SPECIFICATIONS OF AN INTEGRATED INFORMATION SYSTEM FOR MICRO LEVEL PLANNING IN AGRICULTURE: A USER-CENTERED ANALYSIS

By

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(2011-21-105)

THESIS

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DECLARATION

I hereby declare that this thesis entitled "Specifications of an Integrated Information System for Micro Level Planning in Agriculture: A User-centered Analysis" is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award of any degree, diploma, fellowship or other similar title, of any other University or Society.

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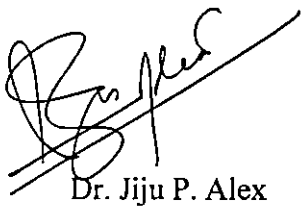

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INTRODUCTION

1. INTRODUCTION

It is well known that the development of a region or community is directly influenced by the effectiveness of planning and successful implementation of planned activities. The vision of planners and the resources available for bringing about changes are so significant in making planning process successful. Optimum utilization of resources and better targeting can be brought about only if data pertinent to all the resources are made available to the planners.

Formalized planning for development has been a major feature of Indian economy. Centralised planning was perceived as a national goal in the wake of independence. Long term plans called five year plans were prepared since independence, focusing on the immediate needs of the country with a national perspective. It is widely admitted that centralized planning has been instrumental in providing the country with adequate infrastructure during the initial stages of nation building. It has also contributed to overall development of the rural sector in general and improvement of agriculture and industries in particular, to a large extent. A national plan in India comprises plans of the central government, state governments, central and state public-sector undertakings, and private sector. Formulation of five year plans had followed a definite iterative process starting from working groups of the National Planning Commission to the Cabinet. Though this process is consultative and iterative involving several stakeholders, centralized planning has been criticized on the ground that it has failed to yield the expected results [Byrd (1990), Vazquez and Rider (2006)]. Being centrally planned, development objectives had been locally irrelevant mostly. Moreover, there had been imbalances in the distribution of resources in different regions within the country. Also, real and deserving beneficiaries of projects could not be found out due to lack of proper targeting. Centralized approach is now understood to have prevented effective utilization of local resources as the development needs at the grassroots level are different from macro level requirements. Making things worse, centralized planning is also characterized by heavy bureaucratic procedures. Alongside, macro level indicators cannot show realities at the grassroots level as they give only aggregate figures and averages. Summing up these arguments, Dutta and Singh (2007) observe that initial approach of planning based on macro level assessment of resources has not yielded the desired results.

On the contrary, micro level planning can take care of many of these issues as it is highly contextual and location specific. It is a dynamic process at the grassroots level which takes into consideration the individual, family and category of the community for which planning is to be done. It would not only help analyze grassroots level situations critically, but also understand the power relations existing in the political, socio economic and cultural spheres which might have implications on access to resources. It would take into cognizance, status of available resources and the needs and aspirations of the local people.

As mentioned before, micro level planning addresses the shortcomings of centralized planning in several ways (Tornquist, 2000; Heller, 2000). First, decentralization ensures more degree of participation of the beneficiaries and better involvement of stakeholders. The interests and concerns of the people at the local level are better represented in decentralized planning. Second, decentralized planning envisages better utilization of human and other resources available at the grassroots level. It would help identify local resources clearly and enable better targeting of benefits. Since the funds for development are given based on local needs, they would be utilized equitably and there would be balance between different regions with respect to utilization of resources.

Third, it gives opportunity to freely express the ingenuity of the local people to find out solutions to their problems. Decentralized planning for formulating micro level development interventions help explore appropriate and judicious distribution of resources, convergence of resources and utilization of local production possibilities. More importantly, finding solution to diverse local problems would help fine-tune the technological solutions available. It would also provide inputs to research systems to evolve new solutions. Fourth, it would improve transparency of implementation of development projects and enable people's participation leading to better monitoring.

Decentralized or local level planning has changed the traditional concepts of planning. It has demonstrated that development is sustainable, area- specific and should take into account the felt needs of local people (Dutta *et.al.*, 1997). Considering the diversity of crops and the geographic and socio-economic characteristics of agriculture, micro level planning has been suggested as the best way to plan agricultural development projects.

Kerala showcases a very good example of decentralized and micro level planning. Emboldened by the provisions of the 73rd and 74th Constitutional Amendments and the subsequent Panchayati Raj Bill in 1994, Kerala has devised a unique method of decentralized planning. Democratic decentralization implemented in Kerala has envisaged redeployment of about 12 development departments at the Grama Panchayat level to facilitate planning of development projects at the micro level. This has automatically led to generation and maintenance of local level databases for administrative purposes. The data thus generated are available in the records and registers of the offices transferred to the Local Self Government Institutions (LSGIs).

However, in the initial year of democratic decentralization, local level plans were formulated by collecting primary data, reports and other conventional data bases available at various offices. It had been reported that data were not available from registers since LSGIs were not full-fledged institutions at that time. However, over a period of several years since the initiation of democratic decentralization, these offices have grown into full fledged institutions with multitude of responsibilities. Also, the process of micro level planning has turned out to be complicated, which requires specific data and information.

The process of micro level planning in Kerala has nine distinct phases viz. situation analysis by working groups, village council for citizen consultation, projectisation by implementing agency, development seminar for fine-tuning project proposals and consolidation, approval by the LSGI, technical verification by block level expert committees, administrative sanction by the district planning committee and finally implementation by the implementing officer. The processes also include participatory monitoring and evaluation.

Micro level planning is now known to be highly information intensive and it requires information flow from different hierarchical levels, in addition to grassroots level data. The process of planning includes data and information pertaining to policies, priorities, targets and guidelines. Local bodies and village level offices could provide data on land, infrastructure, vital statistics, institutions, demographic characteristics etc. A wide range of information ranging on crops, topography and climate is also required for planning at the grassroots level. It will also require demographic and socio economic data, in addition to the vast repository of technical information on crop production, crop maintenance, post harvest handling, marketing etc. It is

also observed that integration of spatial and non spatial data would be required for proper planning. Data on natural resources, their distribution, spatial orientation etc. are important inputs for micro level planning.

The above facts drive home the fact that micro level planning in the strict sense warrant generation, maintenance and use of data on a large scale. However, in practice, the process does not rely much on current data on the development status of a sector. Instead, it depends mostly on the status of implementation during the previous years.

Creating data support for micro level planning, however, is not that easy as it would appear because of the diversity of problems and lack of micro level information. The significance of databases and information in micro level planning has been expressed by many authors. It is well known that there is an increasing demand for small scale statistics as the projects are focused on rural areas. Issac and Franke (2002) emphasize the significance of having information and databases for micro level planning, by specifically stating that economic information and other factors relevant to development planning are not available to panchayats and municipalities. They also observe that comprehensive area plan requires a comprehensive database for every locality. Even the Planning Commission had recommended for the creation of databases on plan formulation, plan monitoring and plan evaluation (Moni, 2010).

Sources of data for drawing out development plans at the micro level are very many. While it would be advisable to collect primary data from the field to have objective understanding of existing situations, it will not always be possible to get primary data as it is expensive and time consuming. In such situations, existing secondary sources of data can be utilized to draw out development interventions. Since it is also difficult to get well defined secondary sources such as literature or reports at the micro level, it would be better to make use of existing registers and indigenous databases that are available at the village level to obtain data. Of late, there are several attempts to make micro level data available in electronic form due to various e-governance programmes for LSGIs as well as the transferred institutions. Considering all the above, it has become apparently important that comprehensive databases are required for efficient planning at the grassroots level. Undoubtedly for this, database requirement at various levels will have to be explored. Different types of information required for planning at different levels indicate that action needed for establishing a multi level planning process is building up a

suitable database and information system to support planning and decision making activities. This not only calls for generating bonafide and accurate information on different development sectors, but also reiterates the need for generating relevant parameters for improving decision making. This implies that micro level planning requires multitude of information that would facilitate objective appraisal of existing situation in an area.

Though micro- level plans might get integrated at higher levels, it can be done only by compiling micro-level information. However, as observed earlier, the status of availability of databases at the micro level is not that satisfactory. For instance, the committee of the study group on information gap set up by the Planning Commission observes that there are significant gaps in the availability of data at the sub-state level as against the requirement of such data for planning (Dutta and Singh, 2007). This report again reflects on the basic information on several socio-economic aspects required for planning at the lower level which is not available to users in time.

Though a lot of data is collected at micro level, which is processed and published for the country as a whole or for individual states, no disaggregation of the data for state- sub levels is done. Under these circumstances, it is imperative that we closely examine the databases required for micro level planning, their sources and the preference of various stakeholders. It would also give indications on the possibilities of devising an integrated information system for micro level planning and the backend databases that will have to be created. Though micro level planning is an expansive process which include all development sectors, planning for agriculture needs to be mentioned specially as it involves large amount of data and information from different direct and indirect sources. Agriculture is the most important sector among the different sectors transferred to LSGIs. This is evident from the substantial amount of plan funds earmarked for agriculture, for formulating development projects. Moreover there is an added focus on agriculture, which is ensured by insisting the compulsory minimum amount to be spent in this sector. Being a very sensitive and vital sector, agriculture assumes greater role in micro level planning.

1.1. Scope and importance of the study:

It is generally observed that, use of development databases is very important in local level planning. In this context, the study proposes to specifically explore micro level planning in

agriculture, as this sector is the most important sector which requires micro level investigation prior to formulation of development projects. Hence, this study entitled "Specifications of an Integrated Information System for Micro Level Planning in Agriculture: A User-centered Analysis" has been designed with the following objectives:

1. To appraise the current status of micro level planning in agriculture in Kerala with respect to use of databases and information
2. To characterize the legacy databases and types of information used for this purpose, with focus on availability and completeness of data
3. To evolve a typology of information and development databases required for micro level planning
4. To formulate specifications regarding the content and hierarchy of an 'Integrated Information System for Micro Level Planning in Agriculture'

The study would help us design the framework of an Integrated Information System for Micro Level Planning in Agriculture, which could be used by all stakeholders involved in the process. The inference of the study would help us define the components of an Integrated Information System and their relative importance. An information system thus developed would make micro level planning process more objective and realistic. It would also reduce the drudgery of planning process as information would be made readily accessible.

1.2. Limitations of the study

Though the study is meant for exploring the nature of use of data and information in micro level planning in agriculture and suggest the specifications for an integrated information system that could be used for this purpose, the study has several limitations as described below:

1. It is not possible to obtain complete and accurate information by overcoming the personal bias of respondents. Some of the respondents might not have correctly or fully reflected their opinion about the use of data in micro level planning and their perception of developmental databases due to various personal characteristics and reasons. To overcome this, sufficient care has been taken to elicit responses as much objectively and exhaustively as possible from the respondents.

2. The area of investigation was restricted to four Grama Panchayats selected randomly from two blocks of five agro-climatic zones and Onattukara region of Kerala. The study has generalized the inferences drawn from this limited data, which may not be fully representative of the population. However this has been overcome by ensuring randomized data collection through scientific methods.

3. The study has developed only the content structure of an integrated information system for micro level planning. The study does not attempt to devise the actual information system and subject the final output to the judgement of the user, which is the subsequent step. This might have restricted the respondents to come out fully while expressing their perception on the integrated information system.

1.3. Organization of the study

The study has been organized under the following five chapters

Chapter 1: INTRODUCTION: Explains the importance of the topic, objectives, scope and limitations of the study

Chapter 2: REVIEW OF LITERATURE: Deals with review of relevant literature

Chapter 3: METHODOLOGY: Describes the sampling design, study area, measurement of dependent and independent variables, tools for data collection and statistical tools used.

Chapter 4: RESULTS AND DISCUSSION: Discusses the results of the study to draw specific inferences.

Chapter 5: SUMMARY : Briefly summarizes the work done and salient findings. Explains the implications based on the results of the study.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

This chapter intends to systematically compile existing information on important aspects of micro level planning in agriculture and importance of databases in the process of planning. Alongside, it also tried to gather existing literature on the use of databases in planning development programmes in Kerala. Available information on the prospects of designing an integrated information system to enable robust micro level planning is also explored. Literature on different aspects of the study has been grouped under the following subheads.

2.1. Significance of micro level planning in agricultural development

2.2. Importance of database support for micro level planning in agriculture

2.2.a. Types of data required for micro level planning

2.2.b. Types of data required for micro level planning in agriculture

2.3. Sources of data for micro level planning

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2.8. Importance of integrated information system in decentralized planning

2.9. Information and database support for micro level planning in agriculture

2.10. Efficacy of micro level planning

2.11. Adequacy of legacy databases for micro level planning in agriculture

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2.13. Integrated information system for micro level planning in agriculture

2.14. Specifications of integrated information system

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2.15.3. Experience in micro level planning

2.1. Significance of micro level planning in agricultural development

Agricultural development requires planning at the micro level as it is highly contextual and location specific. Ray (1999) defines planning as decision making, which involves selecting and integrating the courses of action that an organization will follow to attain its objectives. Planning is deciding in advance what to do, how to do, when to do, who is to do and with what result.

Prasad (2001) defines planning as a process which determines the future course of action, particularly as to why an action should take place, what action should take place and, how to take up the action, and when to take an action. According to him, why of action reveals that action has some objectives or the end result which an organization wants to achieve, what of action specifies the activities to be undertaken, how and when generate various policies, programmes, procedures and other related elements .

Micro level planning on the other hand is a dynamic process which involves planning at the grassroots level taking each individual, family and category of the community of a given area. Almost every deliberation on development of rural communities reiterates the need to decentralize the process of planning to bring about effective participation of stakeholders and redistribution of benefits (Blair, 2003; Crook and Severrisson, 2003).

Planning denotes the possibility of influencing or directing different sets of developments (Gandy, 2006). Khan and Somani (2013) also define planning as deciding in advance what is to be done; it is projected course of action. Micro level planning in agriculture like any other planning process is information intensive (GOK, 2009).

Planning is conceived in public governance as a process that analyses the situation, identifies the needs, sets the priorities, allocates the resources and fixes the targets for achieving the pre determined objectives. A plan must be a realistic account of the expectations. Preparation of a comprehensive plan may not guarantee success, but lack of a sound plan will almost certainly ensure failure (GOK, 2014).

Micro level planning derives its methodology from the general concept of planning. Micro level planning as a process is defined as an attempt to coordinate the planning activities of the numerous actors within a limited terrestrial unit (Schmidt-Kallert, 2005). However, the area of operation is less as a micro-region is described as a distinct territorial unit with clearly marked boundaries below the regional level (Schmidt-Kallert, 2005). He states that such a unit would also mean the living space of a particular ethnic group. He further describes that a micro region shall also be physical features like water catchment areas or the resource base of a particular unit. Emphasizing this, Dutta and Singh (2007) define micro level planning as dynamic basic unit of planning and forum to analyze a situation critically and understand the power relations existing in every sphere: political, socio-economic and cultural.

Emphasizing the duration for which micro level plans are prepared, Devadas (2007) observes that micro level plans are prepared on short-term bases to fulfill immediate requirements, on the basis of available resources and the needs and aspirations of the local people that may vary from area to area, region to region, group to group, etc. He also points out that micro level planning requires a shift of the focus of decision making authority down the hierarchy and closer to local sources of information. This change in the focus, according to Harilal (2012), makes the system more reflexive and adaptive to changes at the local level.

FAO (1995) observes that execution of an integrated approach in planning depends on policies that support planning for the use and sustainable management of land resources, on strengthening of implementing institutions and on ensuring the active involvement and participation of stakeholders in the decision making process. Pointing to the key functions of micro level planning, Ghosh *et al.* (2011) describe micro level planning as one of the key factors in rural development and sustainable resource management.

To sum up, micro level planning shall be defined as the process of determining the course of action for bringing out development that is beneficial to the members of the community by making the best use of the resources available.

2.2. Importance of database support for micro level planning in agriculture

While explaining the different types of information required for planning at different levels Sundaram (1997) sums up that action needed for establishing a multi level planning process is

building up a suitable database and information system at the critical area levels to support the planning and decision making activities. According to him, decentralized planning which mainly involves micro level planning is not a single-stroke planning operation. It is a relay-rerelay process in which the micro-units, through a repetitive process of interaction, seek convergence to the dynamic path of stable equilibrium for the entire macro system. The different area levels have to act and interact repeatedly, until harmonious planning is achieved. This interaction is achieved through a vigorous flow of information, both top-down and bottom-up.

As Coleman and Galbraith (2000) observe, holistic planning involves input from multiple, interrelated data sources and types.

Abissat (2008) observes that access to information and advice is a key resource for local people in maintaining active and independent lives. Access to information is also critical to letting people know their entitlements to welfare benefits and sources of support to overcome social exclusion.

Reiterating the importance of useful information, Harande (2009) observes that information is raw material for development for both urban and rural dwellers. Prosperity, progress, and development of any nation depend upon the nation's ability to acquire, produce, access, and use pertinent information.

Expressing concern over the constraints involved in obtaining data support for planning at the micro level, Harilal (2012) insists that there should be an urgent overhauling of the process of collection and storage of data on local governments and local level planning. Data collection should facilitate planning and should not be allowed to be a cause of delay.

These observations not only call for generating bonafide and accurate information on different development sectors, but also reiterate the need for generating relevant parameters for improving decision making. This implies that micro level planning requires multitude of information to facilitate objective appraisal of existing situation in an area.

2.2.a. Types of data required for micro level planning

While it is important that micro level planning for development be supported with information generated from objective databases, subsequent consideration is the type of information required for planning. Information required for different sectors of development would definitely vary from each other. For instance, Sundaram (1997) explains that information flow through different hierarchical levels involve information pertaining to policies, priorities, targets, guidelines of planning etc.

Issac and Franke (2002) while discussing decentralized planning in Kerala, emphasize the significance of having information and databases for micro level planning, by specifically stating that economic information and other factors relevant to development planning are not available to panchayats and municipalities. They also observe that comprehensive area plan requires a comprehensive database for every locality. In fact, micro- level plans get integrated at higher levels to form the macro level plans. Planning in agriculture in particular requires wide variety of information ranging from crops to topography to climate, which are to be compiled from micro level data.

In agreement with this, Dutta and Singh (2007) observe that sustainable development of any region could be accomplished only through successful integration of spatial and non-spatial data with proper planning at the micro-level. They also opine that planners and managers should be facilitated with maximum data that they can utilize as proper planning tools.

Ghosh *et al.* (2011) while exploring the possibilities of formulating appropriate micro-level planning strategies argue that proper and sufficient amount of real time spatial database is needed which can be successfully developed through digital mapping and decision support systems like Geographic Information System. According to him, concrete database on physiography, soils, cultural environment, land use, economy, irrigation, cropping pattern, livelihood status etc are required for preparing spatial database.

The review of available literature show that a wide variety of data is required for planning at the micro level, which form a major point of exploration in the present study.

2.2. b. Types of data required for micro level planning in agriculture

As seen above, specific data and information at various levels are required for micro level planning in agriculture. Each component of agriculture requires varying data that can be realized from different sources. For instance, FAO (1995) insists development of decision support system for land use planning with the specific purpose of land evaluation and socio economic evaluation. The support system for land evaluation includes land resources database and land use database, which further include sub items viz. soil, climate, crop requirements, production systems, land management units, land use options etc. The system for socio-economic evaluation would require economic database and database on social factors, where the sub units are cost of inputs, sale prices, objectives, resources etc. for selecting best land use.

Issac *et al.* (1995) report that the team involved in preparing the database for Grama Panchayat level resource mapping programme in Kalliassery, which was the precursor to decentralized planning in Kerala, collected data on land resources, water resources, shift in cropping pattern, expansion of infrastructure, demographic characteristics, issues of agricultural organization, agricultural practices, integrated land, water and cover management, schemes under watershed development programme etc.

Similalry, the State Planning Board of Kerala (1997) report the details of its attempt to develop a comprehensive resource based information system for Kerala to set up an integrated resource based database of various spatial variables, which included data relating to land, water and biomass, and non-spatial determinants like socio-economic variables.

Charvak (2000) suggests development of a comprehensive database of the land, water and human resources and the status of their present utilization for local planning, as the database at hand are pertained to the national or regional level only and hence of little use in local level planning. Citing the the Panchayat Level Resource Mapping Programme (PLRMP) conducted in Kerala, he reports that thematic maps had been prepared on land form, surface material, ground water potential, general land use and depth of bed rock, for formulating micro level plans.

Jackson-Smith (2002) vividly identify the types of data used in agricultural planning and its potential uses as follows.

Potential uses of different types of data for agricultural planning

Type of Data	Relevance / Use
Farming systems, demographics, and land tenure	
Farm numbers, types, and sizes	Characterize local farming activities, evaluate stability and viability of local farms; recognize varying potential for off-site impacts from different types of farms; farm modernization and expansion needs and plans
Spatial farming patterns	Identify clusters of farms, patterns of farm fragmentation and the proximity of farm operations to other land uses
Farm demographics and plans for future	Understand age of farm operators and rates of entry and exit; identify plans of different farm operators for the future use of their land; social service needs; community connections
Farmland ownership patterns	Likelihood of conversion to other uses; importance of rented land to local farms; identify areas with many small parcels
Biophysical Information	
Soils	Serves as indicator of suitability for agriculture production; may be linked to different types of agriculture; basis for use value assessment decisions; restrictions on hydric soils
Topography	Helps identify steep slopes unsuitable for tillage; "hot spots" for ground or surface water pollution by agrichemicals;
Hydrography; surface drainage; groundwater	Locate flood plains and floodways; wetlands; locate drain tiles and other drainage structures; stream buffers; identify areas vulnerable to groundwater contamination

Moni (2010) while proposing the framework and content of an Agricultural Resources Information System insists that it should have data and information on basic resources such as soil resources, water resources, climate resources and other data sets such as basic data on crops, animal husbandry and fisheries, genetic (plant, animal and fisheries) materials, land ownership, socio-economic data and infrastructure for agricultural development.

Similarly, Ghosh *et al.* (2011) list the different types of information and data required for developing a spatial database for sustainable micro level planning. They emphasize the need for developing databases on physical environment, cultural environment and livelihood pattern. The list of information includes physiography, soils, land use, irrigation, cropping pattern, micro economic status etc.

Relevant and recent literature on data requirement for micro level planning reveal the wide variety of domains involved in the process and the data types thereof.

2.3. Sources of data for micro level planning

Information vital to planning shall be meaningfully derived from relevant databases that could be made available by the agencies responsible for planning. There are different sources from which data can be collected. While it is always better to have primary data for planning development, it would not be possible as collecting primary data is cumbersome. Hence we have to depend on secondary sources for varied information. Secondary sources are mostly 'legacy databases' available in the registers, records and other documents maintained in offices.

Database is defined as a collection of data which is organized. In conventional terms, databases are systematically organized data which can be accessed for extracting useful information (Vanitha and Kalpana, 2011). Now a days, database refers to a collection of data which can be accessed through a computer programme.

Issac and Franke (2002) describe various sources of information used for micro level planning during IXth Plan Period. Drawing from their extensive field experience in mapping the resources of Grama Panchayats, they report that the Grama Panchayat office provides data on receipts and expenditure of the Grama Panchayat, the physical assets, vital statistics, types of institutions etc. The Village Office provides data on land ownership, broad land use patterns, land classified by revenue status etc. The Krishi Bhavan provides data on cropping pattern, production and productivity, fertilizer and pesticide use, soil quality, irrigation, and distribution of farms by land use. Similarly the Veterinary Hospital, Soil Conservation Office, Minor Irrigation Office, Primary Health Centre, Anganawadis, Electricity Office, Block Development Office and Civil Supplies Office also provide vital information to micro level planning.

Apart from the registers kept at these offices, there are several other secondary sources of data. Coleman and Galbraith (2000) point out several secondary sources such as soil survey manuals, topographic maps, aerial photographs, vegetation surveys, flood maps, hydrology maps, property surveys etc.

Several agencies and institutions who are part of development planning point out the need for collection of data and the sources from which data could be obtained for planning. For instance, the Planning Commission (2006) emphasizes the need for collection and computerization of habitation wise information on a large number of parameters. The Expert

Group Report on decentralized planning in the eleventh plan suggests that data available from several sources either computerized or otherwise, need to be integrated. They suggest census data, economic data, data on socio-economic indicators, income details, reports of task forces, publications of line departments, evaluation reports etc. as the sources from which inputs for planning could be obtained. It also suggests that National Sample Survey should be taken to all blocks in this country (Planning Commission, 2008).

Dutta and Singh (2007) are of the opinion that successful planning of developmental activities at the grass roots level depends on the quality and quantity of data emerging from both natural and socio-economic resources. They further state that in this context, it is essential to develop and utilize the spatial information technology together with conventional techniques, which would help in the planning as well as storing of a large amount of data.

Moni (2010) reports that considering the significance of databases in different stages of planning, the Planning Commission has recommended creation of databases on plan formulation, plan monitoring and plan evaluation.

However, many authors have also commented that collecting data for planning at the micro level is seemingly difficult. Sigauke and Neugomasha (2011) report that as understood from the observations made by experts on e-governance, collecting and collating data required for e-governance programmes is an important task which has to be undertaken meticulously.

There are several sources which can provide comprehensive database support for micro level planning. These sources are to be utilized creatively and effectively. As the review indicates, there is also a need to extract useful information from primary as well as secondary sources to create databases at the micro level.

2.4. Status of databases used for micro level planning

Planning for development at the micro level, as we have seen earlier, is a process that requires information from different sources. However, availability of information has been viewed as a major impediment, as deliberate attempts have not been made by any agency to generate data at the micro level.

It is well established that availability of data is essential for any meaningful process of decentralized and micro level planning for any substantial and particularly socio economic development. However, it is generally observed that databases available are not adequate to support the essential functions involved in micro level planning. Mohan (2003) while portraying the status of data availability at various levels of planning, observes that at levels below the state like districts, blocks or villages there are qualitative and quantitative shortfalls in data availability resulting in huge information gap.

Similalry, the Department of Planning and Co-ordination, Nagaland (2006) highlights some of the major problems with the existing data management system at the district level for centralized planning. It is observed that the administrative machinery has not taken into account specialized local requirements, which has resulted in lack of arrangements for identifying location specific problems and data requirement for local area planning. This essentially calls for new methods for getting data support to agencies involved in planning development programmes at the local level.

