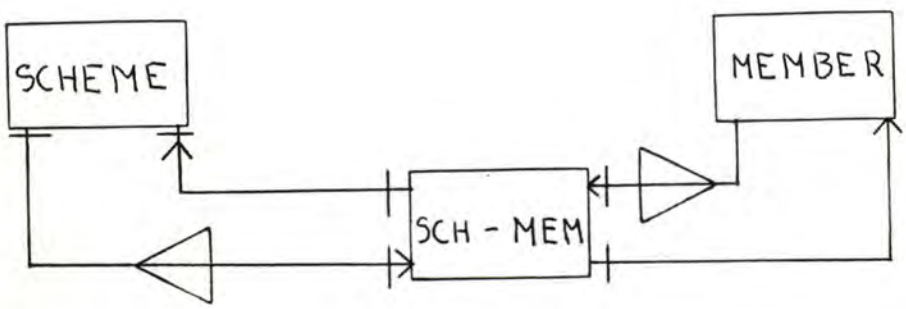


FIG. 3.

2.3.2. Files Description.

A. SAMITIES.

Samities form S.L.D.B. corner stone file, and play the same role as HOUSEHOLDS file in D.E.A.D.B.

A.1. IDENTIFICATION: a key system is set up which is based on the same principles as D.E.A.D.B. key system. SAMITIES are identified within their village and R.C.T.P. branch, each of those elements being provided with a specific number.

A.1.1. BRANCH #:

- Format: 2 digits.
- Range: from 0 to 32.
- Specification: same as in D.E.A.D.B.

A.1.2. VILLAGE #:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: same as in D.E.A.D.B.

A.1.3. SAMITY #:

- Format: 2 digits.
- Range: from 1 to 16.
- Specification: SAMITY # inside the village.

A.2. NAME OF SAMITY:

- Format: 20 letters.
- Range: all letters from latin alphabet, space included.
- Specification: name chosen by Samity.

A.3. SEX OF SAMITY:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
  - 0: male Samity
  - 1: female Samity
  - 2: mixed Samity

A.4. DATE OF FORMATION:

A.4.1. YEAR:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: year of Samity inception.

A.4.2. MONTH:

- Format: 2 digits.
- Range: from 1 to 12.
- Specification: month of Samity inception.

A.4.3. DAY:

- Format: 2 digits.
- Range: from 1 to 31.
- Specification: day of Samity inception.

A.5. INITIAL GROUP SIZE:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: how many members when Samity was set up.

A.6. NUMBER OF MEMBERS:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: how many normal members now in Samity.

A.7. NUMBER OF LEADERS:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: how many leaders now in Samity.

A.8. SAVINGS:

A.8.1. RESERVE:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount of money in Samity reserve account.

A.8.2. EMERGENCY:

- Format: 4 digits.
- Range: from 0000 to 9999.

- Specification: amount of money in Samity emergency account.

A.8.3. SAVING:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount of money in Samity saving account.

A.8.4. GENERAL:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: amount of money in Samity general account.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
A.1.1.	2	12	8	5
A.1.2.	2	12	8	7
A.1.3.	2	12	8	4
A.2.	20	120	160	100
A.3.	1	6	8	2
A.4.1.	2	12	8	7
A.4.2.	2	12	8	4
A.4.3.	2	12	8	5
A.5.	2	12	8	7
A.6.	2	12	8	7
A.7.	2	12	8	4
A.8.1.	4	24	16	14
A.8.2.	4	24	16	14
A.8.3.	4	24	16	14
A.8.4.	4	24	16	14

FILE A: SAMITIES:

TOTAL	BYTES	BITS
ASCII	55	440
SIXBIT	42	330
4-BIT	38	300
BINARY	26	208

B. MEMBERS:

B.1. IDENTIFICATION: members will be identified by the adjunction of a serial number to the normal Samity identification. This number will count how many members form the Samity.

B.1.1. SAMITY: same as A.1.

B.1.2. SERIAL NUMBER:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: serial number.

B.2. D.E.A.D.B. IDENTIFICATION:

- Format: 9 digits.
- Range: concatenation of all ranges in D.E.A.D.B. information B.1.
- Specification: recall of this member's identification in last D.E.A.D.B. survey.

B.3. NAME:

- Format: 15 letters.
- Range: all letters from latin alphabet, space included.
- Specification: member's personal name.

B.4. FATHER'S/ HUSBAND'S NAME:

- Format: 15 letters.
- Range: all letters from latin alphabet, space included.
- Specification: member's husband's or father's name.

B.5. DATE OF MEMBERSHIP:

B.5.1. YEAR:

- Format: same as A.4.1.
- Range: same as A.4.1.
- Specification: year of member's inception.

B.5.2. MONTH:

- Format: same as A.4.2.
- Range: same as A.4.2.
- Specification: month of member's inception.

B.5.3. DAY:

- Format: same as A.4.3.
- Range: same as A.4.3.
- Specification: day of member's inception.

B.6. DATE OF DROP OUT:

B.6.1. YEAR:

- Format: same as A.4.1.
- Range: same as A.4.1.
- Specification: year of member's drop out of Samity, "00" if still member.

B.6.2. MONTH:

- Format: same as A.4.2.
- Range: same as A.4.2.
- Specification: month of member's drop out of Samity, "00" if still member.

B.6.3. DAY:

- Format: same as A.4.3.
- Range: same as A.4.3.
- Specification: day of member's drop out of Samity, "00" if still member.

B.7. STATUS WITHIN ORGANIZATION:

- Format: 1 digit.
- Range: from 0 to 1.
- Specification: code:
    - 0: normal member
    - 1: Samity leader

B.8. AGE:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: age in completed years.

B.9. MAIN OCCUPATION:

- Format: 2 digits.
- Range: from 00 to 19.

- Specification: another code than in D.E.A.D.B. is used:
    - 00: farmer
    - 01: agriculture labourer
    - 02: household labourer
    - 03: day labourer
    - 04: fisherman
    - 05: fishing labourer
    - 06: self employed business man
    - 07: weaver
    - 08: weaving labourer (knitting)
    - 09: weaving labourer (non knitting)
    - 10: blacksmith
    - 11: carpenter
    - 12: potter
    - 13: mason
    - 14: boatman
    - 15: rickshaw puller
    - 16: paddy husking
    - 17: service
    - 18: housewife
    - 19: others/ unspecified

B.10. EDUCATION/ LITTERACY:

- Format: 2 digits.
- Range: from 00 to 15.
- Specification: another code than in D.E.A.D.B. is used:
    - 00: illitterate
    - 01: class I
    - 02: class II
    - etc...
    - 09: class IX
    - 10: S.S.C.
    - 11: H.S.C.
    - 12: graduate
    - 13: litterate but no schooling
    - 14: F.E. graduate
    - 15: others/ unspecified

If member is a leader, than following informations are recorded, else they are left with value all "0".

B.11. HOUSEHOLD HOLDING:

B.11.1. HOMESTEAD:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: homestead holding in hundredths of acre.

B.11.2. ARABLE:

- Format: 3 digits.
- Range: from 000 to 999.
- Specification: arable holding in hundredths of acre.

B.12. NUMBER OF EARNING MEMBERS:

B.12.1. MALES:

- Format: 2 digits.
- Range: 00 to 15.
- Specification: number of male earning members.

B.12.2. FEMALES:

- Format: 2 digits.
- Range: 00 to 15.
- Specification: number of female earning members.

For all members:

B.13. FIRST SCHEME:

- Format: 2 digits.
- Range: 00 to 99.
- Specification: first scheme in which member is presently involved (see file F).

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
B.1.1.	6	36	24	16
B.1.2.	2	12	8	7
B.2.	9	54	36	29
B.3.	15	90	120	75
B.4.	15	90	120	75
B.5.1.	2	12	8	7
B.5.2.	2	12	8	4
B.5.3.	2	12	8	5
B.6.	6	36	24	16
B.7.	1	6	4	1
B.8.	2	12	8	7
B.9.	2	12	8	5
B.10.	2	12	8	4
B.11.1.	3	18	12	10
B.11.2.	3	18	12	10
B.12.1.	2	12	8	4
B.12.2.	2	12	8	4
B.13.	2	12	8	4

FILE B: MEMBERS:

TOTAL	BYTES	BITS
ASCII	78	624
SIXBIT	59	468
4-BIT	54	432
BINARY	36	282

C. SCHEMES.

C.1. IDENTIFICATION: schemes will be identified by the adjunction of a serial number to the normal Samity identification. This number will count how many schemes were undertaken by a given Samity.

C.1.1. SAMITY: same as B.1.1.

C.1.2. SERIAL NUMBER: same as B.1.2.

C.2. TYPE OF SCHEME:

- Format: 2 digits.
- Range: from 00 to 29.
- Specification: code:
  - 00: paddy cultivation
  - 01: horticulture
  - 02: vegetable cultivation
  - 03: wheat cultivation
  - 04: jute cultivation
  - 05: potato cultivation
  - 06: sugarcane cultivation
  - 07: banana cultivation
  - 08: pulse and oil seeds cultivation
  - 09: tobacco cultivation
  - 10: net making
  - 11: rickshaw
  - 12: weaving
  - 13: paddy husking
  - 14: carpentry
  - 15: pottery
  - 16: blacksmiths
  - 17: cow rearing
  - 18: goat rearing
  - 19: eri/seri culture
  - 20: cottage industry
  - 21: small trading
  - 22: poultry
  - 23: fishing
  - 24: pisciculture
  - 25: release of mortgaged land
  - 26: appropriate technology
  - 27: boatman
  - 28: oil grinding
  - 29: others/ unspecified

C.3. NUMBER OF MEMBERS INVOLVED:

- Format: 2 digits.
- Range: from 01 to 99.
- Specification: how many members are involved in this scheme.

C.4. NUMBER OF LOANS:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: how many loans were granted to that scheme.

C.5. PERIOD OF SCHEME OPERATION:

- Format: 2 digits.
- Range: from 01 to 99.
- Specification: how long is this scheme going to last.

C.6. EXPECTED NET PROFIT:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: total expected net profit over scheme duration, in takas.

C.7. DISPOSAL OF NET PROFIT:

C.7.1. RESERVE:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: percentage of net profit aimed at reserve fund.

C.7.2. EMERGENCY:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: percentage of net profit aimed at emergency fund.

C.7.3. SAVINGS:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: percentage of net profit aimed at savings fund.