The committee of the study group on information gap set up by the Planning Commission observes that there are significant gaps in the availability of data at the sub-state level as against the requirement of such data for planning (Dutta and Singh, 2007). Elaborating on the type of data, the report explain that basic information on several socio-economic aspects required for planning at the lower level is not available to users in time. Moreover, though a lot of data is collected at micro level, which is processed and published for the country as a whole or for individual states, no disaggregation of the data for state- sub levels is done. The report emphasizes the need for improving the information system at the grassroots level to improve data availability for micro level planning. Considering this, the study group has recommended preparation and maintenance of developing databases with respect to socio-economic, agroeconomic, infrastructure, demographic and natural resources at the local level. This would serve as a resource base for micro-level decision making regarding needs and development potential.

Devadas (2007) observes that the historical data for preparing micro level plans are based on either district- or state-level statistics and are available only for a few major decision factors of the system. He further adds that most of the data connected with the decision factors

applicable to rural systems are not available. This issue has assumed greater importance with the introduction of decentralized planning as a major approach towards rural development in the wake of the 73rd and 74th constitutional amendments.

It is also observed that quality of decision making at the grassroots level is often compromised as the decisions are not usually based on objective appraisal of existing situation in an area (GOK, 2009). One of the most pertinent issues in this regard is the availability of data at different levels.

Akin to the above general situation, database availability for development planning in agriculture is also bleak as testified by FAO (2012) in its Global Action Plan. The document underlines the significance of evidence based decision making for poverty reduction, increased food security, sustainable agriculture and rural development. It is also stated that the recent food crisis and the ongoing debates on food price volatility, the impact of climate change on agriculture and food security clearly highlight the weaknesses in the available agricultural data.

They also highlight the urgent need for evidence on which to base implementation of the relevant effective policies at the global, regional and national levels. Further, they report that many countries, especially in the developing world, are lacking the capacity to produce and report even the minimum set of agricultural data needed to monitor various trends. Reviewing the overall trend of the quality of databases available for development planning, it is also reported that the problems pertaining to databases existing in developing countries include lack of institutional coordination, which results in lack of harmonized and integrated data sources and difficulty for data users in accessing existing data with no metadata or indication of quality.

2.5. Decentralized (micro level) planning in Kerala

Decentralized planning was initiated in Kerala in the early 1970s with the establishment of District Planning Offices and identification of district schemes. Each department was to indicate the funds it set apart for the Special Component Plan (SCP) from its departmental plan allocation in that particular district. The schemes were to be prepared by a working group taking local conditions into consideration.

A major step was taken in the mid- 1980s with decentralization of the SCP and Tribal Sub-Plan (TSP) (SPB 1988). The next major event was the formulation of the Eighth Five- Year Plan in 1991. The Left Democratic Front (LDF) ministry of 1987-91 took major steps towards setting up district councils and local self-government system. The District Development Council (DDC) was to prepare the district plan in consultation with the Block Planning Committees (BPCs) and Grama Panchayats. The plans approved by the DDCs were to be forwarded to the State Planning Board (SPB) for inclusion in the state plan (Ramalingam and Gulati, 1993; Gulati, 1994; Issac and Franke, 2002). District councils were formed in 1991.

The decentralization process was initiated by the 73rd and 74th amendment Acts of the Indian constitution. By 1993, the government of Kerala like the other state governments passed conformity legislation for the 73rd and 74th constitutional amendments.

Emboldened by the provisions of the constitutional amendments, Kerala embarked on the idea of decentralized planning of local level development programmes by strengthening LSGIs by means of enhanced funds and authority. The process of decentralization named as 'Peoples' Plan Campaign' was launched at the beginning of the IXth Five Year Plan in 1995. The important land marks in decentralization include transfer of powers, functions, institutions and staff to LSGIs, adoption of separate budget document for LSGIs, decision to devolve 35 to 40 per cent of the plan funds to LSGIs, launching of People's Campaign in August 1996, institution-building at different tiers and level, restructuring of the relevant State Level Acts and Rules and submission of the State Finance Commission Reports (GOI, 2006; GOK, 2014)).

Kerala follows a multi-stage decentralized plan formulation process that has tremendous de-bureaucratization potential. The different stages adopted and found successful in this model of decentralized planning are environment setting, situation analysis, need identification, vision setting, plan formulation, projectisation, plan vetting, plan approval and plan implementation (GOK, 2014). Each of these stages is information intensive which require credible information sources for meaningful planning process.

2.6. Information support for decentralized planning

According to Cheema and Rondinelli (1983), planning and development administration are to be organized through various layers of territorial space, extending from the centre through

the state/region, district, subdistrict, field units of central ministries, local government and para-statal bodies. Also, such planning and development had to be rendered increasingly relevant and specific to the requirements of the respective areas/administrative units and the people for whom development benefits were intended. They opine that lack of adequate and timely information for any sector is a serious handicap in the regional and district level planning.

Several solutions have been proposed to address this issue. Considering the factors that would affect the efficacy of decentralized planning programme in Kerala, Oommen (2009) suggests formulation of specific micro level databases. He emphasizes the importance of creating Planning Data Banks to meet data requirement for decentralized planning in Kerala and puts forward a methodology to make databases at the local level by collecting and collating all secondary data pertaining to the district and to the lower area level which are produced by the state level departments, parastatal agencies, other autonomous organizations like the university, colleges or other organizations or individuals. This may also include the surveys carried out on any specific subject or sector by different organizations, researchers etc. These available data may be bound, documented and numbered and made available in a planning library. This data bank should be available for Grama Panchayats for planning their own programmes as well as planning at the higher level. This proposal is considered to be an important step towards informed decision making and planning in local bodies. This also brings forth the possibility of devising new ways of preparing local level databases with the participation of various development agencies.

As stated earlier, comprehensive local databases can be better created by using existing registers and databases at the local level. Unnikrishnan (2004) observes that compilation of information from registers and other legacy databases that are conventionally and mandatorily used is one method of database creation in e-governance programmes. Referring to information generated by centres of learning and research, it is observed that technological advances and software packages developed with the hope of promoting efficiency in the information dissemination practices of research institutions and universities, or even in the companies of the developed countries, have not in reality brought benefit to farmers (Vidanapathirana, 2012).

Shodhganga (2014) reports that generating local level data bases requires a comprehensive survey of all development sectors for all Panchayats and Municipalities, a list of

plausible solutions to the development problems and formation of task forces to prepare development projects for each development sector.

All these observations call for generation of comprehensive and integrated databases for planning at the micro level.

2.7. ICT enabled information systems for development administration and planning

Traunmiller and Lenk (1996) express the view that concepts on databases have been redefined to a great extent with the advent of Information and Communication Technologies (ICTs) According to them, information technology is often identified as the key to the re-invention of the Government. It is believed that developments such as electronic document management, groupware for computer supported group work, the Internet and intranet can lead to innovative administrative information systems which can enhance policy formulation, promote participation, improve service quality, make planning more effective and become a means of employing citizens.

With e-governance programmes gaining momentum, there had been earnest attempts to generate databases at the micro level to meet various data requirements. For instance, Environmental Systems Research Institute (1999) points out the importance of converting printed information to digital format and integration using Geographic Information System (GIS) to enable land-use planners to correlate multiple data layers to one location and manipulate the appearance of the data to visualize trends and patterns.

Literature on e-governance systems discuss the importance of digitized databases for the development of e-governance applications. Bhatnagar (2000) categorizes information and communication technology applications in administration into the following types: decision support to public administrators, improving services to citizens, and empowering citizens to access information and knowledge.

Application of ICT has not only enhanced accessibility to databases, but also made creation of databases and updating easier. Unnikrishnan (2004) reports that conventional legacy databases and registers have been digitized for integration into various e-governance applications. Digitization is done to update collection and to provide better access to

information through the new information highway. Digitization enables faster delivery of information to its users via the Internet or intranet. Off line sources like CDs are also used for accessing digitized data and information (Santos-ong, 2006).

De (2006) reports the different attempts by state governments of Karanataka, Andhra Pradesh and Kerala in digitizing land records and providing e-services to the stakeholders. The 'Bhoomi' project of Karnataka has digitized all manual land records and provides land record certificates (RTCs) digitally from the computer system, to beneficiaries. Similar attempts have been initiated by 'CARD' by Andhra Pradesh, 'Gyandoot' by Dhar district of Madhya Pradesh, 'Akshaya' by Kerala, 'Lokvani' by Madhya Pradesh and 'Sari' project by Tamil Nadu.

While discussing digitization of conventional databases for the purpose of e-governance, Sigauke and Neugomasha (2011) caution about the disadvantages of digitization, which include accidental loss of data, spoiling of valuable collections and archives. However, this is challenged by several sources. For example, they also underline the fact that, conversion of printed information to digital format and integration using Geographic Information Systems (GIS) enables land-use planners to correlate multiple data layers to one location and manipulate the appearance of the data to visualize trends and patterns.

The Kerala Land Information Mission (2014) explains the 'bhoomikeralam' project of Government of Kerala which was formulated to complete the resurvey of the state, ensuring to collect details of each and every land holder. Government has implemented a special purpose vehicle- the Kerala Land Information Mission- to complete resurvey of the state which uses the most modern hybrid techniques- combination of aerial photogrammetry and ground survey using modern survey equipment.

Singh (2014) describes "Sankhyaki Patrika", a database covering village level amenities and various socio-economic indicators using digitized data at district level by Uttar Pradesh government. It is also reported that data of different departments could be linked with village boundaries, so as to generate thematic maps for viewing whole area at a glance for appropriate grassroots planning.

The review show that the digitized developmental databases have evolved as a major source of information and data support for decentralized planning. There is immense scope to develop these databases as part of the expanding e-governance initiatives in the country.

2.8. Importance of integrated information systems in decentralized planning

The concept of integrated information systems finds a prominent place in the literature on decentralised planning. According to Garcia-Molina *et al.* (1995), though decision makers often need information from multiple sources, most of them are unable to get and fuse the required information in a timely fashion due to the difficulties of accessing the different systems, and the fact that the information obtained are inconsistent and contradictory. This highlights the need to integrate information from different sources and to avoid redundancies to find out the development needs and beneficiaries at the grassroots level. This is emphasized by Bhatnagar and Patel (1988) in their deliberations on e- governance systems at the local level. They state that access to databases across government departments and analysis can make a difference in the quality of policies that are initiated and implemented for promoting economic development.

Unnikrishnan and Chathopadhyay (1997) give a detailed account of the pilot project for a 'State Level Informatics system for strengthening peoples' planning process and Decentralised planning' (SLIDE) initiated under the auspices of the Kerala State Planning Board to facilitate decentralized planning in Kerala. The project aimed at creating a state-level developmental information system nucleating from an integrated database at the local body level. Following this, there had been several attempts to formulate databases for development planning, which can be used by the local bodies.

The Information Kerala Mission (2004) explains the importance of the much required database support for better decision making by local self government institutions, while outlining the evolution of the e-governance applications developed for local self government institutions. Acording to them, comprehensive databases are required to improve public services and responsive local administration.

According to Moni (2010) development of information systems and utilization of information resources over the Internet or intranet is a matter of strategic importance in all countries today. They play an important role in the information flow from the implementation

level to the planner at macro (national) level, macro-meso (region covering more than one state) level to meso (state) level, and micro (district, block and village) level.

Discussing the pre requisites of e-governance support for local development, Alex (2011) points out the lacunae in data management systems in local bodies and explains the need to digitize local registers and databases for providing database support for local bodies to make decisions on development issues and projects at the grassroots level.

NIC (2014) observes that the data available for micro level planning is not of desired quality and coverage. Improvement in information system is necessary to make the process of development planning effective at various levels. Hence it is necessary to build comprehensive databases at the district, block and village levels to meet the growing demand of information for planning.

2.9. Information and database support for micro level planning in agriculture

Micro level planning in agriculture requires dynamic information support, according to many authors. Schmidt-Kallert (2005) emphasises the need to have a holistic approach in micro level regional planning, taking into consideration details of agriculture and allied sectors.

Ayala *et al.* (1999) report the work done to develop a decision support system for agricultural planning in Spain to enable the identification of important agricultural possibilities and risks. They observe that use of decision support tools based on Geographical Information Systems is of great interest in the field of rural planning, particularly in regions where the main wealth source is agriculture.

Moni (2010) suggests development of a comprehensive Agricultural Resources Systems with public funding for facilitating sustainable agricultural development. He also suggests the need for development of metadata and application of open GIS model for optimal utilization of agricultural resources in India. He discusses the characteristics of agricultural databases and observes that the size of agricultural databases continues to increase, and sources of information are growing more and more diversified. This is especially the case for databases dedicated to the traceability of agricultural practices. He further explains that while some data are directly collected from the field using embedded devices; other data are entered by means of different

computer-based applications. Once stored in the same database, all this information must be consistent in order to guarantee the quality of the data. He concludes that this consistency issue is becoming a new challenge for agricultural databases, especially when complex data are stored.

Pinet *et al.* (2009) opines that in order to achieve consistency in a database, a precise, formal specification of the integrity constraints is needed. In this regard, Vasquez (2011) holds the view that this could be done by integrating existing data without reinventing all the systems, and without recreating one huge database.

Sau (2014) insists that relevant and timely information is needed for each of the four stages of decentralised planning *viz.* formulation of projects, implementation, monitoring and evalution on completion.

The report of the Department of Planning and Coordination, Nagaland states that the methodologies for supporting decision of local area planning are neither developed, nor tested and demonstrated. The work done by the department has found that conventional methods of data collection, collation and storage are not amenable to quick updating, retrieval and integrated analysis (GOI, 2008).

2.10. Efficacy of micro level planning

As stated earlier, micro level planning involves a series of well defined processes carried out by different agencies and participative institutions. Hence it is important to understand the indicators of the efficacy of the process of micro level planning in detail. Being a relatively recent concept, literature on the efficacy of the process of micro level planning has been found to be scarce. Hence only relevant and recent literature in this domain has been presented. The quality of information means relevance, accuracy, up-to-dateness, reliability and timeliness (Ahanene, 1991).

Andrew and Brian (2000) conceive efficacy of planning as the efficiency with which each activity of planning process is undertaken. They also report that efficiency in the provision of planning and regulatory services show variation on the basis of geographic and demographic conditions.

It is well known that each step involved in micro level planning requires adequate information and data support. Holistic planning involves input from multiple, interrelated data sources and types. In order to accomplish this feat a great deal of information must be considered simultaneously. In this regard, it is generally observed that planning at the local level is not efficient due to various institutional and other constraints. Substantiating this, Nair (2000) reports widespread misutilization of the benefits distributed under individual beneficiary programmes and the unproductiveness of a substantial part of investment made in the production sector for want of effective mechanisms for better targeting.

Coleman and Galbraith (2000) enlist the different sources of information required under each category of information. They cite the example of physical and chemical soil information, which is a vital component in the planning process which reflects directly upon land-use suitability. This could be utilized from different sources of printed information such as soil survey manuals, topographic maps, aerial photographs, vegetation surveys, flood maps, hydrology maps, property surveys etc. They also state that human decision-makers are challenged to keep track of all this information at once, to understand the interrelationships, and to correlate multiple data sources at single locations, which they consider as a constraint.

As elaborated by Jackson-Smith (2002), a planning process typically involves multiple steps, which include appraisal of community's physical and human assets, setting up priorities based on concerns expressed by the community, identification of strategy, implementation and monitoring.

It is also observed that the technical content of development programmes and quality of decisions have deteriorated over a period of time (GOK, 2009).

The report on decentralized planning programme in Kerala specifically states that micro level planning has not been efficient in projectising local needs. There have been deficiencies with respect to participation of different sections of people and timely completion of project objectives. Prioritization of development needs and allocation of funds for important sectors also required to be improved (Oommen, 2009).

2.11. Adequacy of legacy databases for micro level planning

As described earlier, a database is defined as an organized collection of data. The data is typically organized to model relevant aspects of reality, in a way that supports processes requiring this information. Legacy databases are registers and records that are traditionally maintained in offices. Legacy databases are considered as an important data source in local level planning.

According to Au-Yeung (1995) accurate records in an office enable better control of the business by helping with financial planning and decision making.

As seen earlier, data and information available for planning at the grassroots level has been found to be grossly inadequate. According to Unnikrishnan and Sreedharan (2001), information systems that could be employed generically to facilitate planning at the local level are scant and the available ones are incomprehensive.

Department of Planning and Co-ordination, Nagaland (2006) expresses the view that crucial data about development collected by various agencies is not shared systematically and often not checked for accuracy. Sachdeva (2008) holds the view that legacy systems are difficult to be changed as stakeholders do not want to change the system immediately. Bhatnagar (2004) also discusses the importance of legacy databases that could be used as the sources of data for developing e- governance applications.

GOI (2008) in its eleventh report on second administrative reforms commission categorizes the data available for e-governance into static information, dynamic information and transactional information. Static information is that information which generally does not change in short time frames. These include information about the organization, rules, regulations and various procedures. Dynamic information on the other hand changes quite often and this includes information like various notifications specifying time limits, tender notifications, notifications calling for applications etc. This categorization has been followed in this study to group the legacy databases and registers that could be used for generating data for the information systems for micro level planning in agriculture.

NARS (2014) while discussing the criteria to evaluate efficacy of legacy databases states that records management is a process of ensuring proper creation, maintenance, use and disposal of records to achieve efficient, transparent and accountable governance. Sound records management warrants an organizational records management programme governed by an organizational records management policy. According to them, the advantages of effective records management are that a sound records management programme is advantageous because a well-organized file plan enables an organization to find information easily. Records that are correctly filed and stored are easily accessible, and this facilitates transparency, accountability and democracy.

The authors also conceive that the orderly and efficient flow of information enables the organization to perform its functions successfully and efficiently. The study also emphasizes the need to create authoritative and reliable records and maintain them in an accessible, intelligent and usable manner to support the business and accountability requirements of the organization. Efficiency and economy are ensured by eliminating unnecessary duplication of records.

2.12. Information requirement of personnel involved in micro level planning

Having reviewed the significance of legacy registers and other databases in the process of micro level planning, it is important to know the information requirement of the personnel involved in micro level planning. In order to design and conceive a comprehensive and integrated database, an understanding of the information requirement of the key stakeholders involved in the programme is important.

Bell (1979) holds the view that dependence upon information to create innovation and change, places a high premium on the ability of developing countries to access and use information to create advances in society.

Babu *et al.* (1997) while describing the role of information systems for organizations states that customized information systems are required for organizations to avail information support for decision makers.

Zaman (2002) opines that the potential users of agricultural information include government decision-makers, policy-makers, planners, researchers, teachers and students,

program managers, field workers and farmers. According to Adesope *et al.* (2010), populations that use various agricultural information include policy makers and planners, researchers, extension staff, educators and students, staff of agro-based industries and services and farmers.

However, Meera *et al.* (2004) hold the view that despite the huge potential to employ ICTs in agricultural development, only a few isolated projects have been started in the public sector. This has entailed poor information support to development agencies working at the grass roots level.

Without the right information, incorrect decisions are made and scarce resources are used unwisely. With such chaos a realization of the need for organized information within an organization gives birth to the information centre/ system/ network (Karim *et al.*, 2004).

Hooja (2006) indicates the minimum details required for local level scheme as suggested by the Hanumantha Rao Report as (a) description of the scheme and its significance to the area (b) location (c) raw material and inputs requirements and linkage (d) volume of beneficiaries (f) likely employment generation, and (g) simple cost-benefit calculation.

Alex and Sulaja (2012) enlist the knowledge created at various stages of decentralized planning that are to be shared among different stakeholders across the state. They also explain the varied information required at each stage of participatory planning programme from the evidences gathered from field experiences of agricultural officers and people's representatives of local bodies. Specific knowledge is generated at each stage of participatory planning as the process demands analysis of existing situations and evolving solutions to problems. Knowledge is generated with respect to planning, budgeting, natural resource management, implementation, monitoring, conflict resolution etc. during decentralized planning process.

2.13. Integrated Information System for Micro Level Planning in Agriculture

In the light of the above review, it is evident that database support for micro level planning is inadequate to meet the information requirement for formulation, implementation and monitoring of developmental projects. Efforts have been made to develop ICT enabled integrated information systems for planning by several agencies. Attempted below is a review of available literature on integrated information systems for micro level planning for development.

Gow (1980) in his paper on the proposals for a new management information system for rural development in Nepal reports the archaic systems of information management for rural development at different levels and suggests the structure of an integrated management systems which would include crops, cultivation practices, technologies, market details etc. He also gives a detailed account of the different types of field level data to be collected to make a comprehensive database for planning.

Unnikrishnan (2001) discusses the formation of an integrated citizen database for facilitating development administration in local bodies in the introduction to SLIDE programme described earlier. He also outlines the methodology for digitization of legacy databases for developing the software application for civil registration and plan monitoring.

As mentioned earlier, the Department of Planning and Co-ordination, Nagaland (2006) envisages a digital information system of the state using the latest in the field of information Technology (IT) which will be user friendly, easily accessible, easy to modify, easy to store and it will answer to any information required for assessing the potentialities and liabilities in planning process for the State, District, Block, Administrative circles levels and to the village level. According to Ghobrial (2010) an information system comprises a combination of various components including facilities for collection of data, its storage, retrieval and dissemination to users. It also includes the functions which require institutional infrastructure and arrangements for collecting materials from national and international sources, storing, processing, retrieval and preparation of information products and provision of services to meet users of the system.

Singh *et al.* (2011) observe that the task of creating databases to complete spectrum of agriculture is a giant task. The long term agriculture policy provides an exhaustive list of all the areas that are to be covered. This can be taken as a guiding list to evolve design and develop suitable systems catering to each of the specified areas.

Vanitha and Kalpana (2011) explain management information system, geographic information system, expert systems, decision support systems and database management systems which are used in agriculture. All these are advanced technologies which are used by farmers, scientists, managers, traders and experts at various stages of agricultural production, processing, marketing to consumption of products.

2.14. Specifications of integrated information systems

The Report of the Working Group on District Planning held in 1982 (GOI, 1987), highlights the need to identify minimum information and data required for planning and decision making at the district level, in the context of decentralized planning. It provides an illustrative list of data/ information needed for district planning. It insists that various institutions, research organisations, NGOs involved in micro-level planning should be linked up through NICNET, for wider dissemination and utility of DISNIC-PLAN database. It is also envisaged that the NIC in close association with these organizations will build development indicators at the decentralised spatial units, using the DISNIC-PLAN database, to gauge the spatial variations in the levels of development and to form a base to evade the subjectivity in resource allocation at district level.

According to Smith (2005), data is rapidly growing in stature as a recognized corporate resource. A centralized approach to logical and physical data management will promote the development and use of integrated, sharable data throughout applications, preserve the quality of that data and serve the needs of the business more effectively.

Janssen *et al.* (2009) describes the SEAMLESS integrated database on European agricultural systems. It contains data on cropping patterns, production, farm structural data, soil and climate conditions, current agricultural management and policy information. To arrive at one integrated database, a shared ontology was developed according to a collaborative process, which facilitates interdisciplinary research. The paper details this process, which can be re-used in other research projects for integrating data sources.

With the wide availability of huge amounts of data in database systems, the extraction of knowledge in databases by efficient and powerful induction or knowledge discovery mechanisms has become an important issue in the construction of new generation database and knowledge-base systems. Han (2012) suggests an attribute-oriented induction method for knowledge discovery in databases is investigated, which provides an efficient, set-oriented induction mechanism for extraction of different kinds of knowledge rules, such as characteristic rules, discriminant rules, data evolution regularities and high level dependency rules in large.

Coleman and Galbraith (2000) report how they used soil survey data and Geographical Information Systems (GIS), which are important tools in land use planning. A high intensity soil survey was created for the Southern Piedmont Agricultural Research and Extension Center (SPAREC) in Blackstone, Virginia. The soil information was recompiled from an uncorrected aerial photographic base to a USGS topographic base map. Soil data were added to numerous other data layers and images. Interpretation maps, flooding frequency maps, and runoff maps were created from map unit interpretive records (MUIR). Additional soil and timber data were collected by field visits. The soil based-GIS made the decision-making process more accurate, automated, and efficient. It is a dynamic product that serves to convert verbal communication into visual communication while preventing information overload.

Planning for Agriculture is broadly focused on developing strong working relationships between local governments, the farm community and the province to ensure that agriculture is given appropriate consideration in local government planning processes. Examples of opportunities to plan for agriculture include encouraging agricultural land use inventories and the application of geographic information system (GIS) technology to increase the understanding of farm systems and land use relationships; ensuring greater land use compatibility at the time of urban subdivision next to farming and adopting agricultural area plans in key farming communities (British Columbia, 2014). The quality of any planner's decision depends on the quality of information upon which such decisions are based.

2.15. Socio economic characteristics of key stakeholders in micro level planning and their relation to perceptions on various aspects of information systems

As reviewed above, the extent of use of databases for micro level planning depends on so many factors ranging from issues like lack of data to reluctance on the part of the stakeholders to make use of available data. This implies that there could be some relationship between the socio economic characteristics of stakeholders and their attitude towards informed decision making, extent of use of databases and available information systems, use of legacy databases etc. It is under this assumption that a review of literature in this direction is attempted.

2.15.1. Age:

It is referred to the chronological age of the respondents in completed years at the time of investigation. Age may refer to the length of time that an individual has lived.

Nagananda *et al.* (2006) in a study on the profile of ADAs and AOs and organizational climate in Karnataka State observe that comparatively more number of ADAs (40%) belonged to young age group as compared to AOs (28.3%), whereas in middle age group 50 per cent of AOs and 30 per cent ADAs were noticed.

In a study on job enrichment techniques for district agricultural officers in Botswana Oladele *et al.* (2010) report that utilization of job enrichment techniques is significantly related to age.

Yadav *et al.* (2012) in their study on the training needs of agricultural extension officers about watershed management observe that the age of agricultural extension officers varied from 27 to 57 years, of which about 53 per cent of the respondents belonged to middle age group (38-47 years) while 31.43 per cent belonged to old age group (48-57 years). Only 15.17 per cent of the respondents belonged to the young age (27-37 years) category.

Kurbett and Badiger (2013) report that women agricultural officers with high age had better involvement in job. The age of women agricultural officers were related to job involvement, at five per cent level of significance. Kurbett opine that as age advances the understanding of the job becomes clear and involvement can be on higher side.

Kumari and Kumar (2013), in a study of panchayat members in Mysore District report that 66 per cent of respondents belonged to middle age group varying from 30-50 years. Thirty per cent of the respondents belonged to age group of 51-70 years and four per cent of respondents were old (above 70 years). They state that matured age reflects quite sound and reasonable views in conformity with the needs and necessities warranted by the circumstances.