C.7.4. GENERAL:

- Format: 2 digits.
- Range: from 00 to 99.
- Specification: percentage of net profit aimed at general fund.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
C.1.1.	6	36	24	16
C.1.2.	2	12	8	7
C.2.	2	12	8	5
C.3.	2	12	8	7
C.4.	2	12	8	7
C.5.	2	12	8	7
C.6.	4	24	16	14
C.7.1.	2	12	8	7
C.7.2.	2	12	8	7
C.7.3.	2	12	8	7
C.7.4.	2	12	8	7

FILE C: SCHEMES:

TOTAL	BYTES	BITS
ASCII	30	240
SIXBIT	21	168
4-BIT	14	112
BINARY	12	91

D. LOANS.

D.1. IDENTIFICATION: loans will be identified by the adjunction of a serial number to the normal Samity identification. This number will count how many loans were granted to a given Samity.

D.1.1. SAMITY: same as B.1.1.

D.1.2. SERIAL NUMBER: same as B.1.2.

D.2. SCHEME NUMBER:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: number of scheme to which this loan is related.

D.3. DURATION:

- Format: 2 digits.
- Range: from 1 to 99.
- Specification: number of years during which loan is living.

D.4. DATE OF DISBURSMENT:

- Format and Range: same as B.5.
- Specification: when was loan disbursed (year-month-day).

D.5. INTEREST RATE:

- Format: 1 digit.
- Range: from 0 to 3.
- Specification: code:
  - 0: interest rate A
  - 1: interest rate B
  - 2: interest rate C
  - 3: interest rate D

D.6. TERM:

- Format: 1 digit.
- Range: from 0 to 2.
- Specification: code:
  - 0: short term
  - 1: medium term
  - 2: long term

D.7. ACCOUNT NUMBER:

- Format: 8 digits.
- Range: all 8-digits numbers.
- Specification: loan account number in B.R.A.C.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
D.1.1.	6	36	24	16
D.1.2.	2	12	8	7
D.2.	2	12	8	7
D.3.	2	12	8	7
D.4.	6	36	24	16
D.5.	1	6	4	2
D.6.	1	6	8	2
D.7.	8	48	32	27

FILE D: LOANS:

TOTAL	BYTES	BITS
ASCII	28	224
SIXBIT	21	168
4-BIT	15	120
BINARY	11	84

E. PAYMENTS.

This file will account for both repayment schedule issued upon loan granting and actual installment payments. A STATUS field tells the difference between both kinds of payments. For each loan, the first PAYMENTS records will always be repayment schedule components.

E.1. IDENTIFICATION: payments will be identified by the adjunction of a serial number to the normal loan identification. This number will count how many payments of both kinds are accounted for a given loan.

E.1.1. LOAN: same as D.1.

E.1.2. SERIAL NUMBER: same as B.1.2.

E.2. STATUS:

- Format: 1 digit.
- Range: from 0 to 1.
- Specification: if this is a repayment schedule component, value is "0"; if this is an actual installment payment, value is "1".

E.3. DATE:

- Format and Range: same as B.5.
- Specification: when was actual installment payment done, or when is repayment shedule component planned.

E.4. PRINCIPAL:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: which part of payment is principal, in takas.

E.5. INTEREST:

- Format: 3 digits.
- Range: from 0000 to 9999.
- Specification: which part of payment is interest, in takas.

E.6. SERVICE CHARGE:

- Format: 3 digits.
- Range: from 0000 to 9999.
- Specification: which part of payment is service charge, in takas.

E.7. CREDIT VOUCHER NUMBER:

- Format: 4 digits.
- Range: from 0000 to 9999.
- Specification: credit voucher number which accounted for actual installment payment, "0000" if this is a repayment schedule component.

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
E.1.1.	8	48	32	23
E.1.2.	2	12	8	7
E.2.	1	6	4	1
E.3.	6	36	24	16
E.4.	4	24	16	14
E.5.	3	18	12	10
E.6.	3	18	12	10
E.7.	4	24	16	14

FILE E: PAYMENTS:

TOTAL	BYTES	BITS
ASCII	31	248
SIXBIT	24	186
4-BIT	16	124
BINARY	12	95

F. SCH-MEM.

As fig 3 shows it, a new record type was created to facilitate implementation of the scheme-member access path. This new record type, called SCH-MEM, records all informations relevant to a specific member-scheme relationship, i.e. relevant to the situation of a given member within a given scheme. As far as members are concerned, their SCH-MEM records form a chain. It means that each SCH-MEM record related to a specific member tells where to look for the next SCH-MEM record related to the same member.

The way this chain works is very simple. Information B.13. gives the number of the first scheme in which a given member is involved. With this scheme number, and with the member number, a specific SCH-MEM record can be found, which in turn gives the number of the next scheme in which the same member is involved. By repeting this process, all schemes in which a given member is involved can be accessed.

In order to access all members involved in a given scheme, a normal sequential-indexed access has to be done from SCHEMES records towards SCH-MEM records.

F.1. IDENTIFICATION: SCH-MEM records will be identified by the adjunction of scheme number and member number to the normal Samity identification. There will be as many SCH-MEM records for a given Samity as the sum of all total number members involved in each scheme.

F.1.1. SAMITY: same as A.1.

F.1.2. SCHEME #: same as C.1.2.

F.1.3. MEMBER #: same as B.1.2.

F.2. MEMBER'S STATUS:

- Format: 1 digit.
- Range: from 0 to 1.
- Specification: code:
  - 0: normal participant in scheme
  - 1: scheme manager

F.3. NEXT SCHEME:

- Format: 2 digits.

- Range: from 00 to 99.
- Specification: number of next scheme in which member whose number is given in F.1.3. is involved. If no such scheme, use value "00".