2.15.2. Educational qualification

Education is the extent of formal education completed by respondents. Education denotes production of desirable changes in human behavior- the changes may be in knowledge, attitude and skill.

Nagananda *et al.* (2006) in a study on the profile of ADAs and AOs and organizational climate in Karnataka State observe that a high per cent of ADAs possessed M. Sc. (Agri.) and Ph. D. degree (70.0 % and 19.7 %, respectively) as compared to AOs (51.7 % and 1.7 %, respectively). They further state that only one fourth of ADAs (25.0 %) and AOs (26.7 %) fell under high job experience category.

Kurbett and Badiger (2013) report that in Karnataka State, women agricultural officers with high education showed better involvement in job. There was significant influence of education at 1% level of significance with contributions of women agricultural officers.

A study on the training needs of agricultural officers, Yadav *et al.* (2012) observe that majority of the respondents (57.14 %) were either graduate or post graduate in the discipline of agriculture.

Kumari and Kumar (2013), in a study of panchayat members in Mysore District, report that 28 per cent of the respondents were graduates, 36 per cent were having secondary education, 22 per cent were having primary education and 14 per cent were illiterates.

2.15.3. Experience in micro level planning

Experience of agricultural officers in micro level planning is defined as the number of years they have a played role in micro level planning as implementing officer, key resource person or member of technical advisory committee or working committees. Similarly, the experience of elected members in panchayathi raj institutions is defined as the number of years they have played a role as working group chairman, working group member, member of statutory committee, chair person of statutory committee or resource person in micro level planning.

In Karnataka State, women agricultural officers with high experience were observed to have better involvement in job; experience was related to job involvement at five per cent level of significance (Kurbett and Badiger, 2013). As experience increased knowledge also increased which made them perform better in their job.

Yadav (2012) in a study on training needs of agricultural extension officers reveals that 40 per cent of the agricultural extension officers had service experience of 21-30 years, whereas 31.43 per cent and 28.57 per cent were having service experience upto 10 years and 11-20 years, respectively.

METHODOLOGY

3. METHODOLOGY

This chapter describes the methods and procedures followed in the study. Appropriate data collection tools and analytical methods have been employed to accomplish the objectives of the study. Details of the methodology used are given under the following heads:

3.1. Research design of the study

3.2. Locale of the study

3.3. Variables and their measurement

3.4. Tools used for data collection

3.5. Statistical methods used to analyze data

3.1. Research design of the study

As one of the major objectives of the study was to appraise the current status of databases and perception of stakeholders on micro level planning and the use of databases in that process, ex-post facto design of research was employed. Ex-post facto research is the systematic empirical enquiry in which the scientist does not have any direct control over the independent variables because their manifestations have already occurred or because they are inherently not manipulated (Kerlinger, 1973).

3.2. Locale of the study

Multi stage random sampling was adopted for selection of respondents and the LSGIs from where legacy databases and registers were collected. From each of the five agro climatic zones classified under NARP (Northern, Southern, Central, High altitude and Problem area) and also from Onattukara region, one district was selected randomly. Subsequently, two blocks were selected at random from each district. Four Grama Panchayats were selected from each block randomly. Sample of respondents consisted of 66 Officers of the Department of Agriculture working with the Grama Panchayat, Block Panchayat and District Panchayat selected at the rate of one from each local body and 66 People's Representatives who are presiding over the working

groups on agriculture at Grama Panchayats as Chairmen selected at the rate of one from each local body.

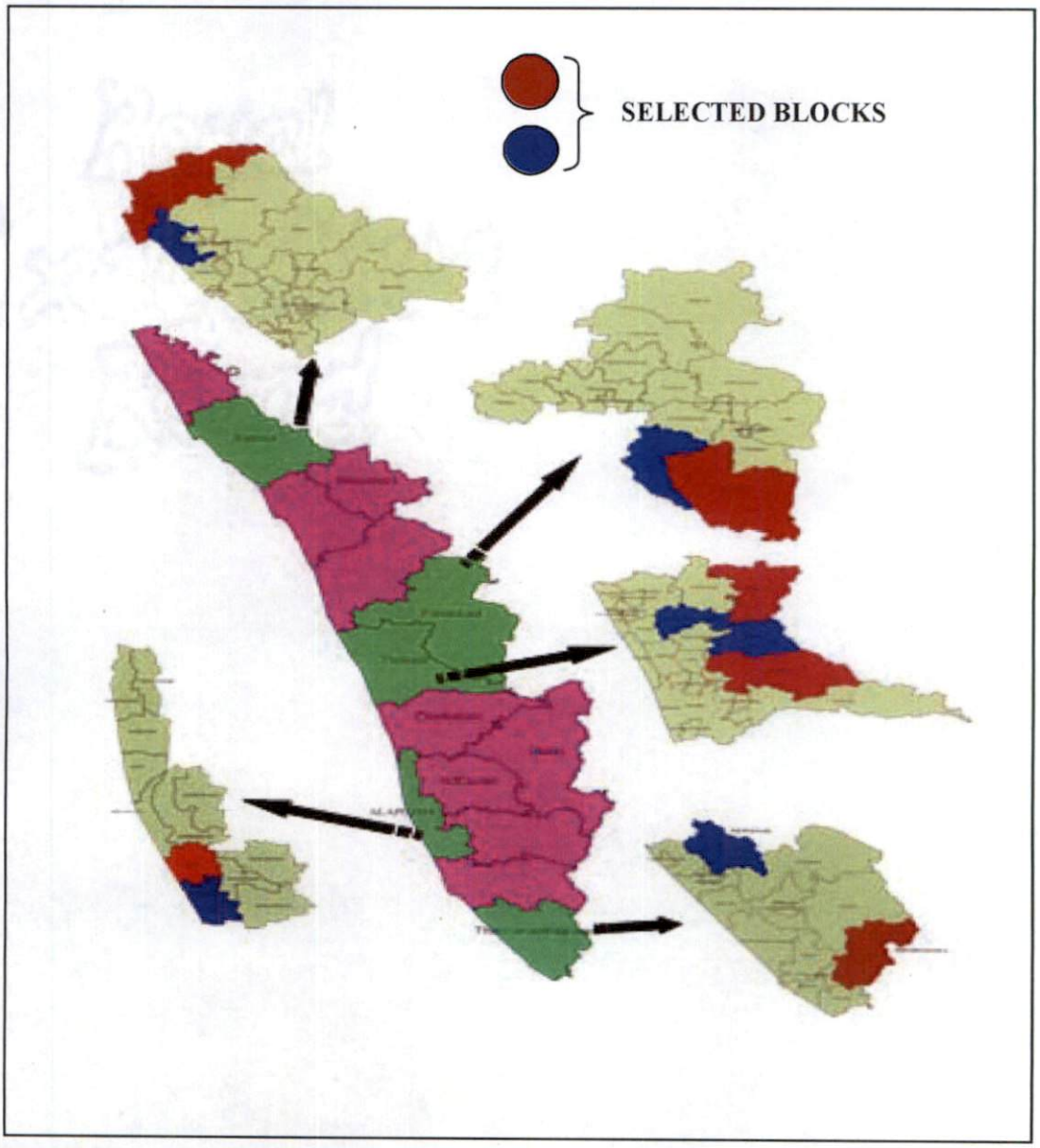


Fig. 1. Map of Kerala showing the study area

3.2.1. Selection of Districts

One district was selected from each of the five agro climatic zones and from Onattukara region as follows:

Northern zone- Kannur District; Central zone- Thrissur District; High altitude zone- Palakkad District; Southern zone- Thiruvananthapuram District; Special problem zone- Thrissur District and Onattukara region- Alappuzha District.

3.2.2. Selection of Blocks

Two blocks were selected randomly from each district by following simple random sampling procedure, thus making a total of 12 block panchayats and 12 Offices of the Assistant Director of Agriculture, for the study. The blocks selected were Kalliassery and Payyannur from Kannur District (Northern zone); Kodakara and Pazhayannur from Thrissur District (Central zone); Alathur and Nenmara from Palakkad (High altitude zone); Kilimanoor and Perum kadavila from Thiruvananthapuram (Southern zone); Puzhakkal and Ollukkara from Thrissur (Special problem zone); and Harippad and Muthukulam from Alappuzha (Onattukara) district.

3.2.3. Selection of Grama Panchayats

From each block, four Gram panchayats and from each office of the Assistant Director of Agriculture (ADA) at the block level four Krishi bhavans were selected as follows:

Kannur District- Kankol, Karivellur, Kunhimangalam, Payyannur, Madayi, Cherukunnam, Kalliassery and Payyannur; Thrissur District (Central zone)- Alagappanagar, Kodakara, Pudukkad, Nenmenikkara, Chelakkara, Panjal, Pazhayannur and Thiruvilwamala; Palakkad District- Vandazhy, Nenmara, Ayiloor, Elavanchery, Kizhakkenchery, Vadakkenchery, Tharur and Alathur; Thiruvananthapuram District- Pulimath, Nagaroor, Pazhayakunnummel, Kilimanoor, Kallikkadu, Aryancode, Kunnathukal and Vellarada; Thrissur District (Special problem zone)- Puzhakkal, Kaiparambu, Avanur, Tholur, Pananchery, Puthur, Madakkathara and Nadathara; Alappuzha District- Harippad, Chingoli, Kumarapuram, Karthikappally, Muthukulam, Kundallur, Krishnapuram and Pathiyoor.

3.2.4 Selection of respondents

Respondents of the study include Agricultural Officers and Peoples' Representatives from selected Krishi Bhavans and Grama Panchayats respectively. From each of the Block Panchayats, one People's Representative was selected. The Assistant Director of Agriculture (ADA) in the block was also included in the sample. Similarly, from each District Panchayat, one representative was selected. The Principal Agricultural Officer (PAO) was also included in

the sample invariably. Officials of the department from which responses are collected would be termed as "Extension Personnel" in this study. Similarly the representatives of people at three levels of local self government institutions *viz.* Grama Panchayat, Block Panchayat and District Panchayat would henceforth be termed "People's Representatives" in this study.

A schematic representation of the methodology of sample selection is given below (Fig. 2)

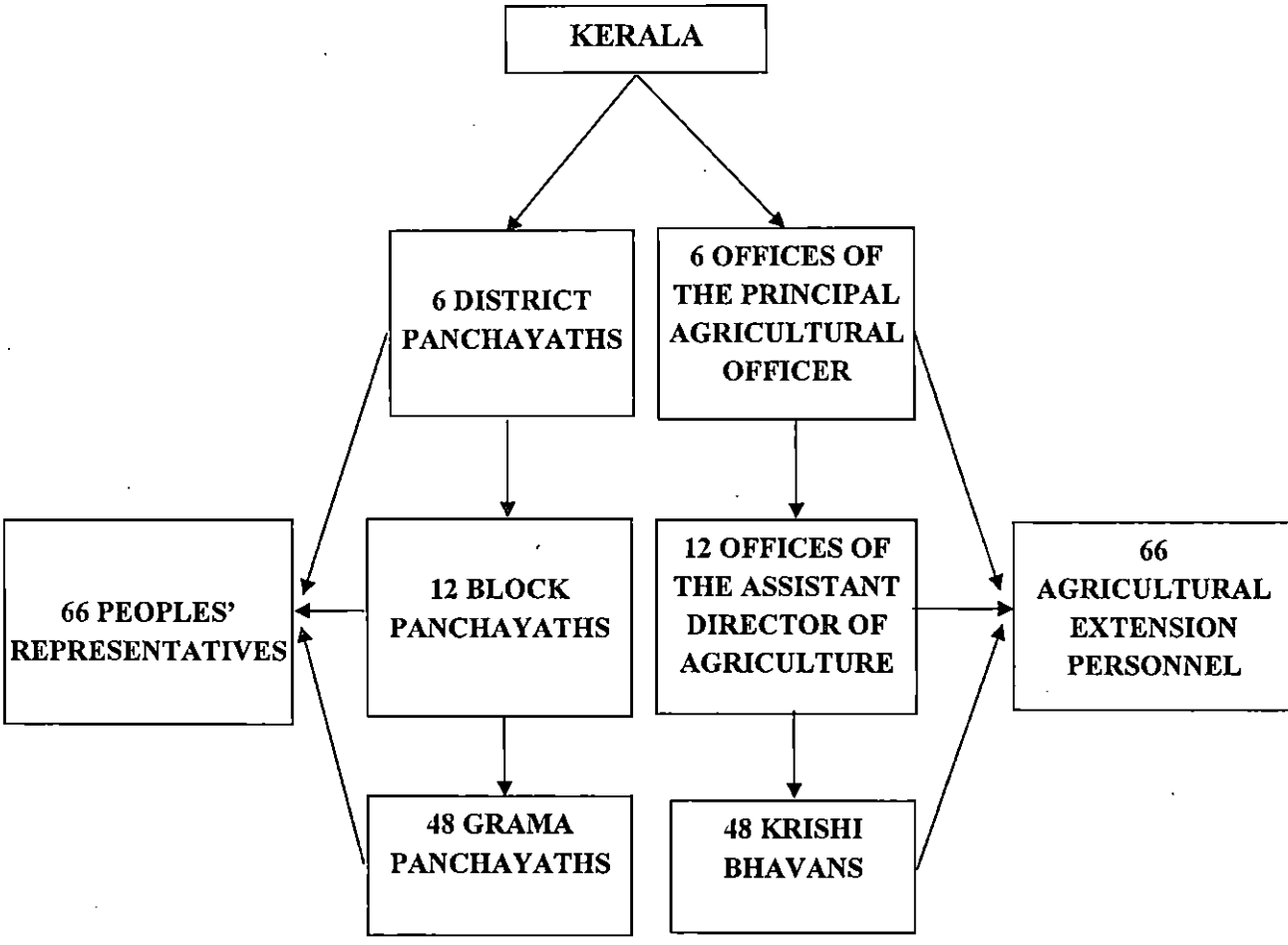


Fig. 2. Schematic representation of selection of samples

3.3. Variables and their measurement

The variables along with their prescribed measurements were selected in compliance with the objectives, review of literature, rating by selected experts, discussion with known experts in the concerned field and observations made by the researcher. While selecting variables, main focus was on bringing out the effectiveness of current decentralized planning mechanism from the

perspective of different stakeholders and the information use by personnel involved in micro level planning. The present status of conventional databases available at the Grama Panchayat level was also subjected to examination. Along with this, the gaps in data required for planning agricultural development programmes at the grassroots level were also explored. Attempts have also been made to identify the databases that could be used as a starting point for developing an integrated information system in agriculture.

3.3.1. Perception of stakeholders on efficacy of current micro level planning mechanism in terms of different dimensions

The efficacy of current micro level planning mechanism has been estimated by assessing the perception of the stakeholders on the efficacy of the four important dimensions of planning process, *viz.* planning, participation, implementation and impact. The major phases of micro level planning mechanism include organizing Grama Sabhas with participation of local people wherein it is insisted that at least 10 per cent of the total population in the ward should be present. This is followed by formulation of plans by the working groups and presentation of proposals at the development seminars, which would help fine-tune the proposals. Incorporating the suggestions, the local self government institutions would finalise the local plan. These plans would be verified by block level Volunteer Technical Corps or expert committees for technical corrections and confirmation of observance of guidelines. The projects are then submitted for approval of the District Planning Committee. Approved projects would then be handed over to the local self government for implementation by the concerned implementing officer. Efficacy of the whole process of micro level planning procedure followed in Kerala depends on the efficacy of each of these phases. In this study, efficacy is estimated by drawing responses on statements that reflect the various dimensions of the efficacy of micro level planning. Operational definitions of the major points of observation are given below.

Efficacy of micro level planning is operationally defined as the extent to which micro level planning is effective in ensuring fullest participation of local people, implementation of projects in a timely and phased manner, monitoring projects as per schedules at pre determined phases and providing maximum benefits to the beneficiaries as envisaged by the project.

Based on this, four important dimensions of efficacy *viz.* Planning, Participation, Implementation and Impact have been identified.

Planning in dimensions of efficacy may be defined as the extent to which the activities in the planning phase have been completed efficiently as envisaged in the guidelines for micro level planning.

Participation- This is the extent to which different stakeholders have participated in the planning and implementation phases of micro level planning process.

Implementation- It reflects the extent to which different activity components of implementation have been successfully executed as envisaged in the guidelines.

Impact- It may be defined as the extent to which the project has been able to make the expected impact/ outcome on the community.

For measuring these dimensions, 50 relevant statements were formulated after conducting literature reviews. Fifteen Extension Personnel and 15 People's Representatives were the judges selected for relevancy rating. The statements were given to these judges with the request to rate each statement's importance (extent of positiveness towards construct/ extent of negativeness towards construct) in reflecting an attitude towards the efficacy of micro level planning. The judges were requested to rate each statement on a 5-point scale.

On the basis of the judges ratings, the median value of the ratings for each item, as well as the 2^{nd} and 3^{rd} quartile range was calculated. The statements for which the judges' ratings were scattered over the scale were discarded, as this indicates that, even among experts, there is no agreement as to the degree to which that statement reflects an attitude towards the issue in question. From the remaining statements the items that best reflect the various aspects of micro level planning was selected. The items with median values in each of the five categories and with the lowest interquartile range (will indicate most agreement amongst judges) were selected.

The main advantage of the Thurstone scale is that, as the importance of each statement is determined by judges, it reflects the absolute rather than relative perceptions of respondents. A questionnaire was constructed comprising 20 items pertinent to micro level planning.

This questionnaire was used for measuring the dimensions described above. The responses were collected along a five point continuum with scores of 5,4,3,2 and 1 for *strongly agree*,

moderately agree, slightly agree, slightly disagree and *strongly disagree* respectively. The scores for all the four dimensions are summated to get the score for efficacy of micro level planning mechanism.

Efficacy of micro level planning mechanism = Efficacy of (planning + participation +implementation +impact)

The maximum and minimum expected score of each respondent was 100 and 20 respectively. By adding scores of all the statements, the individual total score was worked out. The respondents were categorized into three groups *viz.* low, medium and high on the basis of mean and standard deviation of the total score as follows.

Category	Score
Low	< Mean – Standard Deviation
Medium	Mean ± Standard Deviation
High	>Mean + Standard Deviation

3.3.2. Perception of stakeholders on efficacy of legacy databases used for planning at the micro level

Conventional registers and records that are maintained at offices would be a reliable source of data in the planning process. These records are termed as legacy databases and shall be regarded as the starting point for developing integrated information systems for micro level planning. The efficacy of legacy databases maintained at Grama Panchayats and Krishi Bhavans has been observed to be an important aspect for analyzing the features of an ideal database. Efficacy of legacy databases is a relatively new concept for the purpose of this study as it is important to understand whether these data bases are really put to use to draw data and information during the process of planning.

Operationally, efficacy of legacy databases shall be defined as the ability of traditional records and data books to provide adequate data required for micro level planning in agriculture.

Completeness, adequacy, reliability and updatability have been identified as the major dimensions of the efficacy of legacy databases through observations, experience sharing and review of literature.

Completeness shall be operationally defined as the extent to which the data fields in a register or record are completely filled in.

Adequacy is the extent to which the data or information available from a legacy register would suffice the information requirement in planning a micro level project.

Reliability points to the credibility and dependability of the contents provided by legacy databases.

Updatability denotes the extent to which data in a database can be updated.

For measuring these dimensions, relevant statements were formulated after conducting literature review. A 'judges' panel contributed by 15 Extension Personnel and 15 People's Representatives were requested to rate the importance of each statement with respect to the extent to which it can reflect the 'attitude towards the efficacy of micro level planning' on a 5-point scale that indicates the range of positiveness and negativeness towards the statement. The procedure of finalization of questionnaire was similar to that of perception of efficacy of micro level planning described in section 3.3.1, using Thurstone scale.

The responses of Extension Personnel and People's Representatives were collected along a five point continuum with scores of 5,4,3,2 and 1 for *strongly agree*, *moderately agree*, *slightly agree*, *slightly disagree* and *strongly disagree* respectively. The scores for all the four dimensions are summated to get the score for efficacy of legacy databases.

Efficacy of legacy databases } = Efficacy of (completeness + adequacy + reliability + updatability)

The maximum and minimum expected score of each respondent was 100 and 20 respectively. By adding scores of all the statements, the individual total score was worked out. The respondents were categorized into three groups on the basis of mean and standard deviation as described in section 3.3.1.

3.3.3. Perception on Integrated Information System for Micro Level Planning in Agriculture

The major focus of the study is to specify the requirements of an integrated information system which would be suitable for meeting the information requirement of various stakeholders in micro level planning in agriculture. Based on an extensive review of literature, different dimensions of an integrated information system *viz.* comprehensiveness, usability, updatability, spatial and temporal orientation were identified.

Integrated information system in agriculture is envisaged as an information system which is capable of providing the user with comprehensive information related to agricultural planning, which is oriented on spatial and temporal levels and could be timely updated.

Perception on integrated information system for micro level planning has been operationalised as the understanding of the dimensions and functionalities of an information system that can provide information and data support to personnel involved in micro level planning. It has been measured under four dimensions *viz.* comprehensiveness, usability, updatability, spatial and temporal orientation.

Comprehensiveness shall be operationally defined as the extent of coverage of data components related to all possible aspects of agriculture.

Usability is the extent to which the information provided by the integrated information system could be used in the process of micro level planning.

Updatability shall be operationally defined as the extent to which the data and information in an integrated information system are timely updated.

Spatial and temporal orientation denotes the extent to which data and information specific to geographical location and period of time are available in the information system.

In order to measure these dimensions, 10 statements were formulated for each dimension and they were subjected to relevancy rating by a panel of judges. Fifteen Extension Personnel and 15 People's Representatives were the judges selected for relevancy rating. The procedure of finalization of questionnaire was similar to that of perception of efficacy of micro level planning described in section 3.3.1, using Thurstone scale.

This questionnaire was used for measuring each dimension. The responses of Extension Personnel and People's Representatives were collected along a five point continuum with scores

of 5,4,3,2 and 1 for *strongly agree, moderately agree, slightly agree, slightly disagree* and *strongly disagree* respectively. The scores for all the four dimensions are summated to get the score for integrated information system in agriculture.

Integrated Information System for for Micro Level Planning in Agriculture } = Perception on (comprehensiveness + usability + updatability + spatial and temporal orientation)

The maximum and minimum expected score of each respondent was 100 and 20 respectively. The individual total score was worked out by adding scores of all the statements. The respondents were categorized into three groups on the basis of mean and standard deviation as described in section 3.3.1.

3.3.4. Awareness of stakeholders on rural databases and information systems

This variable was included based on the observation that the officials and people's representatives who are involved in the process of micro level planning require data support for decision making and that they must be using some existing sources of information. This is estimated using a scale developed for the purpose. The statements were prepared using a check list of information items collected from different government offices.

About 50 statements which reflect the utility and relevance of databases and information systems maintained at government offices were prepared for relevancy rating by a panel of judges comprised of 15 Extension Personnel and 15 People's Representatives. The standardization of questionnaire was done similar to that of 'perception on efficacy of micro level planning', using Thurstone scale described in section 3.3.1.

Twenty statements were selected finally for measuring awareness. The responses were collected along a five point continuum with scores of 5,4,3,2 and 1 for *strongly agree, moderately agree, slightly agree, slightly disagree* and *strongly disagree* respectively. The scores for all the twenty statements are summated to get the score for micro level planning mechanism.

The maximum and minimum expected score of each respondent was 100 and 20 respectively. By adding scores of all the statements, the individual total score was worked out and the respondents were categorized into three groups on the basis of mean and standard deviation of scores as described in section 3.3.1.

3.3.5. Expectation of stakeholders on the prospects of employing development databases in micro level planning

Since informed planning process is becoming increasingly important, it is relevant to understand the expectation of the stakeholders regarding the prospects of developing and employing databases exclusively for planning purpose. Expectations of the personnel of agricultural department and people's representatives were elicited as response to queries reflecting the level of requirement of various data for performing the planning functions at the micro level. In order to measure this, an exhaustive inventory of data that are used for planning agricultural projects in grama panchayat in ideal situations was prepared. The respondents were then asked to rate the relevance of each item along a three point continuum as *very important, important* and *not important* with scores 3, 2 and 1 respectively. The frequency of the responses was estimated to find out the importance of each item.

3.3.6. Constraints faced by stakeholders with regard to availability and adequacy of data and information required for micro level planning

This was done to find out the constraints faced by the stakeholders of micro level planning with regard to availability and adequacy of data and information required for micro level planning. The Extension Personnel who are maintaining several registers, face constraints in collecting adequate data for planning. Similarly People's Representatives who are the major stakeholders also are constrained with lack of adequate data. Constraints which were collected during the pilot study were listed out for ranking them based on severity.

The respondents were asked to rank the items with respect to the 'importance' perceived by them for each item and scores were assigned to ranks. These scores were multiplied with frequency of occurrence to find out the rank score for each item. The item which has obtained the highest score was adjudged as the most important item.

3.3.7. Profile of respondents

3.3.7.1. Age

Age is operationally defined as the chronological age of the respondents in completed years at the time of investigation. The respondents were categorized into three groups on the basis of mean and standard deviation as described in section 3.3.1.

3.3.7.2. Education

It refers to the level of education obtained by the respondent at the time of study.

3.3.7.3. Experience

It refers to the number of years of experience that the Extension Personnel and People's Representatives have in micro level planning in various capacities.

In the case of Extension Personnel, the number of years they have played different roles such as implementing officer, key resource person, member of any technical advisory committee etc. was considered for estimating the 'experience'.

In the case of People's Representatives, experience denotes the number of years they have played different roles such as working group member, chairman of working group, member of statutory committee, chairman of statutory committee or resource person.

Experience was tabulated in four categories as 'less than 4 years', '5 to 9 years', '10 to 14 years' and 'more than 14 years'.

Further the respondents were categorized into three groups on the basis of mean and standard deviation as described in section 3.3.1.

3.4. Tools used for data collection

Keeping in view the objectives and variables under study, research review, consultation with experts and professionals in agricultural extension, micro level planning and data management, a structured questionnaire was prepared for data collection. The questionnaire was pre-tested in a non-sample area and validated in the pilot study. The final questionnaire was prepared by necessary modifications, additions and deletions based on the results of the pre-test. The final format of the questionnaire is furnished in Appendix I.

3.5. Statistical methods used to analyse data

The following statistical tools were used in the present study.

3.5.1. Percentage analysis

Percentage analysis was done to make simple comparisons wherever necessary.

3.5.2. Student's 't' test

Student's t test was used to compare age and experience of Extension Personnel and People's Representatives.

3.5.3. Kendall's co-efficient of concordance

Kendall's co-efficient of concordance *W* (Siegal and Castellan, 1988), was employed to study the agreement between perception of two group of respondents *viz.* Extension Personnel and People's Representatives, with regard to the dependent variables. The data were analysed using Statistical Package for Social Sciences (SPSS).

3.5.4. Spearman rank order correlation coefficient

Spearman rank order correlation coefficient r_s is a measure of association between two variables which requires that both variables be measured in at least ordinal scale so that the objects of individuals may be ranked in two ordered series (Siegal and Castellan, 1988).

Spearman rank order correlation coefficient is used for ranking different dimensions of the dependent variables in the study. The data were analysed using SPSS.

3.5.5. Mann-Whitney U test

Mann-Whitney U test is a powerful nonparametric test for independent samples (Vercruyssen and Hendrick, 2012). The difference in perception of Extension Personnel and People's Representatives with regard to the dependent variables and the dimensions of dependent variables was analysed using Mann-Whitney U statistic.

3.5.7. Interrater reliability (Cohen's Kappa)

Interrater reliability is a measure used to examine the agreement between two groups (raters/observers) on the assignment of categories of a categorical variable. The interrater reliability of Extension Personnel and People's Representatives was measured.

A statistical measure of interrater reliability is Cohen's Kappa which ranges generally from 0 to 1.0 (although negative numbers are possible) where large numbers mean better reliability, values near or less than zero suggest that agreement is attributable to chance alone.

Cohen's Kappa was used to measure agreement between Extension Personnel and People's Representatives on information requirement at various stages of micro level planning *viz.* planning, implementation, monitoring, evaluation and follow-up.

RESULTS AND DISCUSSION

4. RESULTS AND DISCUSSION

Results have been arranged in the order of the objectives of the study. However, it has been made in such a way that the key points of observation envisaged in the objectives are presented and discussed. Presentations of the results are followed by discussion of the concerned portions. Attempts have also been made to interpret the results in line with the objectives of the study and overall framework of research. The results have been presented in the following sections.

4.1. Sources of data and information for micro level planning

4.2. Classification of registers in the Krishi Bhavans and Grama Panchayats

4.3. System of maintaining registers

4.4. Classification of registers/ databases based on purpose

4.5. Data support for different stages of micro level planning

4.6. Comparison of development projects and legacy databases across different agro climatic zones

4.7. Profile of respondents

4.8. Perception on efficacy of micro level planning

4.9. Perception on efficacy of legacy databases

4.10. Integrated Information System for Micro Level Planning in Agriculture

4.11. Awareness of stakeholders on rural databases and information systems

4.12. Correlation between age and dependent variables

4.13. Correlation between experience and dependent variables

4.14. Expectation of stakeholders on the prospects of employing development databases in micro level planning

4.15. Information requirement of Extension Personnel and People's Representatives

4.16. Process of micro level planning

4.17. Overall information requirement of stakeholders in micro level planning

4.18. Stakeholders involved in micro level planning mechanism

4.19. Data support provided by Soil Survey Department

4.20. Data provided by Land Use Board

4.21. Data provided by Village Office

4.22. Data provided by other agencies

4.23. Constraints perceived by stakeholders in maintaining and updating databases

4.24. Suggested framework of the content and hierarchy of Integrated Information System for Micro Level Planning in Agriculture

SECTION 1

4.1. Sources of data and information for micro level planning

Any attempt towards development of information system for a specific purpose would require a comprehensive appraisal of the current sources of information used for the purpose. Since micro level planning is information intensive, planners and other stakeholders have to depend on different sources of information to facilitate at least the key processes involved in it. However, apart from advanced technical information and new information on procedures, schemes and policies that are dynamically obtained from different government agencies from time to time, all other information presently available are obtained from existing sources *viz.*, the legacy registers kept in offices. In view of this, an attempt has been made to find out the existing sources of data and information. The status of such existing databases has also been observed. Being the key actors of micro level planning in agriculture, the legacy data sources of Krishi Bhavan, Grama Panchayat, Land Use Board, Soil Survey Office and Village Office were observed to find out the kind of information/ data they provide.

4.2. Classification of registers in the Krishi Bhavans and Grama Panchayats

Krishi Bhavan, which is the nodal agency for formulation and implementation of micro level development plans in agriculture maintain 140 registers from where vital information for various subsectors and microsectors of agriculture could be extracted (see Table 1).

Table 1. Classification of registers in Krishi Bhavans

Sl.No.	Category or purpose	No. of types of registers	
		Number	Percentage
1	Accounts	19	13
2	Establishment	5	5
3	Social security service	4	3
4	Comprehensive development	3	2
5	Basic	3	2
6	Project management/ Scheme registers	106	75
	Total	**140**	**100**

The registers kept in the Krishi Bhavans were classified into six categories *viz.* accounts, establishment, social security service, comprehensive development, basic registers and project management/ scheme registers based on the purpose for which they are used (see Table 2). Out of the 140 registers found out, account related registers (13 %) include all those which deal with cash transactions in the office. They include cash books, treasury bill books, acquittance roll, counter foils of TR 5 receipt books, TR 5 receipt book, chalan receipts, chalan register, District Panchayat remittance book, stamp account register, security register, pay bill register, register of DA arrears, TP account register, TP A/C pass book, electricity tariff register, plan cash book, DD/ Cheque distribution register, plan treasury bill book and paddy production bonus register. These registers mostly deal with the cash transactions in the office, and record the mandatory data prescribed by the 'Manual of Office Procedures' and the 'Kerala Financial Code'. However, some scheme specific registers are also maintained in the office.

Table 2. List of registers in Krishi Bhavans

Category	Name of registers
Account	Cash Books Treasury Bill Books Acqittance Roll Counter foils of TR 5 Receipt Books TR 5 Receipt Book (in use) Chalan Receipts Chalan Register District Panchayat Remittance Book Stamp Account Register Security Register Pay Bill Register Register of DA Arrears TP Account Register TP A/C Pass Book Electricity Tariff Register Plan Cash Book DD/Cheque Distribution Register Plan Treasury Bill Book Paddy Production Bonus Register
Establishment	Attendance Register Movement Register Inspection Register Casual Leave Register Service Registers
Social security service based	Details of Beneficiaries of Panchayat Schemes

Category	Name of registers
	Register of Natural Calamity
	Summer Youth Employment Programme Register
	Karshaka Pension-Kisan Abhiman Register
Comprehensive development	Registers of Watershed Development Programmes
	Register for MGNREGS
	Watershed Plan Register
Basic	Basic Data Register
	Paddy Wet Land Data Bank
	Crop Insurance
Project management/ Scheme registers	Vegetable Promotion Programme
	Vegetable Scheme Register- Summer Cluster
	Vegetable Scheme Register-Homestead
	Vegetable- School Vegetable Garden
	Vegetable- Homestead Cultivation for School Children
	School Vegetable Kit
	Vegetable- Training
	Vegetable- Haritha Fund
	Vegetable- Haritha Training
	Vegetable Development Schemes
	Vegetable Development Programme-Grow Bag
	Coconut Development Schemes
	Coconut-Kerasree
	Coconut Procurement Scheme
	Coconut Palm Insurance
	Coconut Cluster
	CDB-Coconut Climbing Machine
	CDB- Coconut Seedlings
	Kera Samithy
	Sustainable Development of Paddy-Upland
	Sustainable Development of Paddy- Fallow Land
	Rice-Fallow Land Cultivation
	Rice Procurement
	Nelkrishi Vikasana Agency
	Sustainable Development of Rice
	Production Incentive for Rice
	Group Farming
	Scheme Review Register
	Soil Testing
	ATMA-Demonstration
	ATMA Plus
	ATMA-LEADS
	Register for Natural calamity
	State Agmark Grading Laboratory

Category	Name of registers
	Crop Health Improvement Programmme
	SHM-State Horticulture Mission-Pepper Area Expansion
	SHM-Pineapple Area Expansion
	SHM-Banana Area Expansion
	SHM-Establishment of Tissue Culture Banana Orchards
	SHM-Floriculture Area Expansion
	SHM- Ginger Area Expansion
	SHM- Turmeric Area Expansion
	SHM-Nutmeg Area Expansion
	SHM-Cashew Area Expansion
	SHM-Weed Cutter
	SHM- Vermicompost
	Mango Area Expansion
	Minor Horticultural Crops Area Expansion
	Medicinal Plants Area Expansion
	RKVY Paddy
	RKVY- Coconut Seedlings
	RKVY- Vegetable Seeds
	RKVY-Seed Cutter
	RKVY- Fallow Land Cultivation
	RKVY- Contract Farming
	Onattukara Vikasana Agency-Tubers Area Expansion
	Onattukara Vikasana Agency-Vegetable Area Expansion
	Onattukara Vikasana Agency-Sesamum Area Expansion
	Mushroom Cultivation
	Vermicompost
	Quality Control
	Light Trap Maintenance
	Mite Control
	Biogas Scheme/ Biogas Plants
	Western Ghats Development Project
	Panchayat Scheme- GALASA
	Grow Bag
	Agro Service Centre
	Contract Farming
	Vegetable Pumpset
	Pumpset
	Plant Protection Equipments
	Irrigation Unit

Category	Name of registers
	Micro Irrigation
	Sprayer
	Upland Paddy
	MKSP(Mahila Kisan Shaktheekaran Paryojana)
	Farm Mechanisation
	Small Farm Mechanisation
	MOU Pepper
	Arecanut and Copra Procurement
	Agro Clinic
	Floriclub
	MOU Rice
	Paddy Insurance
	Crop Insurance
	Natural Calamity
	RKVY- Garden Tiller
	RKVY- Development of Irrigation Sources
	RKVY- Coconut Climber Supply
	RKVY- Installation of Pumpsets
	RKVY- Incentive for Paddy
	RKVY- Incentive for Micronutrients
	RKVY-Seed Minikit
	Minikit-Micronutrient
	Integrated Pest Management
	National Pulses Development
	Fruit Plant Development
	Seed Village
	Technology Mission
	State Food Security Program
	Modernisation of Departmental Farms
	Scheme for Strengthening of Agricultural Extension
	Hitech Farming
	Beneficiary Contribution Register
	Power Tariff Exemption

Establishment based registers include those registers which maintain the details of attendance of staff, movement of staff, details of inspection, casual leave and details of service

matters which include attendance register, movement register, inspection register, casual leave register and service registers.

The main purpose of 'social security service based registers' are the details of beneficiaries availing particular services provided by the office, other than those involved in development projects. They include registers that record details of beneficiaries of different schemes funded by Grama Panchayat, details of the beneficiaries of natural calamity, Summer Youth Employment Programme register and Farmer Pension.

The category of 'comprehensive development programmes' registers are kept for recording the integrated projects of Krishi Bhavan. The register for watershed development programmes, MGNREGS and watershed plans and various schemes of the central and state governments are classified under this category.

Basic registers are registers which contain information on basic data of crops, area, production, productivity, input sources in the Krishi Bhavan area, societies, organizations connected with agriculture, details of agricultural mechanization, wet land area details, irrigation facilities etc. Basic data register, paddy wet land data bank and register of crop insurance are classified under this category.

It is interesting to note that about three fourth of the registers (106) was related to project management. As stated earlier, project management is an information intensive process in itself. The surge in the number of projects formulated and implemented by local bodies has made it more complicated which require wide variety of data and information. This has resulted in substantial increase in the number of registers which have to be mandatorily kept for future reference. These registers will also form valuable source of data that can be used in further projects.

The Grama Panchayat also has an array of registers that deal with the multiple responsibilities of a local government (Table 3). While some of the registers would not seem to be important, many registers are sources of vital information that could be used in different stages of development planning and implementation.

Table 3. Classification of registers in Grama Panchayats

Sl.No.	Category based on purpose of register	No. of types of registers		No. of types of forms	
		Number	Percentage	Number	Percentage
1	Establishment	8	5	25	18
2	Accounts	26	15	7	5
3	Finance	10	6	12	8
4	Panchayat Meeting	5	3	4	3
5	Professional Tax	2	1	7	5
6	Property Tax	10	6	9	6
7	Public Works	11	6	13	9
8	Entertainment & Advertisement Tax	4	2	6	4
9	License Fee	4	2	10	7
10	Births & Deaths	5	3	15	11
11	Kerala Building Rules	2	1	7	5
12	Taxation & Appeals	1	1	6	6
13	Office Procedure	12	7	0	0
14	Right to Service Act 2012	1	1	3	2
15	Other Items	10	6	4	3
16	Hindu Marriage Rules	1	1	2	1
17	Common Marriage Rules	1	1	6	4
18	Library	7	4	3	2
19	Welfare Scheme	1	1	9	6
20	Private Hospital & Para Medical Institutions	1	1	4	3
21	Unemployment Dole Schemes	5	3	5	4
22	Pension for Agricultural Labourers	2	1	3	2
21	Plan Fund	6	3	8	6
21	Water Supply Scheme	2	1	5	5
22	Front Office operations	6	3	0	0
23	Government Schemes	28*	16	0	0
	Total	**171**	**100**	**173**	**100**

* Schemes related to agriculture only

The Grama Panchayat office is the basic unit of the three tier system of Panchayati Raj institutions, which also include Block Panchayat and District Panchayat at the higher tiers. As envisaged in the 73rd and 74th amendments of the Constitution and the Panchayati Raj Act of Kerala, Grama Panchayat is responsible for most of the direct transactions of the local governments with citizens. Major registers include those which record the details of civil registrations (birth, death and marriage). They are the vital records maintained as a mandatory function of local bodies. Taxation, another major mandate of local bodies, accounts for the registers on property tax, entertainment and advertisement tax and appeals. Similarly the local bodies give licenses for enterprises, shops, hotels and other business concerns which require registers on license fee remitted for various licenses issued by the local body. Details are provided in Table 4.

Table 4. List of registers in Grama Panchayats

Category	Name of register
Establishment	Incumbancy Register Stock Register of Service Book Increment Register Register of Pension Contribution Pension Contribution Register 1 Pension Contribution Register 2 P.F. Subscriber's Register Establishment Register
Accounts	Register of Cheques and Drafts Cheque Issue Register Pension Money Order Register Register of Receipts Investment Register Treasury/ Bank/Post Office Investment Balance Register Deposit Register Register of Bills Register of Payment Cash Book Subsidiary Cash Book Advance Register Register of Contingent Charges Recurring Charges Register Petty Cash Book Imprest Register Register of Money Orders Received Office Collection Register Outdoor Officer's Collection Register Hand book of Outdoor Collection Register Stock Account Register Stock Account of Forms Register Acquittance Roll of Members Stamp Account Register Pay Bill Register
Finance	Arrear Demand Register Miscellaneous Demand Register Register of Deposits (cash) Register of Grants Revenue Recovery Demand Register Sale Register of Un-serviceable Articles Audit Objection Register Audit Recovery Register Auction Register Register of Write off
Panchayat meeting registers	Attendance Register of Members Agenda Register Meeting Notice Book (Quarter size) Meeting Notice Book (Standing committee) Minutes Book

Category	Name of register
Profession tax registers	Profession Tax Register (Form V) Profession Tax Demand Register- old rule
Property tax registers	New Building Construction Register Building Demolished Register Vacancy Remission Register Register of Rented Buildings Bills and Notice Issue Register Property Tax Return Register (Form- 3) Property Tax Assessment Register (Form- 4) Property Tax Demand Register (Form- 8) Property Tax Assessment Register for Unauthorized Construction Property Tax Remission Register
Public Works (Registers)	Register of Roads Minor Irrigation Register Register of Tanks and Wells Tender Register Agreement Register Level Field Book Measurement Book (100 Folio) Measurement Book (50 Folio) Measurement Book (25 Folio) Works Register Work Bill Register
Entertainment Tax & Advertisement Tax (Registers)	Ticket Books and Receipt Book Stock Register Ticket Sealed Register Enertainment Tax Demand Register Advertisment Tax Demand Register
Licence Fee (Registers)	Traders List Register Licence Fee Demand Register Licence and Permission Register Register of Animals Slaughtered
Births & Deaths (Registers)	Birth Register (100 Folio) Death Register (100 Folio) Still Birth Register (50 Folio) Birth & Death Acknowledgement Register Register of Receipts Under Registration of B & D
KBR (Registers)	Register for Regularised Construction Building Permit Application Register
Taxation & Appeals (Registers)	Prosecution Register
Office Procedure (Registers)	Attendance Register of Staff Casual Leave Register Office Order Book Movement Register Distribution Register Personal Register Fair Copy Register

Category	Name of register
	Local Delivery Book Inward Register Outward Register Despatch Cum-stamp Account Register (New) Note Pad
Right to Service Act 2012 (Register)	Form - IV - Register of Cases (To be maintained by the Designated Officer)
Other Items (Registers)	Register of Immovable Properties Revenue Yielding Properties Register Register of Street Light Tools and Plants Register Civil Suit Register Secretary's Diary Vehicle - Log Book Register of Disciplinary Actions IT/ Electronic Equipment Maintenance register
Hindu Marriage Rules (Register)	Hindu Marriage Register
Common Marriage Rules (Register)	Marriage Register
Library (Registers)	Library Admission Register Library Monthly Subscription Register Books and Periodicals Register Library Nalvazhy Register Dailies and Magazine Register Library Stock Register Library Issue Register
Welfare Scheme (Register)	Register of Sanction of Old age Pension
Private Hospital & Para Medical Institutions (Register)	Register for Registration of Registered Institutions
Unemployment Dole Schemes (Registers)	Register of Application (Received, sanctioned, Rejected)
Pension for Agricultural Labourers (Registers)	Register of Application (Received, sanctioned, Rejected) Pension Payment Register
Plan Fund (Registers)	B-I - Appropriation Control Register for Category A,B and C Funds B-II- Register of Income and Expenditure B-III- Register of Implementing Officer wise Allotment and Utilisation of Funds B-IV- Subsidiary Register showing Receipts and Payment of LSGIS B-V-Project Register B-VI-Register of Funds received from Non-Banking Treasuries
Water Supply Scheme (Registers)	Water Meter Reading Recording Hand Book Water Charge Demand Register
Front Office	Distribution Register Hand Receipt Book Front Office Diary Message Book Form Distribution Register Duty Register

Registers on 'finance' mostly deal with the allotment of funds from the government in plan and non-plan account heads. Local bodies are provided with grants by the state government for implementing development plan as well as meeting non-plan expenditure. They also receive maintenance grants for maintaining infrastructure facilities. All these important transactions require registers for recording data on receipt of funds in installments.

Similarly accounts registers, which form 15 per cent of the total registers maintained in the local body are key databases, which can give information on income and expenditure. Accounting has become rigorous in local bodies consequent to a set of administrative reforms implemented for local bodies from time to time, since the ninth plan period which witnessed a massive decentralized planning initiative. The accounting system is mostly computerized and the double entry system is being promoted. Accounting has become stringent in the context of the large amount of plan funds made available to local bodies. The multitude of transaction has made accounting a major and complex activity in the local body.

The accounting registers include register of cheques and drafts, cheque issue register, pension money order register, register of receipts, investment register, treasury/ bank/ post office investment balance register, deposit register, register of bills, register of payment, cash book, subsidiary cash book, advance register, register of contingent charges, recurring charges register, petty cash book, imprest regiser, register of money orders received, office collection register, out door officer's collection register, hand book of out door collection register, stock account register, stock account of forms register, acquittance roll of members, acquittance roll of establishment, stamp account register and pay bill register.

Similarly registers on public works form a major part of the total data management scheme followed in local bodies. This has become a major activity as a result of the increase in construction activities taken up by the local bodies by utilizing plan funds earmarked exclusively for infrastructure development. This category of registers includes register of roads, minor irrigation register, register of tanks and wells, tender register, agreement register, level field book, measurement books, works register and work bill register. It is clear from this list that these registers can provide detailed information on the infrastructure of the local body, which can be effectively utilized for micro level planning.

Social security functions are mandatory functions of local bodies in Kerala. The local bodies are responsible for identifying the beneficiaries for various social security schemes and disbursing pensions. These social security schemes include old age pension, family benefit, financial assistance for marriage, destitute pension, maternity benefit, old age pension, pension for unmarried women above 50 years, pension for mentally retarded person, widow pension and pension for the physically challenged. Detailed registers are to be maintained for all of these schemes. This is a major source of data for better targeting of various development schemes envisaged for these categories.

Similarly, registers that are maintained to record the details of various citizen services also contain data on prospective beneficiaries, which would help target development programmes better. Data on various development programmes planned and implemented by local bodies in various sectors shall be obtained from the registers maintained exclusively for this purpose. The registers in this category include all plan fund registers like 'appropriation control register' for category A, B and C funds, 'B-II register' of income and expenditure, B-III register of implementing officers, B-IV subsidiary register showing receipts and payment of LSGIS, B-V project register, B-VI register for funds received from non-banking treasuries and registers for water supply schemes. They form comprehensive databases for appraising the existing development situation and also to find out the trends over a period of time. The major data fields in these registers provide us with information on the emphasis on various micro sectors of development of the local body. These registers can also provide us with information on the efficiency of project implementation over a period of time.

The registers on various development schemes implemented through the local body provide information on the centrally and state sponsored schemes that are implemented at the Grama Panchayat level. As part of decentralized planning, all these schemes are implemented by the local body through the process of beneficiary identification and implementation. These registers give information on the components of state sponsored or centrally sponsored programmes and extent of convergence with the local development plan.

Classification of the registers maintained in Grama Panchayats based on practical use show that there are 10 categories, the details of which are given in Table 5.

Table 5. Classification of registers in Grama Panchayats based on practical use

Sl. No.	Purpose	Number
1	Civil Registration (birth, death & marriage)	7
2	Taxes (building, entertainment, advertisement, property, profession)	16
3	Licenses	4
4	Finance	10
5	Accounts	26
6	Public works	11
7	Social Security Registers (pension, unemployment, welfare)	8
8	Development Plan	6
9	Service Delivery	6
10	Development Schemes	28
	Total	**122**

It is seen that about seven registers are related to civil registration (birth, death and marriage) which provide important demographic details of a Grama Panchayat. Sixteen registers deal with different taxes *viz.* entertainment tax, property tax, building tax, advertisement tax and professional tax, by which the revenue collected by the Grama Panchayat could be assessed. Four registers record details of licenses given and ten registers deal with finance. A larger number of registers (26 registers) deal with accounts, as the Grama Panchayat should keep the details of tax collections, money transactions of receipts, withdrawals and payments. Eleven registers record public works carried out by the Grama Panchayat in each financial year. About eight registers are classified as social security registers, six as development plan registers and another six as service delivery registers. About 28 registers are kept for recording development schemes in different sectors *viz.* primary sector, secondary sector and tertiary sector, handled by the development departments under Grama Panchayat.

4.3. System of maintaining registers

Democratic decentralization and introduction of micro level planning have brought about substantial increase in the number of registers that are to be necessarily maintained at the local body level. However, when computerization of local bodies was started in 1999, some legacy registers were digitized for being included in the software applications deployed in local bodies. The registers were generated as an outcome of the computerization programme. An enquiry was

made to find out how many registers are digitized out of the total registers maintained at the local body (see Table 6).

4.3.1. Classification of registers based on nature of updating

As seen in Table 6, registers are classified into three, based on the nature by which records are kept by the local body. First one is manual system, where government employees enter data manually in record books and keep it for future reference. The second type is digitized forms for making entries in a computer programme, which is made specifically for keeping the particular register. Hybrid system is another type where data is kept both in manual as well as digitized form. In most of the cases the data in the computer are printed and the sheets are bound to form a register.

Table 6. Distribution of registers in Grama Panchayats based on nature of updating

Sl.No.	Type of register	Number of registers	Percentage
1	Manual	125	73
2	Digitised	0	0
3	Hybrid system	46	27
	Total	**171**	**100**

As evident from Grama Panchayats surveyed, about 73 per cent of the registers are kept manually, while 27 per cent of the registers are being maintained in hybrid form. The manual registers include establishment registers like incumbency register, stock register of service book, increment register, most of the accounts registers, finance registers, panchayat meeting registers, tax registers, public works registers, licence fee registers, KBR registers etc. The registers kept in hybrid form include establishment salary bills, P.F. Chalan, last pay certificate, pension contribution monthly remittance form, property tax demand bill book, register of roads, birth register, death register, summary of monthly reports of births and deaths, distribution register of office procedures, inward register, register of immovable properties, revenue yielding properties register, Hindu marriage register, common marriage register, certificate of marriage, appropriation control register of plan funds, front office registers like distribution register, front office diary etc.

Since all the Grama Panchayats are in varying stages of digitization, the numbers and percentages may vary from one local body to the other. While some Grama Panchayats are far ahead in the process of digitization, with nearly cent per cent of the services rendered to citizens being computerized, some are only half way through. In future, the situation could be different from what is seen today, as the local bodies are in a stage of transition to full digitization. However, as Sharma and Gupta (2003) report, though the movement toward electronic government (e-government) is rapidly advancing and many countries are creating e-government services, there is no documentation of an e-government framework to guide the process.

Consequent to computerization of local bodies, many transferred institutions have also initiated the process of computerization. However, computerization of Krishi Bhavans has been only initiated. Distribution of registers based on nature of updating is given in Table 7.

Table 7. Distribution of registers in Krishi Bhavans based on nature of updating

Sl.No.	Type of register	Number of registers	Percentage
1	Manual	45	32
2	Digitised	0	0
3	Hybrid system	95	68
	Total	**140**	**100**

The registers kept manually in the Krishi Bhavan are attendance register, cash books, treasury bill books, acquittance roll, stock registers, inspection register, service registers and some of the registers of the projects implemented by Grama Panchayat. The registers kept in hybrid system are mostly that of the development projects implemented by the State Agricultural Department *viz.* vegetable promotion programme, sustainable development of paddy, State Horticulture Mission scheme, Rashtriya Krishi Vikas Yojana, National Pulses Development etc. The subsidies given by the State Department of Agriculture is through e-payment mode, hence the beneficiary details are compulsorily maintained in hybrid system.

4.3.2. Classification of registers based on mandatory nature

Registers in the offices have also been classified based on their mandatory nature as 'mandatory',' non-mandatory' and 'project based'.