STORAGE NEEDS:

INFORMATIONS	ASCII (BYTES)	SIXBIT (BITS)	4-BIT (BITS)	BINARY (BITS)
F.1.1.	6	36	24	16
F.1.2.	2	12	8	7
F.1.3.	2	12	8	7
F.2.	1	6	4	1
F.3.	2	12	8	6

FILE F: SCH-MEM:

TOTAL	BYTES	BITS
ASCII	13	104
SIXBIT	10	78
4-BIT	7	52
BINARY	5	38

2.3.3. S.L.D.B. Global storage needs.

For each S.L.D.B. file, an average number of records was estimated:

A. SAMITIES: 260 males and females organizations are registered for the 8 existing branches. Assumed average is therefore 32 Samities per branch, which gives 640 Samities for 20 branches.

B. MEMBERS: we take an average of 30 members per Samity, which makes 19200 records for 20 branches.

C. SCHEMES: so far, R.C.T.P. activity shows an upper limit of 5 schemes per Samity, which gives 3200 schemes for 20 branches.

D. LOANS: we take the same number for loans as for schemes: 3200.

E. PAYMENTS: 4 schedule installment payments are assumed per loan, which give birth to 4 actual payments, thus 8 payments records per loan, with a total of 25600 for 20 branches.

F. MEM-SCH: assuming how many records are in this file is uneasy. We assumed an average of 10 members involved in each scheme, which gives a total of 32000 records for 20 branches.

Summary of S.L.D.B. storage needs per record type, in bytes:

FILE	ASCII	SIXBIT	4-BIT	BINARY
SAMITIES	55	42	38	26
MEMBERS	78	59	54	36
SCHEMES	30	21	14	12
LOANS	28	21	15	11
PAYMENTS	31	24	16	12
SCH-MEM	13	10	7	5

FILES	NUMBER OF RECORDS	ASCII (BYTES)	SIXBIT (BYTES)	4-BIT (BYTES)	BINARY (BYTES)
SAMITIES	640	35,200	26,880	24,320	16,640
MEMBERS	19,200	1,497,600	1,132,800	1,036,800	691,200
SCHEMES	3,200	96,000	67,200	44,800	38,400
LOANS	3,200	89,600	67,200	48,000	35,200
PAYMENTS	25,600	793,600	614,400	409,600	307,200
SCH-MEM	32,000	416,000	320,000	224,000	160,000
TOTAL		2,928,000	2,228,480	1,787,520	1,248,640
GLOBAL		3 MB	2.3 MB	1.8 MB	1.3 MB

From 3 MB (ASCII) to 1.3 MB (BINARY) is needed to store S.L.D.B. Note that at least one file should be built sequential-indexed: SCH-MEM, with the access-key being its IDENTIFICATION field.

2.3.4. Using S.L.D.B.

2.3.4.1. Creating and updating S.L.B.D.

S.L.D.B. mainly gathers its informations from field R.C.T.P. branches. Every two weeks, when all documents from the branches reach Dhaka head office, S.L.D.B. can be updated with informations provided in those documents. Whenever a new record has to be created, all relationships with other record types related to it must be checked and other relevant records created as well. Similarly, whenever a record is deleted, all relationships linked to this record must be killed. The updating system must therefore be able to check all relationships related to a given record so as never to leave the data base incoherent, i.e. with relationships that are not existing in the real life.

2.3.4.2. Statistical work.

S.L.D.B. can also be used to help economic scheme evaluation. B.R.A.C.'s researchers indeed need to assess which schemes were the most profitable for Samities, and how loans are repaid. This kind of process needs mainly to search for given elements inside S.L.D.B. and to compute cross-tabulations the same way as for D.E.A.D.B. Therefore S.L.D.B. data base supporting programs are defined as was D.E.A.D.B. supporting system.

Chap 3. Choice of a configuration.

BRAC's hardware and software requirements are first summarised in points 3.1. and 3.2. When comes the point of deciding which configuration will be chosen, the specific environment in which BRAC is soaked in Dhaka must be taken into account. This environment is restrictive in three ways:

- Training: B.R.A.C. has only one trained person, and training facilities are spare. A training effort is therefore necessary, but it requires a long time. Meanwhile, the system must be operational, and therefore must be easy to use for untrained personnel.

- Maintenance: only I.B.M. ,DIGITAL, Tandy and N.C.R. have either local maintenance teams or dealers. For other manufacturers, or serious problems, maintenance teams are based in Calcutta, Singapore or Hong-Kong. In such cases, any intervention may require up to months before completion.

- Electricity supply: important differences in electricity tensions impose use of stabilizers. Risks of power failures are high at any time and impose expensive data storage back-ups and emergency procedures.

These constraints can best be lifted up with use of micro-computers. Indeed, their reliability gives maintenance unavailability minor importance. Their readiness of use ensures an immediately operational character, and reduces training. In point 3.3., various micro-computer configurations are discussed.

3.1. Hardware requirements:

From data bases definitions and uses which are planned to be done on them, the following hardware requirements are induced:

- Mass data storage: hard disks 25 MB online storage capacities.

- Number of working stations: a minimum of two working stations is required, one for each data base. Therefore two different persons are able to work at the same time on S.L.D.B. and D.E.A.D.B.

- Central Memory: in order to accomodate planned softwares (see point 3.2.), 64 KB central memory capacity is needed.

- Line printer: one line printer is needed for reports, and must be able to print 132 characters per line (statistical reports).