Table 8. Distribution of registers based on mandatory nature

Sl.No.	Type of register	Number of registers	
		Krishi Bhavan	Grama Panchayat
1	Mandatory	31 (22)	165 (96)
2	Non-mandatory	5 (4)	0(0)
3	Project based	104 (74)	6 (4)
	Total	**140**	**171**

Figures in parenthesis represent percentages

'Mandatory registers' are those registers which are maintained in the office obligatorily as insisted by approved manuals, or codes of procedures of service rules. Non-mandatory registers are those registers kept by the local body based on convenience for data management. These registers are sometimes designed and maintained by the office themselves.

Project based registers are maintained exclusively for managing data on the development projects implemented by the local body.

Distribution of registers based on mandatory nature is provided in Table 8. The table shows that 74 per cent of the registers kept in the Krishi Bhavan are project based in contrast to four per cent in Grama Panchayats. However, while 96 per cent of the registers kept in Grama Panchayats are mandatory, in Krishi Bhavans it is only 22 per cent. In Grama Panchayats, non-mandatory registers are not seen, but in Krishi Bhavans, it is four per cent.

The Grama Panchayat keeps most of the registers mandatorily as we have discussed above. They include establishment registers, accounts registers, finance registers, panchayat meeting registers, profession tax registers, property tax registers, public works registers, entertainment and advertisement tax registers, licence fee registers, birth and death registers, KBR registers, taxation and appeals registers, office procedure registers, right to service act registers, other items registers, marriage rules registers and library registers.

The mandatory registers of Krishi Bhavan are account based registers like cash books, treasury bill books, TR 5 receipt book, chalan registers etc. Establishment registers like service registers, movement register etc. are included under this category. Basic data register and scheme registers are also classified under this category. General files like the list of farmer representatives, their contact numbers, addresses of input supply agencies, list of farmers who

enquire about forthcoming projects, list of progressive farmers etc. are coming under non mandatory registers.

4.3.3. Classification of registers based on information content

A detailed examination into the content of registers revealed that they serve diverse purposes by providing different types of information. Though most of the registers are maintained as a routine process, which are observed as a part of fulfilling official pre-requisites, they serve as reliable sources of data and information at the grass roots level. The purposes for which registers in Krishi Bhavan used are presented in Table 9.

Table 9. Distribution of registers in Krishi Bhavans based on information content

Sl.No.	Information	Description	No. of registers
1	Area, production and productivity of crops	Different crops grown in the Krishi Bhavan, area, production, productivity of crops	1
2	Details of schemes	Scheme guidelines, project outlay, amount expended etc	100
3	Details of beneficiaries	Identification details of beneficiaries, area of crop, total area of farmer, bank account details	106
4	Details of employees	Staff strength of Krishi Bhavan, their experience etc	5
5	Natural resources	Natural resources available in the locality	2
6	Organizations	Different organizations present under the jurisdiction of the Krishi Bhavan	1
7	Input sources	Source of different inputs	1
8	Source of services	Different services available and their sources	1
9	Administrative reports	Report on implementation of projects, beneficiaries, amount expended, physical and financial targets	100
10	Details of cash transactions	Cash received from government agencies and individuals and amount disbursed to them	14

Multiple responses, not to total

As evident from the content of registers, there is only one register to record the basic details of the agricultural scenario at the grass roots *viz.* area, production and productivity of different crops grown. However, there are about 100 registers which deal with details of schemes

implemented through Krishi Bhavans. Information on scheme guidelines, project outlay, amount expended etc. are detailed in these registers.

It is interesting to note that majority of the registers (106 registers) are kept to record the details of beneficiaries under various schemes. They form good citizen data, with name and address of beneficiaries, their land area, details of crops, bank account details etc. However, it is to be noted that names are duplicated in these registers and details are not arranged systematically.

Five registers are kept in Krishi Bhavans to record the details of employees. These registers include attendance register, movement register, inspection register, casual leave register and service books of employees. There are only two registers, basic data register and paddy wet land data bank, which deal with natural resources available in the locality. With regard to the social organizations present under the jurisdiction of Krishi Bhavan area, only basic data register gives ample information. The sources of different inputs can also be known from basic data register. The different sources of information available in the locality are also provided in basic data register.

There are about 100 registers, the content of which form administrative reports, communicated to higher authorities of the Department of Agriculture. They include bound print outs of project details stored in computers. The details of the implementation of project, beneficiaries, the amount expended, physical and financial targets, communications on the project etc. are filed systematically to form the respective project register.

Fourteen registers are being kept in Krishi Bhavans with details of cash transactions of the office. The details of funds received from government and other sources and the amount disbursed to individuals and different agencies of government are recorded in these registers.

4.3.4. Classification of registers based on frequency of updating

Attempts to classify registers on the basis of the frequency of updating revealed that two registers (attendance register and cash books) are updated daily whereas 132 registers are updated as per transaction only. Only six registers were found to be updated on the basis of need,

which include stock register, service registers, general files, watershed plan register and paddy wet land data bank (Table 10).

Table 10. Distribution of registers based on frequency of updating

Sl.No.	Frequency of updating information	Number of registers	
		Krishi Bhavan	Grama Panchayat
1	Daily	2 (1)	8 (5)
2	As per transaction	132 (95)	154 (90)
3	As and when required	6 (4)	9 (5)
	Total	**140**	**171**

Figures in parenthesis represent percentages

In the case of Grama Panchayat, only five per cent of the registers, which include attendance registers, cash books and front office registers are updated daily. About 90 per cent of the registers are updated as per transactions, though in Grama Panchayats most of these are updated daily as lot of transactions occur everyday. Almost all the important registers like tax registers, birth and death registers, marriage register, accounts registers, finance registers etc. are included in this category. About five per cent of the registers which include stock register of service books, library admission register, library stock register etc. are updated as and when required.

4.3.5. Classification of registers based on nature of data entry

From the point of view of information systems, which is the major look out of this study, registers or the indigenous databases have been divided into two *viz.* 'transaction based' and 'not transaction based'. While vast majority of registers are transaction based, a very small proportion are not based on transaction (see Table 11 for details).

Table 11. Distribution of registers based on nature of entry

Sl.No.	Nature of entry	Number of registers	
		Krishi Bhavan	Grama Panchayat
1	Transaction based	129 (92)	160 (94)
2	Not transaction based	11 (8)	11 (6)
	Total	**140**	**171**

Figures in parenthesis represent percentages

A perusal of the table shows that 92 per cent of the registers in the Krishi Bhavan are updated based on transactions. This means that a new entry is made in the register whenever a transaction takes place. For instance, entry is made when a beneficiary registers for a project, or subsidy is disbursed to someone in cash or kind. The remaining registers (8 %) are not transaction based. This points to the fact that the databases maintained at the Krishi Bhavan are dynamic in nature, which requires frequent updating. This would give timely information on the status of implementation of projects as well as other programmes at a given point of time.

Similarly, 94 per cent of registers in the Grama Panchayat are transaction based. As Grama Panchayat is having large volume of direct transactions with the citizens, the databases are so dynamic that they change everyday. Only a small proportion (6 %) of registers is not transaction based.The normal routine registers which are not based on any transaction in Krishi Bhavans are attendance register, stock register, dead stock register, movement register, casual leave register, service registers, basic data register, natural calamity register, power tariff exemption register, watershed plan register and paddy wet land data bank. Though they are not frequently updated, they also involve updating at a given point of time, based on the incidences reported.

The registers which deal with natural resources and institutions at the micro level maintained in local bodies, Krishi Bhavan and other offices of allied sectors are considered as repositories of relevant data for micro level planning in agriculture. It is important to look at these data sources from the perspective of micro level planning.

As seen earlier, planning as defined by the Government of Kerala (2014) emphasizes the importance of making objective assessment of available and potential resources and institutions. These data are not arranged and maintained with the purpose of employing them in the process of planning. However, the content of registers and description of data fields show that these data can be effectively used in formulating new projects as well as monitoring of existing projects.

4.3.6. Classification of registers based on data fields

An assessment of the data fields in the registers maintained in Krishi Bhavan showed that data fields ranged from three to ten on an average. The data fields included in different types of data are listed in Table 12.

Table 12. Distribution of registers in Krishi Bhavans based on of data fields

Sl.No.	No. of data fields	No. of registers	Name of registers
1	3	4	Attendance Register Movement Register Inspection Register Casual Leave Register
2	4	19	Treasury Bill Books Acqittance Roll Counter foils of TR 5 Receipt Books TR 5 Receipt Book (in use) Chalan Receipts Chalan Register District Panchayat Remittance Book Stamp Account Register Security Register Local Delivery Book Pay Bill Register Register of DA arrears TP Account Register (Treasury payment) TP A/C Pass Book Service Registers General Files Plan Cash Book DD/Cheque Distribution Register Rice Procurement
3	5	10	Cash Books Stock Register Dead Stock Register Plan Treasury Bill Book Karshaka Pension-Kisan Abhiman Register ATMA- LEADS State Agmark Grading Laboratory Crop Health Improvement Programmme Hitech Farming Beneficiary Contribution Register
4	6	8	Basic Data Register Scheme Review Register Soil Testing ATMA- Demonstration ATMA Plus Register for Integrated Nutrient Management Scheme for Strengthening of Agrl.Extension Power Tariff Exemption
5	7	95	Vegetable Promotion Programme vegetable Scheme Register- Summer Cluster vegetable Scheme Register-Homestead Vegetable- School Vegetable Garden Vegetable- Homestead Cultivation for School Children

Sl.No.	No. of data fields	No. of registers	Name of registers
			School Vegetable Kit
			Vegetable- Training
			Vegetable- Haritha Fund
			Vegetable- Haritha Training
			Vegetable Development Schemes
			Vegetable Development Programme-Grow Bag
			Coconut Development Schemes
			Coconut-Kerasree
			Coconut Procurement Scheme
			Coconut Palm Insurance
			Coconut Cluster
			CDB-Coconut Climbing Machine
			CDB- Coconut Seedlings
			Kera Samithy
			Sustainable Development of Paddy-Upland
			Sustainable Development of Paddy- Fallow Land
			Rice-Fallow Land Cultivation
			Nelkrishi Vikasana Agency
			Sustainable Development of Rice
			Production Incentive for Rice
			Group Farming
			SHM-State Horticulture Mission-Pepper Area Expansion
			SHM-Pineapple Area Expansion
			SHM-Banana Area Expansion
			SHM-Establishment of Tissue Culture Banana Orchards
			SHM-Floriculture Area Expansion
			SHM- Ginger Area Expansion
			SHM- Turmeric Area Expansion
			SHM-Nutmeg Area Expansion
			SHM-Cashew Area Expansion
			SHM-Weed Cutter
			SHM- Vermicompost
			Mango Area Expansion
			Minor Horticultural Crops Area Expansion
			Medicinal Plants Area Expansion
			RKVY- Paddy
			RKVY- Coconut Seedlings
			RKVY- Vegetable Seeds
			RKVY-Weed Cutter
			RKVY- Fallow Land Cultivation
			RKVY- Contract Farming
			Onattukara Vikasana Agency-Tubers Area Expansion
			Onattukara Vikasana Agency-Vegetable Area Expansion
			Onattukara Vikasana Agency-Sesamum Area Expansion
			Mushroom Cultivation
			Vermicompost
			Quality Control
			Integrated Pest Management
			Light Trap Maintenance
			Mite Control
			Biogas Scheme/ Biogas Plants
			Western Ghats Development Project
			Panchayat Scheme- GALASA
			Grow Bag

Sl.No.	No. of data fields	No. of registers	Name of registers
			Agro Service Centre Contract Farming Vegetable Pumpset Pumpset Plant Protection Equipments Irrigation Unit Micro Irrigation Sprayer Upland Paddy MKSP(Mahila Kisan Shaktheekaran Paryojana) Farm Mechanisation Small Farm Mechanisation MOU Pepper Arecanut and Copra Procurement Agro Clinic Floriclub MOU Rice Paddy Insurance Crop Insurance RKVY- Garden Tiller RKVY- Development of Irrigation Sources RKVY- Coconut Climber Supply RKVY- Installation of Pumpsets RKVY- Incentive for Paddy RKVY- Incentive for Micronutrients RKVY-Seed Minikit Minikit-Micronutrient Integrated Pest Management National Pulses Development Fruit Plant Development Seed Village Technology Mission State Food Security Program Modernisation of Departmental Farms Paddy Production Bonus Register Registers of Watershed Development Programmes
6	8	2	Register for MGNREGS Watershed Plan Register
7	10	2	Register for Natural Calamity Paddy Wet Land Data Bank
	Total	**140**	**140**

It is interesting to note that 95 registers have seven data fields, which are similar with respect to the type of information collected. The differences in the title of data fields are not significant since they record similar data. Ten registers have five data fields, while 19 registers

have four data fields. Eight registers were found to have six data fields. There are two registers with as much as eight to ten data fields.

4.3.7. Classification of registers based on completeness

An enquiry was made to find out how many registers in Krishi Bhavans and Grama Panchayats are complete, with respect to data fields. This was found out by estimating whether the fields were blank or not. Based on this 58 per cent of the registers in Krishi Bhavan were found to be complete whereas 42 per cent of registers were found to be incomplete in some respects. Similarly while 64 per cent of registers in the Grama Panchayats were found to be complete and 36 per cent were found to be incomplete (Table 13).

Looking further, it was found that complete registers were mostly mandatory registers and transaction based registers. Incomplete registers were mostly found in the case of registers that deal with administration of schemes.

Table 13. Distribution of registers based on completeness

Sl. No.	Whether complete/ not	Number of registers	
		Krishi Bhavan	Grama Panchayat
1	Complete	81 (58)	109 (64)
2	Incomplete	59 (42)	62 (36)
	Total	**140**	**171**

Figures in parenthesis represent percentages

Registers which were found to be complete in Krishi Bhavan consisted of cash book, treasury bill book, plan registers for coconut development schemes, sustainable development of paddy, RKVY scheme registers etc.

The registers which were found to be incomplete include basic data register, scheme registers like vegetable promotion programme, coconut palm insurance, crop health improvement programme, state horticulture mission scheme registers etc.

4.3.8. Classification of registers based on static/ dynamic nature

An enquiry was also done to find out the number of registers which contain dynamic data that had to be entered on a regular basis in accordance with transactions (see Table 14). It was found that in Krishi Bhavans, about four per cent of the registers were static in nature with respect to data entry as they do not require to be updated on a regular basis whereas 96 per cent

of the registers which were found to be dynamic, require regular updating. Moreover, these registers contained data fields that were filled mandatorily as the end result of transactions. These data were used to find out the status of various interactions with citizens.

Table 14. Distribution of registers based on static/ dynamic nature

Sl. No.	Static/ dynamic	Number of registers	
		Krishi Bhavan	Grama Panchayat
1	Static	6 (4)	3 (2)
2	Dynamic	134 (96)	168 (98)
	Total	**140**	**171**

Figures in parenthesis represent percentages

Static registers were dead stock register, service registers, register for natural calamity, power tariff exemption, watershed plan register and paddy wet land data bank. The entry of the dead stock register of the Krishi Bhavan was seldom done and hence classified as static. Similarly in service registers, entries were made only when it is needed, but not on a regular basis. In the case of natural calamity register and power tariff exemption, changes were made whenever it was required. In the same manner watershed plan register and paddy wet land data bank were also classified as static, as there were no frequent changes in the data fields included in these registers.

In Grama Panchayat offices, about 98 per cent of the registers were found to be dynamic in nature. Only two registers *viz.* register of write off and library stock register were found to be static in nature.

4.3.9. Analysis of registers in Krishi Bhavans based on development subsectors

Since the study intended to find out the pattern of utilization of data and information in micro level planning, an attempt was made to find out the number of indigenous databases that were maintained in relation to the subsectors of major development sectors. Subsectors of development are the sub divisions of major sectors such as agriculture, animal husbandry etc. as out lined by the State Planning Board as a part of democratic decentralization process.

Table 15. Distribution of project based registers in Krishi Bhavans based on development subsectors

Sl.No.	Area	No. of types of registers
1	Rice (1.1)	17 (16)
2	Coconut (1.2.1)	9 (9)
3	Arecanut (1.2.2)	1(1)
4	Spices and condiments (1.2.4)	4(4)
5	Banana (1.2.7)	2 (2)
6	Tubers (1.2.8)	1(1)
7	Fruit trees and other fruits (1.2.9)	4 (4)
8	Floriculture (1.2.10)	2(2)
9	Vegetables (1.2.11)	14(13)
10	Medicinal plants cultivation(1.2.12)	1(1)
11	Mushroom cultivation (1.2.14)	1(1)
12	Comprehensive agriculture improvement programmes (1.2.16)	8(7)
13	Crop Insurance (1.2.18)	3(3)
14	Localised activities to promote other crops (1.2.22)	2(2)
15	Projects other than rice (1.2.23)	8(7)
16	Marketing and quality control (1.3.1)	2(2)
17	Training and extension activities (1.3.2)	2(2)
18	Production of biofertilizers (1.3.6)	2(2)
19	Contract farming , Land Bank, Self Help Groups (1.3.12)	2(2)
20	Chemical fertilizers (1.3.13)	2(2)
21	Pumpsets, sprayers, agricultural implements (1.3.15)	11(10)
22	Tractors, tillers and other agricultural implements (1.3.16)	2(2)
23	Irrigation well (1.3.18)	1(1)
24	Agricultural development programmmes (1.3.27)	1(1)
25	Comprehensive Water shed Plan(1.8)	2(2)
26	Comprehensive soil & water conservation programmes (2.1.7)	1(1)
	Total	**105**

Analyses of project based registers were done to identify and quantify the sub-sectors/ micro sectors addressed (Table 15). It is learnt from the table that rice (1.1) is the sector which had the largest number of registers. This implies that rice, being the major crop has more schemes and programmes. Moreover, recently ownership of rice fields and status of rice cultivation in an area have become mandatory databases in the wake of the 'Kerala Conservation of Paddy Land and Wetland Act, 2008', being implemented in the state. Rice cultivation by local bodies also required planned distribution of inputs at all stages from seed to seed, which would require more number of registers to be kept at the office. Of late, data bank on rice fields has been updated by using current data. It is important to note that rice cultivation involves distinct intervention at the local level under the leadership of the Department of Agriculture. Usually they include consultation with the members of padasekhara samithis, distribution of inputs such as seeds, fertilizers and plant protection chemicals. Rice cultivation also involves disbursement

of subsidies. There are also several state sponsored and centrally sponsored schemes which require the implementing agency to maintain registers presented by the sponsoring agencies. For instance, RKVY is a major source of funds to rice cultivation, is a centrally sponsored scheme. Similarly there are exclusive programmes on rice cultivation planned and implemented by the local self government institutions. The recent thrust on rice cultivation as evident from the large number of projects in this subsector in the wake of state level food security campaign has also contributed to the generation of several registers in this subsector (1.1).

Similarly, registers on vegetables (1.2.11) are also in sizeable number, second to rice. As discussed in the case of rice, thrust on vegetables would be the possible cause for the increase in the number of registers in this sector. Apart from schemes sponsored by state and central governments, there are innumerable locally implemented programmes, which might require use of more registers.

As evident from the apparent tendencies in the field, mechanization (1.3.15) which is a major thrust area now, was also found to require as much as eleven registers. Mechanization was followed by coconut development (1.2.1), with regard to the number of registers maintained. Comprehensive agricultural development programmes (1.2.16) and projects other than rice (1.2.23) were found to require eight types of registers. There were four registers each for spices and condiments (1.2.4) and fruit trees and other fruits (1.2.9). In all other sub sectors there were only one or two registers. The pattern of distribution of the number of registers showed that out of the total 140 registers, 105 registers dealt with different agricultural projects which comprises of 26 different micro sectors.

4.3.10. Classification of registers based on adequacy

Respondents were enquired about the adequacy of registers (Table 16) and found that 17 per cent of the registers were perceived to be 'very adequate' in providing required information for various steps involved in planning. About 81 per cent of the registers have been reported to be 'adequate' and two per cent of the registers were found 'not adequate' to meet the information requirement in the formulation and implementation of micro level plan.

Table 16. Distribution of registers based on adequacy

Sl.No.	Adequacy	Number of registers	
		Krishi Bhavan	Grama Panchayat
1	Very adequate	24 (17)	35 (24)
2	Adequate	113 (81)	130 (76)
3	Not adequate	3 (2)	0(0)
	Total	**140**	**171**

Figures in parenthesis represent percentages

The basic data register, watershed plan register and paddy wet land data bank were found to be 'not adequate' for micro level planning. However, cash book, chalan receipt, plan cash book, security register were adjudged to be 'very adequate' as they were regularly used and were updated mandatorily. In the case of Grama Panchayats, 24 per cent of the registers were perceived to be 'very adequate' and 76 per cent as 'adequate', with respect to information provided by them for various aspects of micro level planning.

4.4. Classification of registers/ databases based on purpose

As seen earlier, micro level planning is done through different stages like resource appraisal, planning, beneficiary selection, implementation, monitoring, evaluation and follow up. The registers that could be used in each of these stages were identified to find out the availability of bench mark data for each of these steps. While 116 registers were found to be used for resource appraisal, and 106 registers for planning purposes. Certain data/ information that could be employed in beneficiary selection were found in 91 registers out the total registers in the Krishi Bhavan. While 102 registers were used for implementation of projects, about 80 registers were found to contain data that could be used for monitoring projects. About 106 registers were found to contain details of evaluation and follow up of projects.

Table 17. Classification of registers based on purpose

Sl.No.	Purpose	Number of registers which can provide data on	
		Krishi Bhavan	Grama Panchayat
1	Resource appraisal	116	48
2	Planning	106	48
3	Beneficiary selection	91	35
4	Implementation	102	22
5	Monitoring	80	36
6	Evaluation	106	48
7	Follow up	106	48

Multiple responses, not to total

In Grama Panchayat, about 48 registers were found to contain data for resource appraisal and planning. Out of the 35 registers that could be used for beneficiary selection, 22 would be useful for implementation of projects. Monitoring of projects could be supported by data from 36 registers; and 48 registers were found to be useful for evaluation and follow up.

4.4.1. Different combination of registers based on purpose

The data provided by some registers can be used for multiple stages of micro level planning. The combinations of purposes for which the data available from different registers could be used are provided in Table 18.

Table 18. Different combination of registers based on purpose

Sl.No.	Purpose	No. of registers
1	Resource appraisal alone	21(15)
2	Resource appraisal+Planning	8 (6)
3	Planning alone	4 (3)
4	Resource appraisal+Planning+ Beneficiary selection+ Implementation	88 (63)
5	Monitoring alone	1 (1)
6	Evaluation alone	1 (1)
7	Resource appraisal+Planning+ Implementation	1 (1)
8	Implementation alone	5 (3)
9	Beneficiary selection+ Implementation	2 (1)
10	Resource appraisal+ Implementation	2 (1)
11	Monitoring+Evaluation	3 (2)
12	Resource appraisal+Evaluation	1 (1)
13	Planning+Implementation	3 (2)
	Total	140

Figures in parenthesis represent percentages

A perusal of the table shows that 21 registers (15 per cent) in the Krishi Bhavan could be used for resource appraisal alone. About two third of the registers could be used for resource appraisal, planning, beneficiary selection and implementation. Most of the project registers were included under this category.

About six per cent of the registers contained information on resource appraisal together with planning. Only three per cent of the registers contained information exclusively for planning. Another three percentage of registers were found to be used for implementation purpose alone whereas two per cent each were used for monitoring+ evaluation and planning + implementation.

4.5. Data support for different stages of micro level planning

An attempt was done to find out the prospective uses of data available from different types of registers in Krishi Bhavan. The data support that could be provided by the registers in Krishi Bhavan for different stages of micro level planning *viz.* resource appraisal, planning, beneficiary selection, implementation, monitoring, evaluation and follow-up is illustrated in Tables 19 to 24 respectively. This was done by closely looking at the data fields of the registers and discussing the possible uses of such data in various stages of micro level planning with Extension Personnel, and by comparing the objectives of projects implemented in the agricultural sector.

Resource appraisal is an activity which requires bench mark details of the resources that could be used in development. Essentially, the sources of data should provide planners with the status of resources, location, amount of products or services that can be availed from the resources etc. The legacy databases kept in Krishi Bhavans can provide us with basic details of the natural, agro climatic and human resources that can be put to use in development. This data would be of use to find out the locally available resources that can be used in the development interventions in agricultural sector. An enquiry to find out the different sources of data available from legacy databases revealed that the major source of data or information on resources were basic data register, scheme registers, registers on projects, procurement, natural calamities, farmer pensions, integrated pest management, high tech farming, power tariff etc. The different data types that could be elicited from these registers are mentioned in Table 19.

Table 19. Data support for resource appraisal from legacy registers in Krishi Bhavans

Type of registers	Major data available	Prospective uses
Basic data	Crops- area, production, productivity	Back ground information for micro level planning
Scheme registers	Name of beneficiaries Benefits distributed Area of intervention	Appraise the human resources Pattern of distribution of financial resources across different crops
Project registers	Project objectives Project accomplishment Financial targets Physical targets Beneficiary contribution Procurement status	To bench mark the interventions in a given field To take stock of interventions Production status Data on institutional support
Procurement registers	Beneficiaries Quantity procured Price of commodities	Status of procurement including gaps Institutional support status

Type of registers	Major data available	Prospective uses
Natural calamity	Households Area Extent of damage Institutional support	Extent of natural calamity Areas of water vulnerability Track record of prominent natural calamities Pattern of distribution of natural calamity
Karshaka pension	Number and personal details of senior citizens interested in farming	Information on agricultural practices Status of agriculture
Integrated pest management	Acreage of IPM practices	Extent of adoption of IPM practices
Hitech farming register	Extent of high technology farming	Information on adoption of technologies
Power tariff exemption	Extent of irrigation	Irrigated area in a Grama Panchayat

In fact these registers can be used not only for resource appraisal, but also for getting information on planning projects. Similar to what has been observed earlier, the basic data register could provide us information to find out the objectives of a project and the targets of a plan. For instance, the prospects for expanding cultivation to new areas could be obtained from the data provided in the basic data register and the status of implementation during previous years.

The major data types available in each register maintained at the Krishi Bhavan and the prospective use during the planning phase are explained in Table 20.

Table 20. Data support for planning from legacy registers in Krishi Bhavans

Type of registers	Major data available	Prospective uses
Basic data	Crops- area, production, productivity	Understand the back ground information for micro level planning
Scheme registers	Name of beneficiaries Benefits distributed Area of intervention	Appraise the human resources for planning Assess the pattern of distribution of financial resources across different crops Fix the financial objectives of the project
Project registers	Project objectives Project accomplishment Financial targets Physical targets Beneficiary contribution Procurement status	Bench mark the intervention in a given field Formulate project objectives Find out new areas of intervention Assess the gaps in development Take stock of interventions for further planning Understand the production status for planning Get data on institutional support
Procurement register	Beneficiaries Quantity procured Price of commodities	Assess the status of procurement including gaps Assess the status of institutional support
Natural calamity	Household Area Extent of damage	Find out the extent of natural calamity Identify the areas of water stress and vulnerability Get the track record of procurement

Type of registers	Major data available	Prospective uses
	Institutional support	Understand the pattern of distribution of natural calamity
Karshaka pension	Number of senior citizens interested in farming	Formulate financial objectives of the project
Integrated pest management	Acreage of Integrated Pest Management (IPM) practices	Get the status of adoption of IPM practices Identify the gaps in interventions
Hitech farming	Extent of high technology farming	Get information on adoption of technologies
Power tariff exemption	Extent of irrigation Amount of subsidy by Electricity board	To assess the irrigated area in a Grama Panchayat

There are several legacy registers that record the details of the individuals who are benefitted from projects (see Table 21). These registers were found to serve the purpose of citizen data bases, which can be effectively used in planning. In micro level planning, finding out the beneficiaries is a process to be done transparently in consultation with Grama Sabhas. However, in order to find out the possible beneficiaries of a project and to do better targeting, these registers with the details of beneficiaries would be useful. These registers can also be used for getting the details of beneficiaries in an integrated information system. However, these registers will have to be compiled and compared with existing citizen data registers such as the building tax registers to find out the exact number of households and their details.

Table 21. Data support for beneficiary selection from legacy registers in Krishi Bhavans

Type of registers	Major data available	Prospective uses
Scheme registers	Name of beneficiaries Benefits distributed	Appraise the human resources
Procurement register	Beneficiaries	Assess the status of procurement including gaps Assess the status of institutional support
Natural calamity	Household Area	Understand the extent of natural calamity Identify the areas of water vulnerability

Though implementation is the step that follows planning, data support that can be availed from various legacy data bases maintained at the Krishi Bhavan during the time of implementation of micro level projects was found out as explained in Table 22. However the pattern of data obtained and their prospective uses have been found to be similar to that of planning.

Table 22. Data support for implementation from legacy registers in Krishi Bhavans

Type of registers	Major data available	Prospective uses
Basic data	Crops- area, production, productivity	Understand the back ground information for micro level planning
Scheme registers	Name of beneficiaries Benefits distributed Area of intervention	Appraise the human resources Assess the pattern of distribution of financial resources across different crops
Project registers	Project objectives Project accomplishment Financial targets Beneficiary contribution Procurement status	Bench mark the intervention in a given field Take stock of interventions Understand the production status of crops Assess the status of institutional support
Procurement register	Beneficiaries Quantity procured Price of commodities	Assess the status of procurement including gaps Assess the institutional support for procurement Get the track record of procurement Understand the period of production of different crops which affect price trends
Natural calamity	Household Area Extent of damage Institutional support	Find out the extent of natural calamity Identify the areas of water vulnerability Understand the pattern of distribution of natural calamity
Karshaka pension	Number of senior citizens interested in farming	Extent of adoption of innovative/ aesthetic practices
Integrated pest management	Acreage of IPM practices	Extent of adoption of IPM practices
Hitech farming	Extent of high technology farming	Get information on adoption of technologies
Power tariff exemption	Extent of irrigation	Assess the irrigated area in a Grama Panchayat

Monitoring, an activity that should be taken up along with implementation is also information intensive as understood from project reports and responses from the implementing officers. The most important data required for monitoring is the project details, particularly the physical and financial targets, time schedule, resource utilization and the method of implementation. These data are readily available from the project proposals and the project registers. However, data available in the legacy registers may help develop bench mark information based on which monitoring is done. Similarly, evaluation of projects and micro level plans also shall be done by means of bench mark indicators that can be developed in advance from the legacy data bases. Evaluation of a micro level plan shall measure the effectiveness in

terms of targets fixed and objectives envisaged. The data support for monitoring and evaluation of micro level planning is given in Table 23.

Table 23. Data support for monitoring and evaluation from legacy registers in Krishi Bhavans

Type of registers	Major data available	Prospective uses
Scheme registers	Name of beneficiaries Benefits distributed Area of intervention	Monitor the pattern of distribution of financial resources across different crops
Project registers	Project objectives Project accomplishment Financial targets	Monitor and bench mark the intervention in a given field Take stock of interventions
Project registers	Beneficiary contribution Procurement status	Monitor the production status Data on institutional support
Procurement register	Beneficiaries Quantity procured Price of commodities	Assess the status of procurement including gaps Assess the status of institutional support
Natural calamity	Household Area Extent of damage Institutional support	Assess the extent of natural calamity Identify the areas of water vulnerability Find out the track record of procurement Understand the pattern of distribution of natural calamity

Another important activity is 'follow up', done after the implementation of projects. Any robust micro level plan should have a clear strategy for follow up, once the project is implemented. This is done for making the development intervention sustainable. Unless follow up is done, the beneficiaries and other actors would loose the enthusiasm to pursue the project and maintain its accomplishments. Effective bench mark details of the project and its background would help us understand the possible follow up programmes. Data support required for follow up and the extent to which legacy databases can provide us with this support are illustrated in Table 24.

Table 24. Data support for follow up from legacy registers in Krishi Bhavans

Type of registers	Major data available	Prospective uses
Basic data	Crops- area, production, productivity	Follow up of projects using back ground information on crops
Scheme registers	Name of beneficiaries Benefits distributed Area of interaction	Appraise the human resources Appraise crop status to decide continuance of projects
Project registers	Project objectives Project accomplishment	Bench mark the interaction in a given field Take stock of interventions

Type of registers	Major data available	Prospective uses
	Financial targets Beneficiary contribution Procurement status	Appraise crop status to decide continuance of projects Correct faults in procurement
Procurement register	Beneficiaries Quantity procured Price of commodities	Assess the status of procurement including gaps Assess the status of institutional support
Natural calamity	Household Area Extent of damage Institutional support	Devise measures to prevent/ control extent of natural calamity Identify the areas of water vulnerability

4.6. Comparison of development projects and legacy databases across different agro climatic zones

The five agro climatic zones of Kerala *viz.* Northern, Central, Southern, High altitude, Problem area and Onattukara region were selected for study. A comparison of projects implemented in these different zones was also attempted to find out whether there were any differences across agro climatic zones with respect to the type of projects implemented at the micro level and the legacy databases. This was attempted in view of the fact that in response to the agro climatic characteristics, there could be difference in the development interventions in agriculture and allied sectors which might in turn reflect on the type of projects and the databases required for facilitating the planning process. The results are presented in Table 25.

Table 25. Development projects and legacy databases across different agro climatic zones

Sl.No.	Agro-climatic zone	Type of project			Other projects
		Rice	Vegetable	Coconut	
1	Northern	10	13	4	No special projects
2	Central	10	11	4	Western Ghats Development project
3	Southern	8	12	5	No special projects
4	High altitude	8	12	5	National Pulses Development Programme
5	Problem area	11	11	4	Thrissur-Ponnani Kole Vikasana Package
6	Onattukara	10	12	4	Kuttanad Package, Onattukara Vikasana Agency Projects

Comparison of projects in major crops like rice, vegetables and coconut showed that the number of projects in rice varied from 8 to 11 in different agro climatic zones and Onattukara region. More number of projects on rice was seen in problem areas, whereas the number was low in Southern and High Altitude Zones. In Northern Zone, there were 13 projects on vegetables, whereas there were only 12 projects in that category in Southern, High Altitude and Onattukara

regions. The lowest number of projects on vegetables was seen in Central and Problem areas. In Southern and High Altitude Zones there were five projects on coconut. Onattukara region and other climatic zones implemented four projects on coconut.

However there were special projects *viz.* the Western Ghats Development project in the Central zone. National Pulses Development Programme was found to have been implemented in certain Krishi Bhavans of High Altitude zone. In Problem zone, Thrissur-Ponnani Kole Vikasana Package was implemented in some of the Krishi Bhavans. Kuttanad package and Onattukara Vikasana Agency projects were the special projects implemented in Onattukara region. In fact no significant difference was observed among the agroclimatic zones with respect to number of projects, though there had been varying emphasis on certain sectors.

RESULTS- SECTION 2

4.7. Profile of respondents

Since the use of databases in micro level planning is not mandatory, its frequency is found to depend mostly on the inclination of the individual officer who is in charge of the planning process. Micro level planning requires professional expertise, which involves careful examination of existing situation, speculation of an emerging scenario based on current trends and formulating project goals to address existing and emerging needs. This warrants proactive involvement of the personnel in the process of micro level planning, which is in turn a function of the psycho-social and economic characteristics of the individual, apart from organizational objectives, training etc. The development orientation of Extension Personnel and officials involved in micro level planning were found to vary significantly from each other, as reported by Alex (1999). Several personal attributes were also found to influence the development orientation and attitude towards decentralized planning, as evident from various studies (Mishra, 1986; Haragopal and Prasad, 1990; Mehta, 1995).

It is in this backdrop, the profile of respondents was analysed to find out whatever these selected characteristics had any influence on the perception and attitude of Extension Personnel and People's Representatives regarding integrated information system for micro level planning.

4.7.1. Age

Classification of the members of the two groups of respondents *viz.,* Extension Personnel and People's Representatives based on their age revealed that about two third of Extension Personnel were in low category compared to the proportion of People's Representatives (17 %) who belonged to this category (see Table 26).

Table 26. Distribution of respondents based on age

Sl.No.	Category	Extension Personnel	People's Representatives
1	Low	42 (64)	11 (17)
2	Medium	24 (36)	50 (76)
3	High	0 (0)	5 (7)
	Total	**66**	**66**

Figures in parenthesis represent percentages

Similarly while 36 per cent of the officials belonged to medium age group, more than three fourth (76 %) of People's Representatives belonged to this category. However, while seven per cent of People's Representatives belonged to high category, there were no Extension Personnel in this category. These results showed marked differences between the age group of Extension Personnel and People's Representatives (Table 27).

Table 27. Difference between age of Extension Personnel and People's Representatives

Sl. No.	Category	Mean	t value
1	Extension Personnel	40.727	13.270*
2	Peoples' representatives	55.606	

* Significant at 5% level

As understood from table, the mean age of Extension Personnel came to 40 years and of People's Representatives to 55 years, and there was significant difference between the two categories in terms of age.

4.7.2. Educational qualification

The educational status of Extension Personnel and People's Representatives was also analysed, the results of which are given below (Table 28).

Table 28. Distribution of respondents based on educational qualification

Sl.No.	Qualification	Extension Personnel (N=66)	People's Representatives (N=66)
1	Below SSLC	0	1 (1)
2	SSLC	0	15 (23)
3	Pre-Degree	0	19 (29)
4	VHSE	1 (2)	0
5	B. Sc (Agriculture)	41 (62)	0
6	Other Degree	0	31 (47)
4	M.Sc (Ag)	23 (34)	0
5	Ph. D	1 (2)	0
	Total	**66**	**66**

Analysis of the profile of Extension Personnel showed that while 62 per cent of officials had Bachelor degree in agriculture, which is the basic qualification of Extension Personnel, only one officer had Vocational Higher Secondary Certificate, who has been promoted as Agricultural Officer from Agricultural Assistant post. About 34 per cent of Extension Personnel had Master degree in agriculture and one of the officer had Doctorate in Agriculture.

On the other hand, about half (47 %) of People's Representatives reportedly had Bachelor degree, whereas 29 per cent of them had only Pre-degree education. Twenty three per cent of elected members were having SSLC qualification, while one of them had not passed SSLC. These results also show marked difference among the two stakeholders with respect to educational qualification. It is noteworthy that while Extension Personnel have been formally trained in the process of micro level planning, others have not obtained any formal education on the process of planning in agriculture.

4.7.3. Experience

The experience of Extension Personnel and People's Representatives in different roles of micro level planning was also collected (see Table 29 for details).

Table 29. Distribution of Extension Personnel based on experience in micro level planning

Sl. No.	Role played	No. of Extension Personnel (experience in years)			
		0-4 years	5-9 years	10-14 years	More than 14 years
1	As Implementing Officer	20 (30)	9 (14)	19 (29)	18 (27)
2	Key Resource Person	13 (20)	9 (14)	17 (26)	18 (27)
3	Member of Technical Advisory Group	17 (26)	9 (14)	17 (26)	17 (26)
4	Working group Convenor	20 (30)	9 (14)	19 (29)	18 (27)
5	District level supervisory role	6 (9)	0	0	0
	Total	51	27	53	53

Multiple responses, not to total

Micro level planning in agriculture, by its very design involve Agricultural Officers, Assistant Directors and Principal Agricultural Officers who play multiple roles as implementing officers, key resource persons, members of technical advisory group, working group convenors apart from district level supervisory roles at different tiers of local bodies. Detailed analysis of professional experience in various roles revealed that about 30 per cent of Extension Personnel had experience of less than four years as implementing officer, whereas 14 per cent had 5-9 years. Twenty nine per cent had 10-14 years and 27 per cent had more than 14 years of experience as implementing officer in decentralized planning process. Analysis of the role of key resource person showed that 20 per cent of Extension Personnel had less than four years of experience and 14 per cent had 5-9 years of experience. About 26 per cent of the Extension Personnel had 10-14 years, and 27 per cent had more than 14 years of experience as key resource person.

It is also observed that an equal proportion (26 %) of Extension Personnel had less than four years, 10-14 years, and more than 14 years of experience as member of technical advisory group. About 14 per cent of them had 5-9 years of experience in the same role.

About 30 per cent of Extension Personnel had experience of less than four years as working group convenor, while 14 per cent had experience of about four to nine years. Twenty nine per cent of Extension Personnel had 10 to 14 years of experience and another 27 percent had more than 14 years of experience as working group convenor. About nine per cent of Extension Personnel had district level supervisory role for less than four years.

Table 30. Distribution of People's Representatives based on experience in micro level planning

Sl.No.	Role played	People's Representatives			
		0-4 years	5-9 years	10-14 years	More than 14 years
1	Working group member	12 (18)	36 (55)	8 (12)	0
2	Member of statutory committee	12 (18)	24 (36)	8 (12)	0
3	Chairman of statutory committee	3 (5)	23 (35)	8 (12)	0
	Total	27	84	24	0

The elected members of the Grama Panchayats play multiple roles in micro level planning process as working group member, member of statutory committee and chairman of statutory committee (Table 30).

The table shows that about 18 per cent of People's Representatives had less than four years of experience as working group member, 55 per cent of them had five to nine years experience and 12 per cent had 10-14 years of experience in the same role. The role as member of statutory committee was analysed further to see that 18 per cent of People's Representatives had less than four years of experience while 36 per cent had experience of five to nine years. About 12 per cent of them had 10-14 years of experience as member of statutory committee.

People's Representatives might work as chairman of various statutory committees in LSGIs. The proportion of elected members who were having less than four years, five to nine years and 10 to 14 years of experience were 5 per cent, 35 per cent and 12 per cent respectively.

The difference between the experience of Extension Personnel and People's Representatives was found to be statistically significant (Table 31).

Table 31. Difference between experience of Extension Personnel and People's Representatives

Sl. No.	Category	Mean	t value
1	Extension Personnel	9.6061	2.304*
2	Peoples' representatives	7.6364	

* Significant at 5% level

The mean value of experience of Extension Personnel was estimated as 9.6 years and that of People's Representatives as 7.6 years. As stated earlier, the difference was found to be statistically significant. This could be due to the fact that Extension Personnel are associated with micro level planning in more roles than that of People's Representatives. They hold responsibilities like implementing officer, key resource person, member of technical advisory group, working group convenor etc.

4.8. Perception on efficacy of micro level planning

Efficacy is the ability to produce an intended or desired result, the capacity for producing a desired result or effect. It may also be defined as the quality of being successful in producing an intended result. Here, efficacy of micro level planning means the ability of different stages of planning, implementation, monitoring and evaluation to create the desired outcome of the whole planning process.

Use of databases in micro level planning was found to be necessarily associated with the perception of the respondents on the concept of micro level planning which is known to many as 'decentralized planning'. Also, it was found that the current status of implementation of micro level planning and the merits and demerits thereof might influence this perception. It is under these circumstances the perception of respondents on the efficacy of current micro level planning process was measured. For this purpose, four major dimensions of micro level planning *viz.* planning, participation, implementation and impact were delineated and statements that measure the efficacy of each of them were included in the study.

The total score for efficacy of micro level planning was found out by summing up the scores of the four dimensions *viz.* planning, participation, implementation and impact of micro

level planning. The result of analysis of the perception of major stakeholders on efficacy of micro level planning is given below (Table 32).

Table 32. Perception of stake holders on efficacy of micro level planning

(N=66)

Sl.No.	Dimensions	Category	Extension Personnel	People's Representatives
1	**Over all perception on efficacy of micro level planning**	**Low** **Medium** **High**	**4 (6)** **30 (46)** **32 (48)**	**14 (21)** **40 (61)** **12 (18)**
2	Planning	Low Medium High	13 (20) 47 (71) 6 (9)	3 (4) 44 (67) 19 (29)
3	Participation	Low Medium High	10 (15) 51 (77) 5 (8)	9 (14) 41 (62) 16 (14)
4	Implementation	Low Medium High	10 (15) 37 (56) 19 (29)	11 (17) 39 (59) 16 (24)
5	Impact	Low Medium High	9 (14) 51 (77) 6 (9)	15 (23) 51 (77) 0

Figures in parenthesis represent percentages

It is seen from the table that only six per cent of Extension Personnel had low perception on efficacy of micro level planning. It is encouraging to note that while 46 per cent of Extension Personnel had medium scores on perception of efficacy, 48 per cent of them had high scores. The comparatively high percentage of Extension Personnel with high scores on perception indicates high level of understanding of the concept of micro level planning and the high level of expectation that they hold, with regard to the efficacy of the process. On the contrary, perception of People's Representatives on efficacy showed distinct difference from that of Extension Personnel. While about 21 per cent of People's Representatives were low in their perception, majority of them (61 %) had medium scores on perception and 18 per cent had high scores. This is a clear indication of the lower level of understanding of the concepts and methods of micro level planning and the standards with which the processes are evaluated by the People's Representatives, compared to Extension Personnel.

Apart from this, analysis of the perception on each dimension of efficacy was carried out separately. In the case of planning, majority of Extension Personnel (71 %) and People's

Representatives (67 %) had medium level of perception. Only nine per cent of Extension Personnel had high perception on efficacy, in contrast to 29 per cent of People's Representatives. This is indeed striking, as the Extension Personnel are convinced of the fact that they were not satisfied with the ways by which planning phase of micro level planning was implemented. This also implies that they had high expectations regarding the efficacy of the process though the planning phase was not efficiently carried out to their dismay. However, the high percentage of People's Representatives having high perception could be due to their enthusiasm in involving the planning process, as representatives of people. Micro level planning provides them with the gratification of involving in the formulation of development interventions in the locality.

On analyzing the second dimension of efficacy, *viz.* 'participation', it was found that majority of the Extension Personnel (77 %) and People's Representatives (62 %) had medium level of perception. Eight per cent of Extension Personnel and 14 per cent of People's Representatives had high perception on participation. This again could be explained in terms of the fact that participation of people in micro level planning had been coming down over a period of time. The initial enthusiasm of people in involving with decentralized planning might have subsided considerably due to various reasons. This reiterates the observation made by the Oommen Committee Report (2009) and several other authors who have reported that participation of people has been low in decentralization process.

In the case of implementation, more than half of Extension Personnel (56 %) and People's Representatives (59 %) had medium level of perception. About one fourth of Extension Personnel (29 %) and People's Representatives (24 %) had high level of perception on implementation. The higher percentage of 'high' level perception clearly indicates that the implementation of micro level plans was perceived positively by the major stakeholders. As they were responsible for achieving the physical and financial targets, they must have been seriously trying to implement the projects effectively.

On analyzing the perception on the 'impact' of micro level planning, it was found that more than three fourth of Extension Personnel (77 %) and People's Representatives (77 %) had medium level of perception. Only nine per cent of Extension Personnel had high perception on the impact of micro level planning. Another interesting observation was that none of the People's Representatives had high level of perception on the impact of micro level planning. This could

be an indication that both groups *viz.* Extension Personnel and People's Representatives were not satisfied with the impact or outcome of most of the projects. They might have been ambitious about the impact of projects implemented through micro level planning process. As evident from field experience, it could be mostly because of the fact that impact assessment is rarely attempted in current micro level planning. Though there were monitoring committees to find out whether the course of implementation has proceeded as per the initial planning, they had not looked into the overall impact of the project quantitatively. This important observation points to the need of strengthening 'impact assessment' in micro level planning underway in Kerala.

4.8.1. Perceptions on different dimensions of efficacy of micro level planning

The perception of stakeholders on different dimensions of efficacy of micro level planning was examined to find out which dimension among the four had been ranked high and to understand the relevance of each dimension. It would also indicate the type of information required and the varying degrees in which information could be provided to each stage of micro level planning (Table 33).

Table 33. Comparison of different dimensions of efficacy of micro level planning

(N=66)

Sl.No.	Dimensions	Extension Personnel		People's Representatives	
		Mean score	Rank	Mean score	Rank
1	Planning	**21.82**	I	17.85	II
2	Participation	20.67	III	**21.45**	**I**
3	Implementation	21.56	II	16.03	IV
4	Impact	20.45	IV	17.47	III

The scores obtained by the stakeholders on different dimensions of efficacy of micro level planning were ranked to understand the relative importance of each dimension. From Table 33, it is seen that while 'planning' had been perceived as most important by Extension Personnel, 'participation' had been perceived as the most important dimension by People's Representatives. Like wise, while 'implementation' had been perceived as the second most important dimension by Extension Personnel, 'participation' appeared next to that. People's Representatives perceived 'planning' as the second most important dimension followed by 'impact'. Extension Personnel have given least importance to 'impact' whereas People's Representatives perceived 'implementation' as least important. These responses are quite reflective of the general attitude

of the stakeholders. While the officers emphasise on 'planning' and 'implementation', which formed their primary responsibilities, People's Representatives attributed importance to participation of people and planning projects, which they were partially accounted for. This finding reiterates similar observation made by Alex (1999) in his studies on development perception of People's Representatives in people's campaign.

Planning is mostly done by the officers of the Department of Agriculture, as they are responsible for implementing these projects. Moreover, on enquiry it was revealed that the planning process has turned out to be an activity solely undertaken by Extension Personnel as others are not creatively involved in the process. The process showed signs of routine nature and some kind of degeneration has set in over the years.

The perception of stakeholders on efficacy of the present system of micro level planning was further explored to find out whether there is any significant difference between Extension Personnel and People's Representatives on perceiving the efficacy of micro level planning.

Table 34. Difference in perception of Extension Personnel and People's Representatives on efficacy of micro level planning

Sl.No.	Dimensions	Category	Mean rank	Mann-Whitney U statistic	Z value
1	**Efficacy of micro level planning**	**Extension Personnel** **People's Representatives**	**84.95** **48.05**	**960**	**5.549****
2	Planning	Extension Personnel People's Representatives	87.85 45.15	769	6.462**
3	Participation	Extension Personnel People's Representatives	63.14 69.86	1956	1.018 NS
4	Implementation	Extension Personnel People's Representatives	88.20 44.80	746	6.548**
5	Impact	Extension Personnel People's Representatives	76.19 56.81	1538	3.009**

**significant at 1% level

The difference between Extension Personnel and People's Representatives in perceiving the different dimensions of 'efficacy' of micro level planning was assessed using Mann-Whitney U test. The test statistic was found to be highly significant implying that the perception varied widely between these two groups (Table 34).

As seen from table, the mean rank scores indicated more positive recognition of the process of micro level planning by the officers of the Department of Agriculture compared to

People's Representatives. People's Representatives had only less mean rank compared to Extension Personnel, which shows higher scores on perception obtained by the latter on efficacy of that component.

Similarly 'planning' was found to have been perceived differently by both the groups. The fact that planning process was not that efficient was also evident from the comparatively low mean rank values obtained by People's Representatives. This shows that these two categories approach 'planning' in significantly different ways. Perception on 'participation' also did not appear to be significantly different. However, perception on 'implementation' showed significant difference at one per cent level of significance. Similarly Extension Personnel and People's Representatives were found to differ significantly at one per cent level of significance in the case of 'impact', of micro level planning.

4.8.2. Relative importance of different dimensions of efficacy of MLP

Perception scores of respondents also revealed that there was significant difference in the importance attached to various dimensions of efficacy of micro level planning. Micro level planning being a fairly complex process which involves planning, participation of stakeholders, implementation and impact, there could be considerable differences in the importance attached to various dimensions of the process. This difference shall help us design the strategies to improve the process by intervening at specific points.

Table 35. Relative importance of the dimensions of efficacy of MLP as perceived by Extension Personnel **(N=66)**

Sl.No.	Dimension	Mean rank	Kendall's W
1	Planning	2.86^{a}	0.096**
2	Participation	2.39^{b}	
3	Implementation	2.71^{ab}	
4	Impact	2.03^{c}	

** significant at l% level

Kendall's W test was employed to assess the relative differences in the perception of Extension Personnel (Table 35). The assumptions were drawn by comparing the mean scores which include four dimensions *viz.* planning, participation, implementation and impact. The Kendall's W was found to be significant showing that Extension Personnel had a greater degree of unanimity among the various responses regarding the importance of four dimensions.

However, the maximum score was about 'planning', and the perception on 'implementation' was almost on par with that of 'planning'. Perception on 'participation' was found to be in the third place followed by perception on 'impact'.

Elaborating the discussions done earlier, it can be further stated that perception on the efficacy of planning was found to be greater than other dimensions, as this could be directly attributed to the efficient system of planning that have been established in the state. There is a set procedure, which has to be essentially followed to draw up local level plans. Similarly, the observation that, there was no difference between planning and implementation; and participation and implementation point to the fact that all these processes were well organized. Of all the four dimensions, planning and implementation were ranked first and second respectively as these two processes were well defined and were regularly carried out. Participation, a dimension which is very important ranked only third, as participation of people and other stakeholders had substantially reduced over a period of time as understood from the direct responses of different stakeholders. 'Impact' ranked the least, as no attempt had been usually made to assess the impact of development programmes formulated as part of decentralized planning.