- Diskette drive: a device for 8 inches double face double density diskettes must be provided.

3.2. Software requirements:

- Operating system: it must be widely used and easy of use. If this operating system is widely used on many different systems, it acquires a standard characteristic and many packages are written compatible with it. The possible choice of application software would therefore be wider. Also software interchanges with other systems would be facilitated. This is why CP/M is a possible solution. It is very simple to use and should not cause adaptation problems.

- Languages: in order to grow autonomy, it is important to offer B.R.A.C. capacity to develop its own programs. Programming languages should be available, such as BASIC, PASCAL or FORTRAN, COBOL. CP/M handles those languages.

- Basic software:

    - sequential-indexed packages: applications often require sequential-indexed files.

    - statistical package: it should be able to compute cross-tabulations and basic tests such as chi-square or linear regression.

- Application software:

    - data base interrogation system: each data base must be provided with:

        - data entry program which performs necessary validity tests

        - interrogation system which is able to access any user's required information

        - updating programs (for D.E.A.D.B.) for entering follow-up surveys

        - transcoding procedures: in order to optimize data storage, another coding system than ASCII can be used, and transcoding procedures must then be supplied.

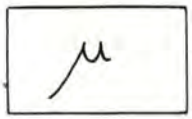
3.3. Decision methodology.

There are two ways to look at the choice of a configuration. On a STATIC point of view, various configurations able to answer BRAC's needs as defined in points 3.1. and 3.2. are discussed. On a DYNAMIC point of view, the motto "start small and grow up" is applied. There certainly isn't any reason for BRAC to acquire a whole system at once. A more efficient policy would be to adapt the chosen system as needs arise. It implies a necessity to acquire modular system on which capacities can be upgraded and new devices added.

3.3.1. Static point of view.

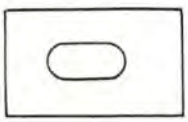
Symbols are used to describe configurations:

Working station

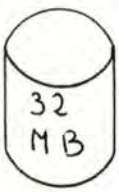


micro-computer: CPU and central memory

line printer



diskette drive

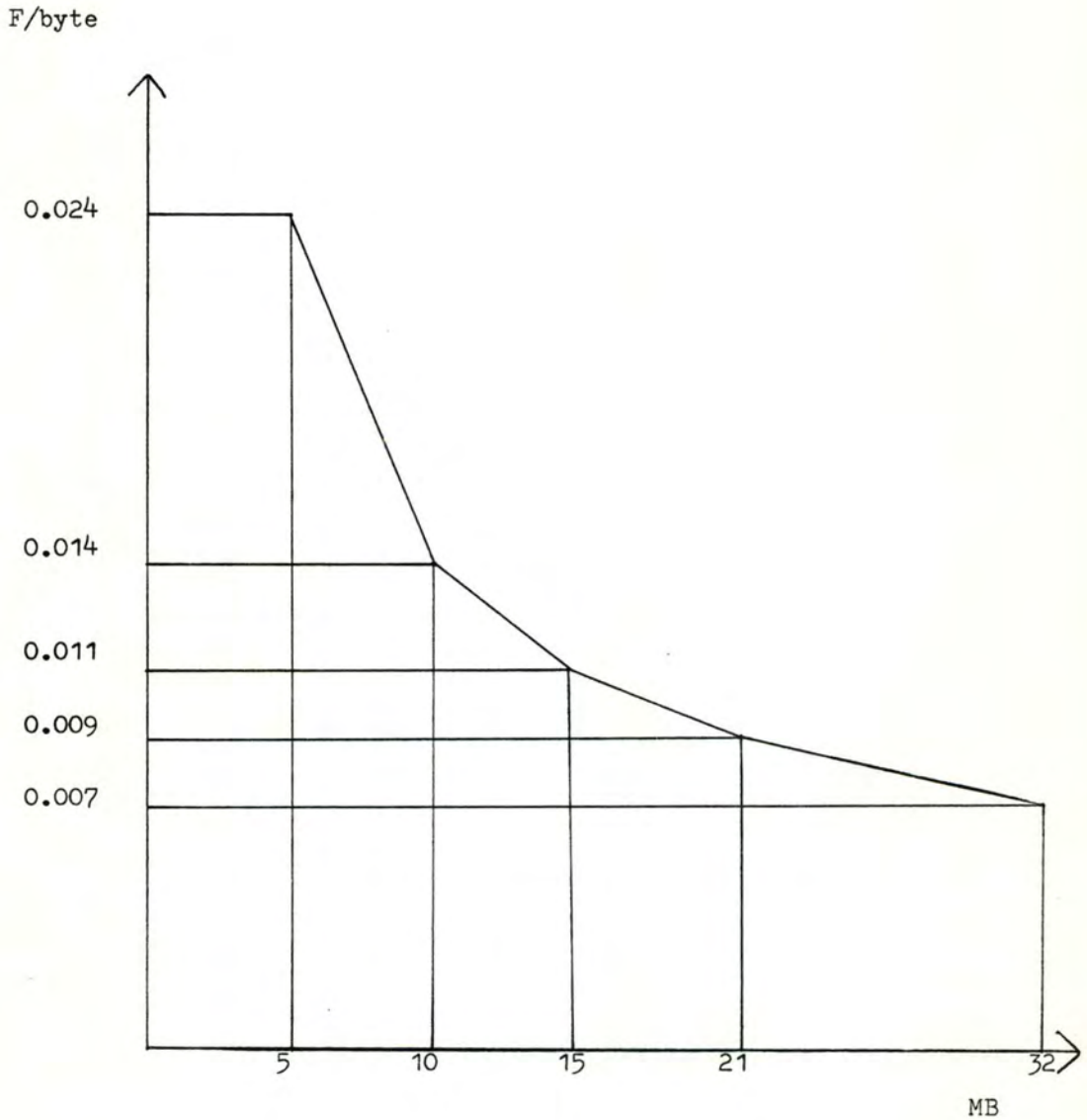


hard disk mass storage device with its capacity

Preliminary remarks:

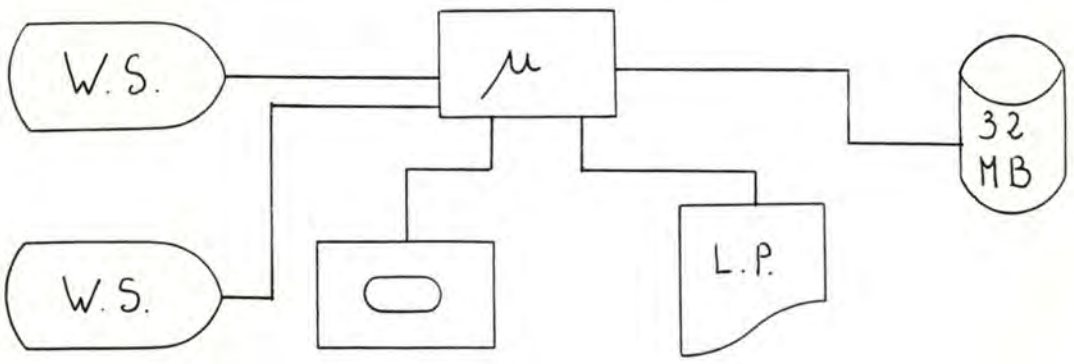
a) Mass storage disk unit: informations were picked up from DAVONG Winchester disks documentation. Five standard configurations are available: 5-10-15-21-32 MB. A very important feature about hard disks is shown in the

following graphic: the cost price per stored byte drops fast as the installed capacity grows bigger.



b) The discussed configurations do not mention any back-up device. Huge back-ups will be performed when a survey is completed. They can be done through transfer from dikettes to tape, although this procedure is awfully heavy. BRAC could make use of backup units which are designed for micro-computers. Such units, as the DAVONG tape backup device, work on video tapes which can store up to 18 MB. It must be remembered that such a unit can always be connected to the selected configuration.

Configuration A: centralised system.



This configuration can be regarded as inadequate:

a) Several working stations connected on the same micro-processor require a complex Operating System (OS) able to handle multi-tasking. Such an OS is not desirable in BRAC's environment, considering how low is BRAC's experience.

b) The whole configuration must be acquired at once, leaving no room for progressive build-up. Its non-modular structure provides no way to adapt to changing needs. Once this system becomes saturated, an entirely new one must be acquired, starting the process all over again.

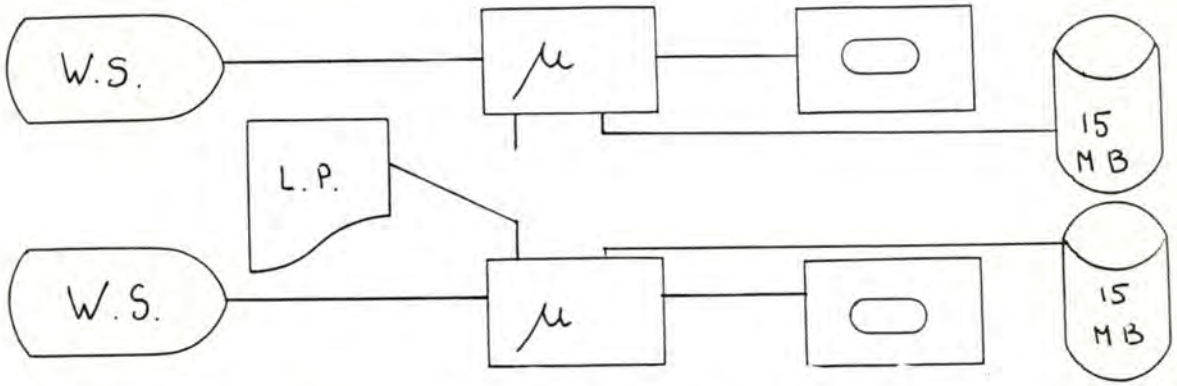
c) In case of breakdown or failure, the entire system becomes inactive during reparation time. Considering maintenance constraints, it could take months before return to operation.

A few advantages can be proposed:

a) Such a configuration is generally provided with a large amount of central memory. BRAC's computer requirements rather implies large amounts of mass-storage capacities, instead of computation facility for sophisticated programming. A large central memory is therefore no real asset.

b) Acquiring this configuration makes it easy for BRAC to plan and budget the needed investment. This aspect of the problem lies beyond the scope of this study.

Configuration B: distributed system.



- Two micro computers with their own 15 MB disk unit, diskette drive and working station.

- One line printer stands between them and can be connected at will at any one of them.

- Diskettes will be used for micro-computers dialogue.