Table 36. Relative importance of the dimensions of efficacy of MLP as perceived by People's Representatives (N=66)

Sl.No.	Dimension	Mean rank	Kendall's W
1	Planning	2.59^{b}	0.708**
2	Participation	3.36^{a}	
3	Implementation	1.81^{c}	
4	Impact	2.23^{b}	

** significant at l% level

Kendall's W test was also employed to assess the relative differences in the perception of People's Representatives as regards the four dimensions *viz.* planning, participation, implementation and impact of efficacy (Table 36). The Kendall's W was found to be significant showing that People's Representatives had a greater degree of unanimity among the various responses regarding the importance of four dimensions.

In contrast to the pattern observed in the case of Extension Personnel, the perception was the highest with regard to 'participation', followed by 'planning'. The perception regarding 'impact' was on par with that of 'planning'. The lowest level of perception was regarding

'implementation'. People's Representatives perceived 'participation' as the most important because of the greater roles they played in ensuring participation of people in all stages of project formulation and implementation. For instance, it is the responsibility of the People's Representatives to convene Grama Sabhas and preside working groups and monitoring committees. These roles would make them more conscious about participation, which is reflected in this trend.

4.9. Perception on efficacy of legacy databases

Legacy databases and registers can be used for decision making on matters regarding micro level planning. However, the rigour with which information and data are used for planning has reduced considerably in course of time. When micro level planning was initiated in the present structure, there had been intense consultation and reference of databases for preparing status papers and other documents. It is known that these legacy databases had been used, though in limited manner, in formulating the base documents for initiating decentralized planning (Issac and Franke, 2002). Efficacy of databases had been defined as the efficiency of available databases in meeting the information or data requirement for formulating, implementing and monitoring micro level development programmes in agriculture.

The requirement of data for planning micro level projects was overlooked as the process became routine and bureaucratic over a period of time. While exploring the pattern of use of databases in the process of micro level planning, it was revealed that databases available with the offices, particularly Grama panchayats and Krishi Bhavans were hardly put to use due to various reasons. In order to find out the perception of respondents on efficacy of legacy databases in meeting the information requirement of micro level planning, four dimensions of efficacy were identified in consultation with judges drawn from selected respondents and scientists who had familiarity with databases.

Completeness, adequacy, reliability and updatability were the dimensions that have been found to be important in defining the efficacy of legacy databases. Respondents have perceived these dimensions with distinct differentiation. Total efficacy of databases was calculated by summing up the scores of dimensions mentioned above. See Table 37 for the scores on different dimensions.

Table 37. Perception of stakeholders on efficacy of legacy databases

(N=66)

Sl.No.	Dimensions	Category	Extension Personnel	People's Representatives
1	**Over all perception on efficacy of legacy databases**	**Low** **Medium** **High**	**9 (14)** **51 (77)** **6 (9)**	**11 (17)** **46 (70)** **9 (13)**
2	Completeness	Low Medium High	15(23) 42 (63) 9 (14)	9 (14) 39 (59) 18 (27)
3	Adequacy	Low Medium High	11(17) 44(66) 11 (17)	12 (18) 47 (71) 7 (11)
4	Reliability	Low Medium High	11 (17) 43 (65) 12 (18)	9 (13) 46 (70) 11 (17)
5	Updatability	Low Medium High	9 (14) 44 (67) 13 (19)	11 (17) 41 (62) 14 (21)

Figures in parenthesis represent percentages

It was found that majority of Extension Personnel (77 %) and People's Representatives (70 %) had medium perception on efficacy of legacy databases. Only a small proportion of Extension Personnel (9 %) and People's Representatives (13 %) regarded the databases to have high efficacy.

'Completeness', the dimension of the 'efficacy of legacy databases' was perceived as 'complete', by the respondents in varying degrees. While more than half of the Extension Personnel (63 %) and People's Representatives (59 %) had medium perception on 'completeness' of these databases, more than one fourth of People's Representatives (27 %) had high level of perception on this attribute. Only 14 per cent of Extension Personnel perceived the databases to be complete at a higher level.

With regard to adequacy, majority of Extension Personnel (66 %) and People's Representatives (71 %) perceived the databases to be only 'moderately adequate' to meet the information and data requirement. About 17 per cent of Extension Personnel and 11 per cent of People's Representatives perceived the legacy databases to be adequate enough to meet the database and information requirements.

Perception of respondents on reliability of legacy databases also showed varying responses. While about two third of Extension Personnel (65 %) and 70 per cent of peoples' representatives perceived the legacy databases to be moderately reliable, 18 per cent of Extension Personnel and 17 per cent of People's Representatives regarded legacy databases to be highly reliable.

Another dimension *viz.* updatability of legacy databases was also perceived differently by stakeholders. Comparing the previous observations, updatability also showed a similar trend. While about 67 per cent of Extension Personnel and 62 per cent of People's Representatives regarded legacy databases to be moderately updatable, 19 per cent of Extension Personnel and 21 per cent of People's Representatives regarded the legacy databases to be highly updatable.

The overall responses showed that legacy databases were perceived to have only low efficacy by 14 per cent to 17 per cent of Extension Personnel and People's Representatives. Majority of respondents (77 per cent Extension Personnel and 70 per cent People's Representatives) regarded the databases to have moderate efficacy and only nine per cent and 13 per cent of Extension Personnel and People's Representatives perceived the efficacy of legacy databases to be high. It is clear that the differences in the nature of duties performed by the respondents might have contributed to the differences in the perception of respondents regarding efficacy of legacy databases.

The registers that might have been put to use for meeting data/ information requirement are different in different contexts. Each register would serve a specific function, and a single register would not be able to meet the entire information requirement for plan formulation. Multiple registers will have to be used in ideal situations where plan formulation is done with support of relevant information or data. It is neither necessary that every respondent is well versed with information intensive planning procedures, nor they would have attempted any such initiatives. These subjective considerations might have influenced their responses and thereby the measure of their perception on efficacy of legacy databases. Moreover, there were no structured norms by which legacy registers are maintained and used. This implies that use of databases/ information is neither mandatory nor a compulsory pre requisite to formulate a micro level plan. At the same time data and information are used in the process as warranted by a situation.

4.9.1. Perception on different dimensions of efficacy of legacy databases

Perception of stakeholders involved in micro level planning on various dimensions of efficacy of legacy databases was further analysed to find out which component was perceived to be more useful (Table 38).

Table 38. Comparison of different dimensions of efficacy of legacy databases

(N=66)

Sl.No.	Dimensions	Extension Personnel		People's Representatives	
		Mean score	Rank	Mean score	Rank
1	Completeness	10.61	IV	11.38	IV
2	Adequacy	24.80	II	18.65	II
3	Reliability	**65.44**	**I**	**30.03**	**I**
4	Updatability	14.77	III	15.88	III

Both category of respondents *viz.* Extension Personnel and People's Representatives were found to have obtained high scores on 'reliability'. Extension Personnel and People's Representatives had perceived the other three dimensions also similarly. Both the categories had perceived that legacy databases were adequate in meeting the data/ information requirements. Updatability of legacy databases was found to be in the second position by both categories of respondents. However 'completeness' was not regarded as an important attribute of legacy databases in common by either of the two categories of respondents as databases and registers were not complete in any respect.

Further analysis of the difference in perception of Extension Personnel and People's Representatives on efficacy of legacy databases revealed that there was no significant difference in the perception of Extension Personnel and People's Representatives on the overall efficacy of legacy databases (Table 39).

Table 39. Difference in the perception of Extension Personnel and People's Representatives on different dimensions of efficacy of legacy databases (N=66)

Sl.No.	Dimensions	Category	Mean rank	Mann-Whitney U statistic	Z value
1	**Efficacy of legacy databases**	**Extension Personnel** **People's Representatives**	**61.27** **71.73**	**1833**	**1.573 NS**
2	Completeness	Extension Personnel People's Representatives	63.77 69.23	1997.5	0.832 NS
3	Adequacy	Extension Personnel People's Representatives	88.14 44.86	750	6.527**
4	Reliability	Extension Personnel People's Representatives	99.50 33.50	567	9.921**
5	Updatability	Extension Personnel People's Representatives	61.17 71.83	1826.5	1.616 NS

However, as evident from Table 39, perception of Extension Personnel and People's Representatives on different dimensions of efficacy of legacy databases showed distinct differences with regard to two dimensions *viz.* 'adequacy' and 'reliability'. The difference was significant at one per cent level of significance. However, no difference was observed in the perception on dimensions like 'completeness' and 'updatability' of legacy databases. These results reiterate the fact that adequacy and reliability of legacy databases were perceived differently.

While Extension Personnel showed greater confidence on adequacy of existing databases, People's Representatives did not exude much confidence on the status of legacy databases. Similarly Extension Personnel relied on the reliability of legacy databases much more than People's Representatives. This could be a direct outcome of the fact that Extension Personnel were directly involved in the process of micro level planning than People's Representatives, who were involved only in consultative capacity.

Both the categories held similar perception on 'completeness' and 'updatability', since such legacy databases had never been complete, in any respect. Data gaps are common in these legacy databases. Synthesizing useful information from the traditional databases and registers is a difficult task, as the existing databases are unevenly structured, without a common purpose, which render them more unusable.

4.9.2. Relative importance of different dimensions of efficacy of legacy databases

The relative differences in the perception of Extension Personnel about the four dimensions *viz.* completeness, adequacy, reliability and updatability were assessed in detail. The Kendall's W was found to be highly significant showing that Extension Personnel had a greater degree of unanimity among the various responses regarding the relative importance of four dimensions (see Table 40).

Table 40. Relative importance of the dimensions of efficacy of legacy databases as perceived by Extension Personnel (N=66)

Sl.No.	Dimension	Mean rank	Kendall's W
1	Completeness	1.12[d]	0.932**
2	Adequacy	2.94[b]	
3	Reliability	4.00[a]	
4	Updatability	1.94[c]	

** significant at 1% level

However the mean rank scores showed that maximum perception was on the dimension of 'reliability', and the next level of perception was regarding 'adequacy'. This was followed by perception on 'updatabiliy', and the least with respect to 'completeness'. These results showed that legacy databases as a source of information in planning was not commonly used by Extension Personnel and the databases were not relied on for any planning purpose.

Extension Personnel perceived reliability as the most important dimension shows the nature of data requirement for this category. They would like to get access to reliable data, to fix the objectives of development projects. Inferences on the enquiry on adequacy of data were also an indication of the fact that currently adequate data support is not available for the Extension Personnel in formulating micro level projects.

The scores of People's Representatives on perception were further analysed to understand the agreement of scores of different dimensions among the respondents (Table 41).

Table 41. Relative importance of the dimensions of efficacy of legacy databases as perceived by People's Representatives (N=66)

Sl.No.	Dimension	Mean rank	Kendall's W
1	Completeness	1.18[d]	0.850**
2	Adequacy	2.71[b]	
3	Reliability	4.00[a]	
4	Updatability	2.11[c]	

** significant at 1% level

Kendall's W test was employed to assess the relative differences in the perception of People's Representatives regarding the four dimensions *viz.* completeness, adequacy, reliability and updatability. The Kendall's W was found to be significant showing that People's Representatives had a greater degree of unanimity among the various responses regarding the relative importance of four dimensions.

However, the highest mean rank was about 'reliability', which was followed by 'adequacy'. 'Updatability' was found to be at the third level and 'completeness' was ranked the lowest. These results are absolutely in line with the trends observed in the case of Extension Personnel.

4.10. Integrated Information System for Micro Level Planning in Agriculture

The varying degrees of perception on legacy databases lead us to think about a scenario wherein all necessary information/ data required for micro level planning are provided by an integrated information system. Though this is a new proposition, the study attempted to find out how the respondents would react to a proposal to create an integrated information system, which has all the attributes described earlier.

The tool to measure the perception of stakeholders on an 'Integrated Information System for Micro Level Planning' included statements that reflected the components and utility of an integrated information system, which was proposed based on the information requirement for micro level projects. As mentioned in the methodology, the statements reflected the essential components of an integrated information system that would provide adequate information to all the stake holders in micro level planning in agriculture.

Distribution of respondents based on the scores of different dimensions of perception on an 'Integrated Information System' is given in Table 42.

Table 42. Perception of stakeholders on 'Integrated Information System for Micro Level Planning in Agriculture'

(N=66)

Sl.No.	Dimensions	Category	Extension Personnel	People's Representatives
1	**Overall perception on Integrated Informtion System for Micro Level Planning**	**Low** **Medium** **High**	**15 (23)** **40 (60)** **11 (17)**	**13 (20)** **40 (60)** **13 (20)**
2	Comprehensiveness	Low Medium High	9 (14) 45 (68) 12 (18)	13 (20) 42 (63) 11 (17)
3	Usability	Low Medium High	11 (17) 42 (63) 13 (20)	17 (26) 33 (50) 16 (24)
4	Updatability	Low Medium High	13 (20) 41 (62) 12 (18)	18 (27) 35 (53) 13 (20)
5	Spatial and temporal orientation	Low Medium High	14 (21) 44 (67) 8 (12)	13 (20) 45 (68) 8 (12)

Analysis of the perception of stakeholders on an 'Integrated Information System for Micro Level Planning in Agriculture', showed that 60 per cent of Extension Personnel and People's Representatives had medium scores, while a minor percentage of Extension Personnel (17 %) and People's Representatives (20 %) were found to perceive high about the proposed integrated information system.

The four dimensions were analysed further to understand the perception of stakeholders on the general attributes of a possible integrated information system for micro level planning in agriculture. 'Comprehensiveness' of integrated information system, was perceived only moderately by 68 per cent of Extension Personnel and 63 per cent of People's Representatives. However, about 18 per cent of Extension Personnel and 17 per cent of People's Representatives were found to have high scores on 'comprehensiveness' of a possible integrated information system, which implies that the proposed integrated information system should cover all relevant and related aspects of micro level planning in agriculture and should cater to the requirement of every stakeholder.

Another dimension of integrated information system *viz.* usability was found to be perceived moderately by 63 per cent of Extension Personnel compared to 50 per cent of People's Representatives. However, 24 per cent of People's Representatives and 20 per cent of Extension Personnel had high scores indicating that this concept had evoked high expectation among these categories. Usability might have been perceived only vaguely as the concept could not be perceived by physically experiencing the attributes and advantages of the system.

On analyzing the updatability of integrated information system, it was observed that 62 per cent of Extension Personnel and 53 per cent of People's Representatives had medium perception on this dimension. However, about 18 per cent of Extension Personnel and 20 per cent of People's Representatives were found to have high perception on 'updatability' of integrated information system, which implies that the availability of up-to-date data becomes an important dimension aspired by the respondents.

Spatial and temporal orientation of the proposed integrated information system was explained in terms of the importance of availing data relevant to a particular place and over a

period of time. Spatial and temporal orientation was further analysed to find out the trends in perception of respondents.

It was reported that about 67 per cent of Extension Personnel and 68 per cent of People's Representatives had medium level of perception on spatial and temporal orientation of integrated information system whereas 12 per cent of both the categories of respondents had high perception on spatial and temporal orientation of an integrated information system.

4.10.1. Perception on different dimensions of an 'Integrated Information System for Micro Level Planning in agriculture'

The perception of stakeholders on different dimensions of an 'integrated information system' was examined to find out the relative relevance of each dimension. It would also indicate the most desired attribute of an integrated information system for planning agricultural development (see Table 43 for details).

Table 43. Comparison of different dimensions of an 'Integrated Information System for Micro Level Planning in Agriculture'

(N=66)

Sl.No.	Dimensions	Extension Personnel		People's Representatives	
		Mean score	Rank	Mean score	Rank
1	Comprehensiveness	20.97	II	22.59	II
2	Usability	**24.05**	**I**	**25.59**	**I**
3	Updatability	15.95	IV	15.39	IV
4	Spatial and temporal orientation	19.83	III	20.81	III

Further analysis of the perception of the two stakeholders on the proposed integrated information system in agriculture revealed that for Extension Personnel and People's Representatives, 'usability' was the most coveted attribute followed by 'comprehensiveness'. They considered 'spatial and temporal orientation' of an integrated information system to be important next to 'comprehensiveness'.

'Updatability' of the databases was found to be the least important among the four dimensions. It is interesting to note that the pattern of perception by the People's Representatives

had also been the same as that of Extension Personnel, as evident from the rank scores provided in Table 43.

Difference in perception of Extension Personnel and People's Representatives on integrated information system in agriculture appeared to be important, considering the future design of the functionalities of the proposed integrated information system. This difference was assessed by employing Mann-Whitney U test, the results of which are given below (Table 44).

Table 44. Difference in the perception of Extension Personnel and People's Representatives on an 'Integrated Information System for Micro Level Planning in Agriculture'

Sl.No.	Dimensions	Category	Mean rank	Mann-Whitney U statistic	Z value
1	**Specifications of integrated information system**	**Extension Personnel People's Representatives**	**61.54 71.46**	**1850.5**	**1.493 NS**
2	Comprehensiveness	Extension Personnel People's Representatives	56.32 76.68	1506	3.134**
3	Usability	Extension Personnel People's Representatives	59.60 73.40	1722	2.094**
4	Updatability	Extension Personnel People's Representatives	69.28 63.72	1994	0.844 NS
5	Spatial and temporal orientation	Extension Personnel People's Representatives	66.29 66.71	2164	0.064 NS

Reiterating the observations made above, results of Mann-Whitney U test did not show any significant difference in the perception of Extension Personnel and People's Representatives on the specifications of an integrated information system in agriculture. However, their perception was significantly different with respect to the dimensions *viz.* 'comprehensiveness' and 'usability', at one per cent level of significance.

It was also found that Extension Personnel and People's Representatives had similar perception on the dimensions 'updatability' and 'spatial and temporal orientation'. These results might have been influenced by their understanding of the purpose of micro level planning and the constraints in conceiving the idea of an integrated information system for micro level planning.

'Comprehensiveness' was perceived to be an important dimension by Extension Personnel as they were in need of a wide variety of data/ information while formulating local

level plans. Multitude of related aspects of agriculture has to be addressed while planning. This calls for inclusion of multiple aspects of agriculture, which would include every cultural practice from seed to seed, as well as related issues such as maturity, value addition etc. Any information system that does not comprehensively address the information requirement would not be of much use to the Extension Personnel. Similarly usability also is an important aspect, which would determine the ease of use and accessibility. Extension Personnel being more instrumental in micro level planning might require information more comprehensively than People's Representatives, who have only lesser roles. This would possibly be the reason why these two dimensions had been differently perceived by these two categories.

4.10.2. Relative importance of different dimensions of an Integrated Information System for Micro Level Planning in Agriculture

Further analysis was carried out to find whether the different dimensions of an integrated information system were perceived with equal importance or not by the two categories of stakeholders (see Table 45 for details).

Table 45. Relative importance of the dimensions of an 'Integrated Information System for Micro Level Planning in Agriculture' as perceived by Extension Personnel

(N=66)

Sl.No.	Dimension	Mean rank	Kendall's W
1	Comprehensiveness	2.78[b]	0.764**
2	Usability	3.75[a]	
3	Updatability	1.09[d]	
4	Spatial and temporal orientation	2.38[c]	

Perception of Extension Personnel as regards the four dimensions *viz,* comprehensiveness, usability, updatability and spatial and temporal orientation, were assessed by Kendall's W, which showed that Extension Personnel had a greater degree of unanimity among the various responses regarding the relative importance of four dimensions. However, while considering the mean rank scores, the dimension of 'usability' was perceived to be of more importance, followed by 'comprehensiveness'. Spatial and temporal orientation was ranked after this and 'updatability' scored the lowest rank.

Similarly, the relative differences in the perception of People's Representatives regarding the four dimensions were also assessed by using Kendall's W. The test statistic was found to be

significant showing that People's Representatives had the same set of perception levels with regard to these four dimensions (see Table 46 for details).

Table 46. Relative importance of the dimensions of an 'Integrated Information System for Micro Level Planning in Agriculture' as perceived by People's Representatives

(N=66)

Sl.No.	Dimension	Mean rank	Kendall's W
1	Comprehensiveness	2.95[b]	0.943**
2	Usability	3.93[a]	
3	Updatability	1.02[d]	
4	Spatial and temporal orientation	2.11[c]	

Among the four dimensions, People's Representatives perceived 'usability' as the most important of all the other dimensions. It was followed by 'comprehensiveness', 'spatial and temporal orientation' and 'updatability' in the decreasing order of importance. These results clearly showed the preference of attributes of an integrated information system for micro level planning, which shall be highly useful in designing the functionalities of an integrated information system.

4.11. Awareness of stakeholders on rural databases and information systems

As understood from review of literature and field observations, large number of indigenous databases and information systems are available in various government offices. But how far it is known to the public is a question of importance, about which notable information is not available.

Table 47. Awareness of stakeholders on rural databases and information systems

(N=66)

Sl.No.	Category	Extension Personnel	People's Representatives
1	Low	12 (18)	8 (12)
2	Medium	49 (74)	49 (74)
3	High	5 (8)	9 (14)

Figures in parenthesis represent percentages

Analysis of the awareness of stakeholders on rural databases and information systems (Table 47) showed that about 18 per cent of Extension Personnel and 12 per cent of People's Representatives had low awareness on rural databases. About three fourth of the Extension Personnel (74 %) and People's Representatives (74 %) had only medium level of awareness

about existing rural databases and information systems. However, notably higher percentage of People's Representatives (14 %) had held high awareness on indigenous databases compared to Extension Personnel (8 %).

This distribution is possibly because of the fact that use of databases in the planning phase of development programmes at micro level is not common. In fact, such readily usable databases are not available at the offices at Grama Panchayats or other local bodies. Obtaining specific information for planning at the micro level is not a mandatory practice. While formulating programmes, the officials try to get information from differential sources. However, use of structured databases for drawing inference on the status of a given situation is done only rarely.

The concept of a development 'database' is also not usually known to the stakeholders due to lack of awareness and training.

4.11.1. Comparison of stakeholders on awareness of rural databases

The differences in the awareness of Extension Personnel and People's Representatives on rural databases were analysed using Mann-Whitney U statistic (see Table 48).

Table 48. Comparison of stakeholders on awareness of rural databases

Dimension	Category	Mean rank	Mann-Whitney U statistic	Z value
Awareness of rural databases	Extension Personnel People's Representatives	65.70 67.30	2125	0.242 NS

It was found that there was no significant difference between the two groups with respect to their awareness of rural databases. The results support the earlier observation that use of databases for planning at the micro level is not a usual practice. It also substantiates the distribution of stakeholders based on awareness. This observation also points towards the need to enhance the awareness of both the stakeholders in order to make micro level planning an information supported activity.

4.12. Correlation between age and dependent variables

The dependent variables of the study *viz.* 'perception on efficacy of micro level planning', 'perception on efficacy of legacy databases', 'perception on Integrated Information System' and 'awareness of rural databases' were correlated with the age of Extension Personnel and People's Representatives (see Table 49 for results).

Table 49. Correlation between age and dependent variables (Spearman's rho)

Sl. No.	Independent variable	Dependent variables	Category	Correlation Co-efficient
1	Age	Perception on efficacy of micro level planning	Extension Personnel	0.012 NS
			People's Representatives	0.088 NS
2		Perception on efficacy of legacy databases	Extension Personnel	0.000NS
			People's Representatives	0.063 NS
3		Perception on Integrated Information System	Extension Personnel	0.051 NS
			People's Representatives	0.266*
4		Awareness on rural databases	Extension Personnel	0.124 NS
			People's Representatives	0.037 NS

*significant at 1% level

As seen from table, there was no correlation between 'age' of Extension Personnel and 'perception on efficacy of micro level planning', 'perception on efficacy of rural databases', 'perception on Integrated Information System' and 'awareness on rural databases'.

However, significant correlation between 'age' and perception on 'integrated information system' at 5 per cent level of significance was found in the case of People's Representatives. The correlation coefficient of 'age' of People's Representatives with 'perception on efficacy of micro level planning', 'perception on efficacy of rural databases' and 'awareness on rural databases' showed non significant values. The significant correlation between 'age' and 'perception on Integrated Information System' could be due to the exposure to the planning process for a long period of time.

4.13. Correlation between experience and dependent variables

The correlation between experience of respondents and dependent variables of the study showed that there was no significant correlation between experience of respondents and dependent variables of the study (see Table 50).

Table 50. Correlation between experience and dependent variables (Spearman's rho)

Sl. No.	Independent variable	Dependent variables	Category	Correlation Co-efficient
1	Experience	Perception on efficacy of micro level planning	Extension Personnel	-0.049 NS
			People's Representatives	-0.034 NS
2		Perception on efficacy of legacy databases	Extension Personnel	0.072 NS
			People's Representatives	0.027 NS
3		Perception on integrated information system	Extension Personnel	0.096 NS
			People's Representatives	-0.199 NS
4		Awareness on rural databases	Extension Personnel	-0.128 NS
			People's Representatives	-0.029 NS

The above results might be due to the low level of awareness on rural databases among the different stakeholders. The awareness and perception have not increased significantly with experience probably because databases are not usually utilised by any category in the micro level planning process.

4.14. Expectation of stakeholders on the prospects of employing development databases in micro level planning

As explained earlier in section 3.3.5, expectation on the prospects of employing development databases was found out by asking the respondents to judge the importance of each category of data/ information across a three point continuum viz. 'very important', 'important' and 'not important'. The information items were categorized into 16 based on logical sequence and incorporating the suggestions of experts in the field of Agricultural Extension and Department of Agriculture.

The major categories identified under natural resources were land, water, soil and climate. The other categories were demographic characteristics, socio-economic characteristics, crops, technology, details of infrastructure, mechanization, institutions, market, government policies, government programmes for agricultural development, project monitoring and existing perspective plans. In each category, there were sub-categories which contain a number of

information items and their possible sources. The inventory of information items under each category is given in Table 51 to 54.