Some interesting features can be pointed out:

a) Configuration B provides a twin system, each branch being devoted to a specific data base. Users do not fear any kind of interference (long waiting time due to multi-tasking, unavailability of shared ressources...). Since both data bases are designed for independant uses, they perfectly fit into this configuration.

b) In case of a system failure, the surviving branch remains unaffected. BRAC is therefore left with half its computing power.

c) Each micro-computer is provided with a single working-station. The simplified OS is therefore much easier to assimilate.

d) Each system is able to grow up independantly as the uses for each data base are being personnalised.

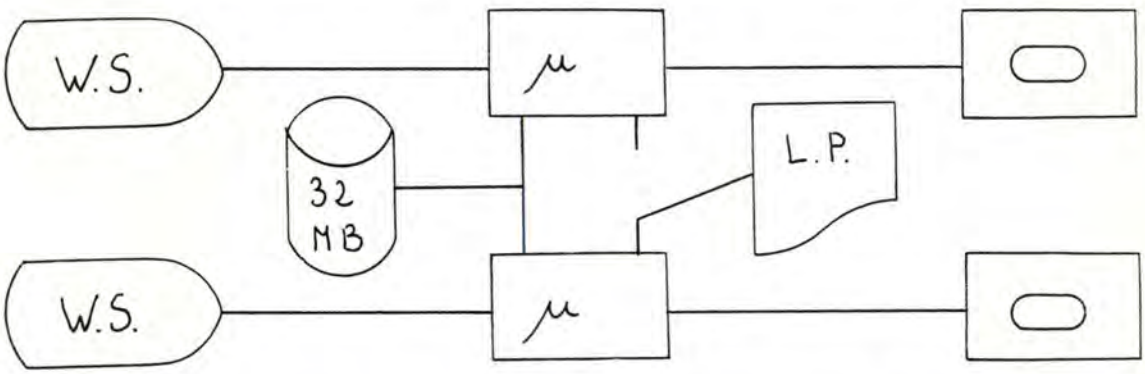
There are also inconvenients:

a) Communications between both micro-computers are done through diskettes interchanges. This is a heavy procedure. If big files are to be exchanged, tens of diskettes may be needed.

b) Each system is only provided with 15 MB. If a special temporary need of more than 15 MB arises, it cannot be answered.

c) According to the decreasing cost per stored byte, two 15 MB units are more expensive than a single 30 MB unit.

Configuration C: Shared mass storage device.



The way the 32 MB disk unit is shared could be very simple. Its management can be done through the OS of both micro-computers. Each system has its own files on which the other system is not allowed to do any accesses, neither read nor write. Passing a file from one system to another simply requires a change in ownership. Simultaneous accesses to the disk are managed through a waiting queue.

Configuration C is seen as the most adequate. It stands as a theoretical configuration, a situation towards which BRAC should trend. Actual configurations available on market might not correspond exactly to the features which are expressed here. It is not the purpose of this study to come up with a complete panel of today's availabilities. It rather gives outlines of what it regards as an adequate solution. BRAC can then use them as guidelines for his actual choice.

3.3.2. Dynamic point of view.

It would be bad policy for BRAC to acquire a complete configuration C at once. Several reasons can be invoked:

a) 32 MB disk unit is a big size. If BINARY is used, 0.5 MB is needed per R.C.T.P. branch per survey. 32 MB therefore can manage to store online two complete surveys for 25 branches, and still offer enough room (7 MB) for system programs.

b) Even if micro-computers are involved, any data-processing system requires an adaptation period which becomes longer as the system complexity increases. Since micro-computers are advocated for their almost immediately operational character, there is no reason for delaying their actual use. A modest system at the beginning still answers BRAC's current needs and requires a short learning period. As new needs then arise, additions can be made which are perfectly handled since in the meantime BRAC would have grown home-made experience.

c) Expected needs only are an estimation. Actual needs might be very different. Hence, a system must show ability to adapt. If a complete system corresponding to specific needs is installed at first, it won't be able to resist changes in requirements.

BRAC could start with half a configuration B: one micro-system with 15 MB. Then as needs are developing, BRAC could trend towards configuration C. The way this evolution is made depends on actual facts. If BRAC is concerned about access time on disks, he could go from a single 15 MB unit towards two 15 MB units, both of them being shared. If instead access time is not so important (why should it be?), but costs are, BRAC could well go from a 15 MB unit towards a 32 MB unit. This solution is cheaper, according to the decreasing cost per stored byte. BRAC could then negociate an exchange with its dealer, by which the 15 MB unit would be replaced by the 32 MB unit, plus a normal compensation.

Conclusion.

The goal of this study was to answer the questions whether BRAC needs computer help, and how. To the first question, a positive answer was given. Computers can help BRAC to achieve his goals by providing him with a mean to formalise his unique knowledge and experience of the Bangladeshi rural world. Such a kwowledge can then be used as basis for the setting up of a service that would be made available to anyone, organization or private person, requesting it.

While showing a way to implement this computer help, the importance of data structures appeared at once. All of BRAC's activity, his rural development programs, are evaluated on the basis of surveys conducted in the areas where they are undertaken. Data bases act as a way to materialise BRAC's knowledge. From RCTP action, two data bases were designed which can be used for RCTP evaluation.

Acquiring the right configuration according to environment constraints proves to be a critical problem for BRAC. Use of micro-computer was advocated in order to enable BRAC to become autonomous as soon as possible, through the growth of self-made experience.

The next step would be the implementation of this system. Whatever specific solution will be chosen, BRAC must be a full actor into the process, and not a mere client or bystander. A passive attitude may thwart BRAC's ability to meet the computerisation challenge. Help can be usefully provided by other organizations in Dhaka or elsewhere, as long as BRAC stays the "maître d'oeuvre".

Annex: list of tables published in Boraigram baseline report.

Volume 1.

1. Number of households surveyed and persons enumerated.

2. Distribution of population by age and sex.

3. Dependency ratio of population.

3(a). Male dependency ratio of population.

4. Distribution of population by age, sex and marital status.

4(a) Percentage distribution of population by age, sex and marital status.

4(b) Median and Quartile ages (in completed years) of population by sex.

4(c) Estimated singulate mean age at marriage.

5. Distribution of population by education and sex.

6. Percentage distribution of population by economic category.

7. Distribution of population by main occupation and sex (population 10 years and above).

8. Distribution of population by age and main occupation (population 10 years and above).

9. Distribution of population by main occupation and subsidiary occupation.

10. Distribution of population by main occupation and level of education (10 years and above).

11. Age specific birth rate.

12. Age specific death rate.

13. Distribution of households by family pattern.

14. Distribution of households by total landholding.

15. Distribution of households by arable landholding.

16. Distribution of households by arable landholding and household size.

17. Distribution of households by family pattern and arable landholding.

Volume 2.

A. Landholding.

Distribution of households by arable landholding and average size of holding in different landholding groups.

Distribution of households by operational landholding and average size of operational landholding in different landholding groups.

Distribution of households by arable landholding and operational landholding.

Distribution of households by arable landholding, area of arable landholding and area of operated land.

Average size of plots (arable landholding).

Average size of plots (operational landholding).

B. Type of tenancy.

Distribution of households by arable landholding and type of tenancy.

Extent of share cropping.

Extent of mortgage of land.

Intensity of cropping.

C. Land transfer.

Frequency distribution of households by mode and year of land transfer.

Distribution of households by arable landholding, year and amount of land mortgaged in.

Distribution of households by arable landholding, year and amount of land mortgaged out.

Distribution of households by arable landholding, type and year of land purchased.

Distribution of households by arable landholding, type and cause of land sold.

D. Agricultural inputs.

Distribution of households by operational holding and amount of land irrigated.

Distribution of households by operational holding and method of irrigation used.

Distribution of households by operational holding and amount of land under fertiliser use.

Distribution of households by operational holding and type of fertiliser used.

Distribution of households by operational holding and amount of land under pesticide use.

E. Production of crops.

Estimates of aus (local) paddy.

Estimates of broadcasted aman (local) paddy.

Estimates of transplanted aman (local) paddy.

Estimates of irri paddy

Estimates of wheat.

Estimates of kheshari.

Estimates of lentiles (masur).

Estimates of geam.

Estimates of mustard.

Estimates of turmeric.

Estimates of sugarcane (molasses).

Estimates of jute.

Production of other crops.

F. Income.

Distribution of persons by type of job, amount of annual income earned from the job and permanency of the job.

Distribution of persons by type of business, amount of annual income earned from business and permanency of business.

Distribution of households by arable landholding and amount of annual income from agriculture.

Distribution of households by arable landholding and annual income earned from business.

Distribution of households by arable landholding and amount of income earned from day labour and service.

Frequency distribution of day labourers by amount of annual income earned from day labour.

Distribution of households by arable landholding and amount of annual income earned from other sources.

Distribution of households by arable landholding and amount of annual income earned from various sources.

Distribution of households by arable landholding and amount of annual income earned from all sources (excluding agriculture).

G. Livestock.

Total number of cows and goats at the beginning and end of the year.

Total number of calves and kids born, and total number of cows and goats died.

Distribution of households by arable landholding, households purchasing cows and number of cows purchased.

Distribution of households by arable landholding, households selling cows and number of cows sold.

H. Assets.

Distribution of households possessing assets (sole/joint).

I. Homestead.

Distribution of households by arable landholding and nature of ownership of homestead.

J. Debts.

Estimates of indebted households and average amount of debts.

Income and indebtedness.

Distribution of indebted households by type of debt.

Distribution of indebted households by arable landholding and sources of debt.

Bibliography.

[1] BRAC: Summary of Current Activities, Bangladesh Rural Advancement Committee, Dhaka, 1980

[2] Proposal for Rural Credit and Training Project: An Innovative Approach to Finance the Rural Poor in Productive Pursuits, Bangladesh Rural Advancement Committee, Dhaka, 1978.

[3] Boraigram Baseline Survey 1981, Bangladesh Rural Advancement Committee, Dhaka, 1982.

[4] Gazaria Baseline Survey 1981, Bangladesh Rural Advancement Committee, Dhaka, 1982.

[5] BRAC's Economic Support Program in Manikgonj, phase 1: April '76 to March '79, Bangladesh Rural Advancement Committee, Dhaka, 1980.

[6] CHOWDHURY, A.M.R., A Design for Evaluating the Impact of a Health Intervention Program on Mortality, Bangladesh Rural Advancement Committee, Dhaka, 1981.

[7] AHMED, Z., Economic Analysis of Some R.C.T.P. Supported Schemes at Monohardi, Bangladesh Rural Advancement Committee, Dhaka, 1982.

[8] The Status of Computer Use in Bangladesh, USAID Mission to Bangladesh, Dhaka, 1981.

[9] HICE, G.F., TURNER, W.S., and CASHWELL, L.F., System Development Methodology, North Holland/ American Elsevier, Amsterdam, 1974.