Table 51. Inventory of information on natural resources

Sl.No.	Major category of information	Items	Source of information at the micro level
1.1	**Land**		
1.1.1		Physiographical conditions	Soil Survey Department
1.2		Elevation	Soil Survey Department
1.3		Topography	Soil Survey Department
1.4		Land forms	Soil Survey Department
1.5		Land capability classification	Soil Survey Department
1.6		Land irrigability classification	Soil Survey Department
1.7		Crop suitability classification	Soil Survey Department
1.8		Hydrologic soil grouping	Soil Survey Department
1.2	**Land utilization pattern**		
1.2.1		Cropped land –location	Land Use Board
1.2.2		Area	Land Use Board
1.2.3		Fallow land – location	Land Use Board
1.2.4		Area	Land Use Board
1.2.5		Homestead – location	Land Use Board
1.2.6		Area	Land Use Board
1.2.7		Plantation – location	Land Use Board
1.2.8		Area	Land Use Board
1.2.9		Forest area – location	Land Use Board
1.2.10		Area	Land Use Board
1.2.11		Wasteland – location	Land Use Board
1.2.12		Area	Land Use Board
1.2.13		Residential area – location	Land Use Board
1.2.14		Area	Land Use Board
1.3	**Land use**		
1.3.1		Area under crops	Krishi Bhavan
1.3.2		Rice- virippu	Krishi Bhavan
1.3.3		Rice- mundakan	Krishi Bhavan
1.3.4		Rice-puncha	Krishi Bhavan
1.3.5		Reclaimed paddy land for nirmithi pradhesham	Krishi Bhavan
1.3.6		Reclaimed paddy land for different crops	Krishi Bhavan
1.3.7		Area under different crops	Krishi Bhavan
1.3.8		Mixed crops	Krishi Bhavan
1.3.9		Area under social forestry	Krishi Bhavan
1.3.10		Fallow land suitable for cultivation	Krishi Bhavan
1.3.11		Fallow land	Krishi Bhavan
1.3.12		Kole lands	Krishi Bhavan
1.3.13		Marshy lands	Krishi Bhavan

Sl.No.	Major category of information	Items	Source of information at the micro level
1.3.14		Forest and sacred groves	Krishi Bhavan
1.3.15		Pasture land	Krishi Bhavan
1.3.16		Area of watershed	Soil Survey Department
1.3.17		Features of watershed	Soil Survey Department
1.3.18		Maps of watershed	Soil Survey Department
1.3.19		Unauthorized encroachment	Soil Survey Department
1.3.20		Cadastral information	Land use board
1.3.21		Survey number of plots	Village office
1.3.22		Details of households	Village office
1.3.23		Land use pattern (transition)	Village office
1.4	**Mining**		
1.4.1		Rocky area	Grama Panchayat, Land use board
1.4.2		Rock mine- (Karingallu)	Grama Panchayat, Land use board
1.4.3		Rock mine- laterite	Grama Panchayat, Land use board
1.4.4		Clay mine	Grama Panchayat, Land use board
1.4.5		Sand mine	Grama Panchayat, Land use board
1.4.6		Abandoned mine	Grama Panchayat, Land use board
2	**Water**		
2.1		Details of rivers	Grama Panchayat, Soil Survey Department
2.2		Amount of water flow in rivers	Soil Survey Department
2.3		Seasonal availability of water	Soil Survey Department
2.4		Catchment area	Soil Survey Department
2.5		Command area	Soil Survey Department
2.6		Ponds - number	Ground Water Department
2.7		Ponds - period of water availability	Ground Water Department
2.8		Wells - number	Ground Water Department
2.9		Wells - period of water availability	Ground Water Department
2.10		Open wells- number	Ground Water Department
2.11		Open wells - period of water availability	Ground Water Department
2.12		Filter point tube wells- number	Ground Water Department
2.13		Filter point tube wells - period of water availability	Ground Water Department
2.14		Height of water table	Ground Water Department
3	**Soil**		
3.1		Drainage channels in the locality	Soil Survey Department
3.2		Soil types	Soil Survey Department
3.3		Slope	Soil Survey Department
3.4		Erosion	Soil Survey Department
3.5		Soil depth	Soil Survey Department
3.6		Soil texture	Soil Survey Department
3.7		Soil fertility status	Soil Survey Department
4	**Climatological factors**		
4.1		Rainfall – intensity, spread	Indian Meteorological Department, KAU
4.2		Wind speed	Indian Meteorological Department, KAU
4.3		Wind direction	Indian Meteorological Department KAU

Sl.No.	Major category of information	Items	Source of information at the micro level
4.4		Relative humidity	Indian Meteorological Department KAU
4.5		Temperature – minimum, maximum	Indian Meteorological Department, KAU
4.6		Cloud	Indian Meteorological Department, KAU
4.7		Atmospheric pressure	Indian Meteorological Department, KAU
4.8		Solar radiation	Indian Meteorological Department, KAU

The information items on natural resources are more in number. The items of information which may be useful to micro level planning on demographic and socio economic aspects are given in Table 52.

Table 52. Inventory of information on demographic and socio-economic characteristics

Sl.No.	Major category of information	Items	Source of information at the micro level
5	**Demographic data**		
5.1		Men	Grama Panchayat
5.2		Women	Grama Panchayat
5.3		Children	Grama Panchayat
5.4		Handicapped	Grama Panchayat
5.5		Widow	Grama Panchayat
5.6		Senior citizen	Grama Panchayat
5.7		Skilled labourers	District Census Handbook
5.8		Semiskilled labourers	District Census Handbook
5.9		Unskilled labourers	District Census Handbook
5.10		Youth men	Grama Panchayat
5.11		Youth women	Grama Panchayat
6	**Socio- economic characteristics**		
6.1		Number of households	Grama Panchayat
6.2		Rural households	Grama Panchayat
6.3		Urban households	Grama Panchayat
6.4		SC/ST colonies- location	Grama Panchayat
6.5		Annual income of the family	Grama Panchayat
6.6		BPL/ APL families	Grama Panchayat
6.7		Occupational status of individuals	Grama Panchayat
6.8		Number of farm families- large, medium, small	Grama Panchayat
6.9		Number of farmers	Grama Panchayat
6.10		Number of farm labourers- men and women	District Census Handbook
6.11		MGNREGS beneficiaries	Grama Panchayat
6.12		Seasonal migration	Not available
6.13		Employment status	Grama Panchayat
6.14		No. of unemployed professionals	Employment exchange
6.15		No. of unemployed under graduates	Not available
6.16		No. of unemployed graduates	Not available

Sl.No.	Major category of information	Items	Source of information at the micro level
6.17		Number of government employees	Grama Panchayat
6.18		Other occupations	Grama Panchayat
6.19		People using ecosystem services	Not available
6.20		Personal details (age, sex, education, monthly income)	Grama Panchayat

Since the information requirement related to agriculture and agricultural development is the main focus of the study, information on crops, technology, infrastructure, mechanization, institutional details and market have been found to be important. The items pertaining to these components are given in the table given below (Table 53).

Table 53. Inventory of information on crop related aspects

Sl.No.	Major category of information	Items	Source of information
7(a)	Crops		
7.1.1		Irrigated area	Krishi Bhavan
7.1.2		Rainfed area	Krishi Bhavan
7.1.3		Area under each crop	Krishi Bhavan
7.1.4		Production of crops	Krishi Bhavan
7.1.5		Productivity of crops	Krishi Bhavan
7.1.6		Cropping systems	Krishi Bhavan
7.1.7		Area under single crop	Krishi Bhavan
7.1.8		Area under double crop	Krishi Bhavan
7.1.9		Area under triple crop	Krishi Bhavan
7.1.10		Area under traditional farming systems	Krishi Bhavan
7.1.11		Source of planting materials	Krishi Bhavan
7.1.12		Price/ unit of planting material	Krishi Bhavan
7.1.13		Diseases- incidence of diseases	Krishi Bhavan
7.1.14		Pests- incidence of pests	Krishi Bhavan
7.1.15		Fertilizers/ manures	Krishi Bhavan
7.1.16		Type of fertilizers required	Krishi Bhavan
7.1.17		Price of fertilizers	Krishi Bhavan
7.1.18		Plant protection chemicals (PPC)	Krishi Bhavan
7.1.19		Type of PPC required	Krishi Bhavan
7.1.20		Price of PPC	Krishi Bhavan
7.1.21		Processing- facilities/ extent of availability	Krishi Bhavan
7.1.22		Product diversification	Krishi Bhavan
7.1.23		Machines required	Krishi Bhavan
7.1.24		Agro machinery services	Krishi Bhavan, Grama Panchayat
7.1.25		Price of produce/ unit	Krishi Bhavan, Market Intelligence Bureau, Department of Agriculture Website
7.1.26		Details of Sericulture, Mushroom cultivation,Bee Keeping etc.	Not available

Sl.No.	Major category of information	Items	Source of information
7(b)	**Agrarian relations**		
7.2.1		Land distribution	Not available
7.2.2		Land reforms	Not available
7.2.3		Tenancy	Not available
7(c)	**Animal husbandy**	Number and breeds of cattle	Veterinary Department
7(d)	**Poultry**	Number and breeds of poultry	Veterinary Department
7(e)	**Fisheries**	Number and types of fish	Fisheries Department
8	**Technology**		
8.1		Package of practices	Kerala Agricultural University
8.2		New technologies	Kerala Agricultural University
8.3		Technology adoption status	Kerala Agricultural University
8.4		Technology gap	Kerala Agricultural University
8.5		Agencies that provide technological solutions	No specific source
8.6		Cost of technologies	No specific source
8.7		Providers of technology- R and D institutions	No specific source
8.8		Development agencies	GOK website
8.9		Programmes of development agencies	No specific source
8.10		Rural enterprises	Grama Panchayat
8.11		Revenue models of enterprises	Kerala Agricultural University
8.12		Agri-business models	Small Farmers Agri Business Consortium
8.13		Projectisation process	Kerala Institute of Local Administration, SPB
8.14		Cost of technologies	KAU, Dept. of Agriculture, Vegetables and Fruit Promotion Council of Keralam
9	**Details of Infrastructure**		
9.1		Canals	Grama Panchayat
9.2		Roads	Grama Panchayat
9.3		Schools	Grama Panchayat
9.4		Hospitals	Grama Panchayat
9.5		Primary Health Centres	Grama Panchayat
9.6		Private Hospitals	Grama Panchayat
9.7		Government Offices	Grama Panchayat
9.8		Type of houses	Grama Panchayat
9.9		Shops	Grama Panchayat
9.10		Village level computer centres/ Information Kiosks	Grama Panchayat
9.11		Internet access and facilities	Grama Panchayat
9.12		Telephone facilities- BSNL, Private Mobile Services	Grama Panchayat
9.13		Public transport facilities - routes	Grama Panchayat
9.14		Other vehicles –private cars, taxis, autorickshaws, bicycles, bullock cart, ambulances etc.	Grama Panchayat
9.15		Public distribution system	Grama Panchayat
9.16		Civil supplies outlets	Grama Panchayat
9.17		Godowns/ storage facilities for food grains	Grama Panchayat
9.18		Railway access	Grama Panchayat
9.19		Anganwadis	Grama Panchayat

Sl.No.	Major category of information	Items	Source of information
10	**Mechanization**		
10.1		Machines for land preparation-common, private	Krishi bhavan
10.2		Number of machines	Krishi Bhavan
10.3		Machines for planting	Krishi Bhavan
10.4		Machines for intercultural operations	Krishi Bhavan
10.5		Machines for harvest	Krishi Bhavan
10.6		Machines for processing	Krishi Bhavan
11	**Institutions**		
11.1		Institutions providing credit support	Grama Panchayat
11.2		Commercial banks	Grama Panchayat
11.3		Private banks	Grama Panchayat
11.4		Co-operative banks	Grama Panchayat
11.5		Agencies providing inputs	Grama Panchayat
11.6		Fertilizer depots	Grama Panchayat
11.7		PP Chemicals depots	Grama Panchayat
11.8		Source of organic fertilizers	Grama Panchayat
11.9		Source of organic plant protection chemicals	Grama Panchayat
11.10		Co-operative societies	Grama Panchayat
11.11		Extension institutions	Grama Panchayat
11.12		Producers' societies	Grama Panchayat
11.13		Rural organizations	Grama Panchayat
11.14		Funding agencies of watershed programmes	Grama Panchayat
11.15		NGOs	Grama Panchayat
11.16		Agencies supporting SHGs	Grama Panchayat
11.17		NHGs	Grama Panchayat
11.18		Private Agencies	Grama Panchayat
11.19		Institutions dealing with consultative services	Grama Panchayat
11.20		Institutions dealing with Social Security	Grama Panchayat
11.21		Institutions of beneficiary group	Grama Panchayat
12	**Market**		
12.1		Number of markets	Grama Panchayat
12.2		Type of markets	Grama Panchayat
12.3		Volume of markets	Not available
12.4		Commodities marketed	Not available
12.5		Market outlets	Grama Panchayat
12.6		Wholesale markets	Grama Panchayat, Krishi Bhavan, Vegetable and Fruit Promotion Council of Keralam
12.7		Procurement centres	Grama Panchayat

Apart from all these details, planning of agricultural development programmes for a locality requires some key information pertaining to government policies and programmes in agriculture. Details of project monitoring and existing perspective plans also should be considered while planning. The items coming under these categories are furnished in Table 54.

Table 54. Inventory of information on government policies and programmes

Sl.No.	Major category of information	Items	Source of information
13	**Government policies**		
13.1		On land use	Department of Agriculture
13.2		On land reclamation	Department of Agriculture
13.3		On subsidies	Department of Agriculture
13.4		On input supply	Department of Agriculture
13.5		On credit	Department of Agriculture
13.6		On marketing	Department of Agriculture
13.7		On export	Department of Agriculture
13.8		On import	Department of Agriculture
13.9		International agreements	WTO Cell, Department of Agriculture
13.10		WTO provisions	WTO Cell, Department of Agriculture
14	**Government programmes and schemes for agricultural development**		
14.1		Name of the scheme/ project	Department of Agriculture
14.2		Total allocation	Department of Agriculture
14.3		Sponsoring agency	Department of Agriculture
14.4		Implementing agency	Department of Agriculture
14.5		Scheme guidelines	Department of Agriculture
15	**Project monitoring**		
15.1		Number of projects – sector wise	Department of Agriculture
15.2		Outlay – year wise distribution	Department of Agriculture
15.3		Physical targets of previously implemented projects	Department of Agriculture
15.4		Financial targets of previously implemented projects	Department of Agriculture
16	**Existing Perspective Plans**		
16.1		Panchayat level development plan	Grama Panchayat
16.2		Master plan in agriculture	District Panchayat
16.3		Strategic Research Extension Plan –SREP	District Panchayat
16.4		Integrated District Development Plan in agriculture	District Panchayat

This exhaustive inventory was used to find out the information requirement of Extension Personnel and People's Representatives at various stages of micro level planning, described in section 4.15.

An analysis of the information items shows that different sources are providing the information for the proposed integrated information systems in agriculture. The source wise distribution of information is given in the Table 55 below.

Table 55. Information sources for the content on 'Integrated Information System for Micro Level Planning in Agriculture'

Sl. No.	Agencies providing information	Percentage of information
1	Grama Panchayat and District Panchayat	33
2	Department of Agriculture, Krishi Bhavan	28
3	Soil Survey Department	10
4	Land Use Board	9
5	Ground Water Department	4
6	Indian Meteorological Department	3
7	Kerala Agricultural University	5
8	Village Office	2
9	District Census Handbook	2
10	Other sources (Fisheries, Veterinary, Forest, Electricity Board, KILA, Market Intelligence Bureau etc.)	5
11	Data not readily available from any source	6

It is evident from the Table 55 that, 33 per cent of information was provided by Grama Panchayat and District Panchayat, followed by Department of Agriculture and Krishi Bhavan (28 %). Soil Survey Department contributes 10 per cent of the information items whereas Land Use Board provides nine per cent of the same.

The other contributing sources were Ground Water Department (4 %), Indian Meteorological Department (3 %), Kerala Agricultural University (5 %), Veterinary Department, Village Office, Fisheries Department, Forest Department etc. About six per cent of the data components/ information items were lacking specific source to provide correct information.

4.15. Overall information requirement of stakeholders in micro level planning

Exploring the information requirement and finding out the typology of information is important in initiating an integrated information system for agricultural planning. In view of this, an attempt was made to find out the type of information required by important stakeholders of micro level planning at various stages. This was made through an exhaustive listing of possible

information requirement elicited from various project reports belonging to different development micro sectors, as seen in the inventories furnished earlier.

The 16 types of information which were identified to be useful for micro level planning were further grouped into 14 sub headings. This included information items on land, water, soil, climate, demographic characteristics, socio-economic characteristics, crops, technology, infrastructure, mechanization, institutional details, market, government policies, and rules on government programmes, project monitoring and existing perspective plans on agriculture. As seen in section 4.14, the scores representing the importance of a category was calculated by summing up the scores ascribed to the category by all the respondents.

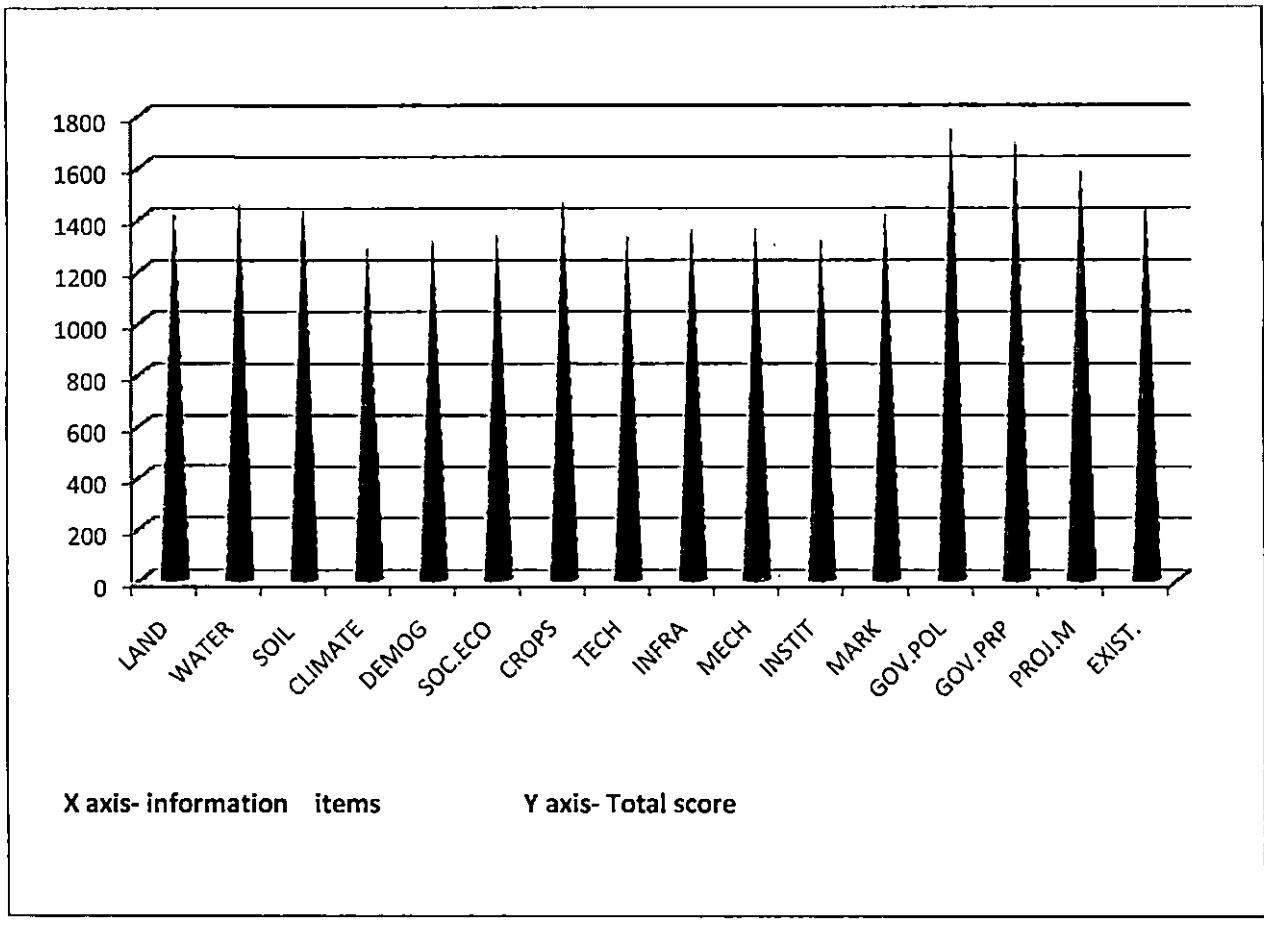


Fig. 2. Overall information requirement of stakeholders in micro level planning

The pattern of information requirement of the respondents *viz.* Extension Personnel and People's Representatives is depicted in Fig. 2. The graph shows that information on government

policies was the most needed and valuable data for micro level planning. The second most important data was on government programmes for agricultural development followed by project monitoring data. The fourth most important one was the data on crops. It was followed by water, information on existing perspective plans, soil, land and market information respectively in the order of the importance cited by respondents.

Information requirement of the two categories of stakeholders is depicted separately in Fig. 3.

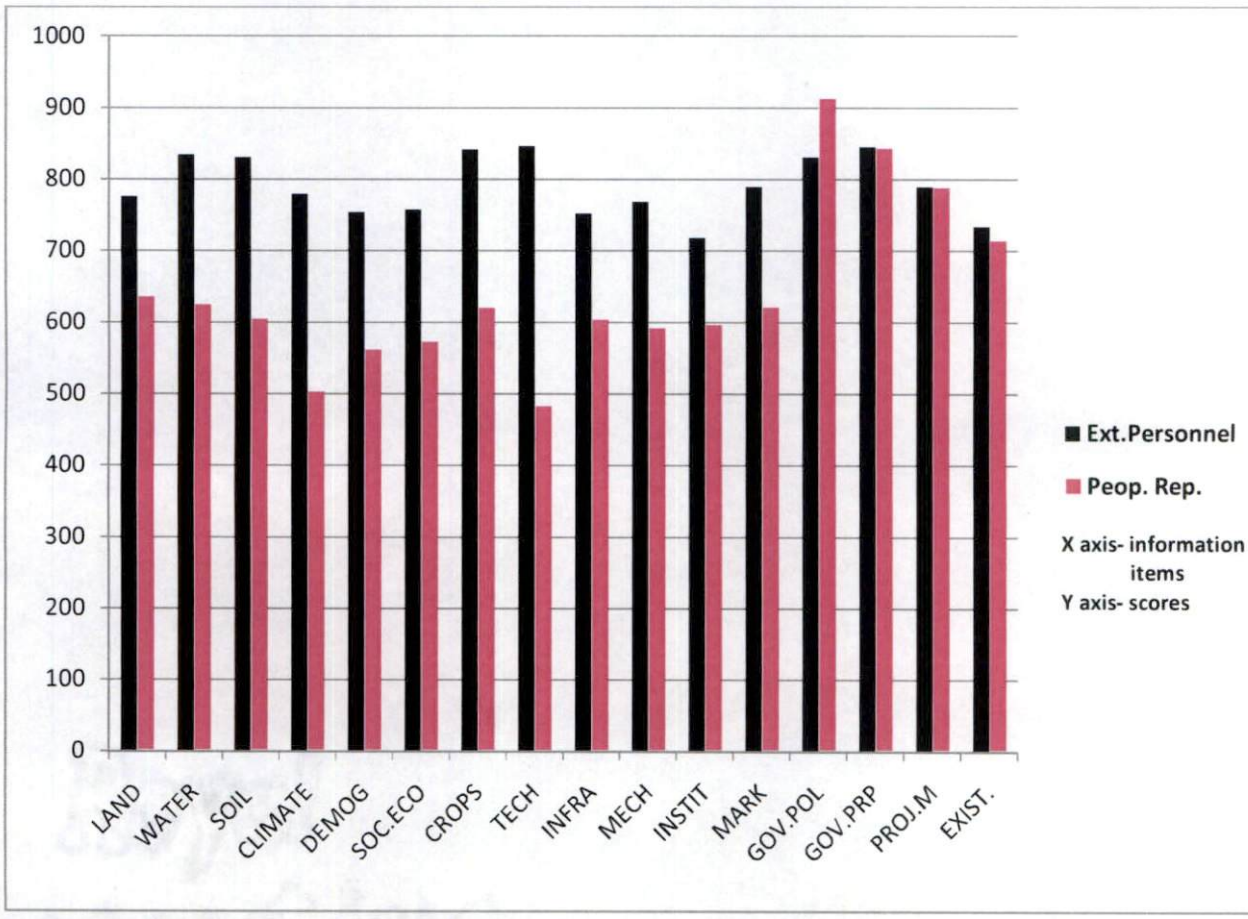


Fig 3. Information requirement of Extension Personnel and People's Representatives in overall process of micro level planning

The graph depicts the item wise frequency distribution of information requirement of Extension Personnel and People's Representatives in the overall process of micro level planning. The frequency of information requirement of Extension Personnel was found to be higher than that of People's Representatives for most of the information items identified.

The most important information item identified by Extension Personnel was technology, followed by government programmes for agricultural development. The third important information item as expressed by Extension Personnel was on crops, followed by spatial information such as water, soil and policy level information on government policies, and dynamic information over market and climate. This was followed by information on land and socio-economic characteristics. This distribution clearly indicates the functional requirement of these major stakeholders involved in the process of micro level planning. Technological information was the most sought after information, by the Agricultural Officers as they are mostly involved in the disseminating technology and providing information to farmers on crop production techniques and crop protection practices. Now-a-days lot of information on mechanization and other modern techniques are also being sought by farmers. These components would naturally be too low for People's Representatives as they are not involved in these activities. Similarly information on government programmes are also important for Extension Personnel as they are mandatorily engaged in implementing the programmes. They require updated information on the way of administering development programmes implemented by the department.

Information on crops on field and natural resources like land and water were also found to be important, as the spatial information is essential for micro level planning.

However, vital information on market was found to be sought only after these information, which again reflected the nature of job performed by the officers. Marketing, which is one of the most important components of the production process was only sparsely attended to by the stakeholders. Most of the development interventions are oriented to production enhancement. Even now, market information is not regarded as a vital component of agricultural development by the department and the local bodies. Information on the socio economic profile of the farming community should have been very important information in the process of planning. However, micro level planning does not seem to look into the profile characteristics, as it is not made mandatory in plan formulation. The information requirement on government programmes for agricultural development was the only item where People's Representatives had higher value than Extension Personnel.

Following this, an attempt was made to find out the importance attributed to different types of information required in each phase of micro level planning (see Fig. 4).

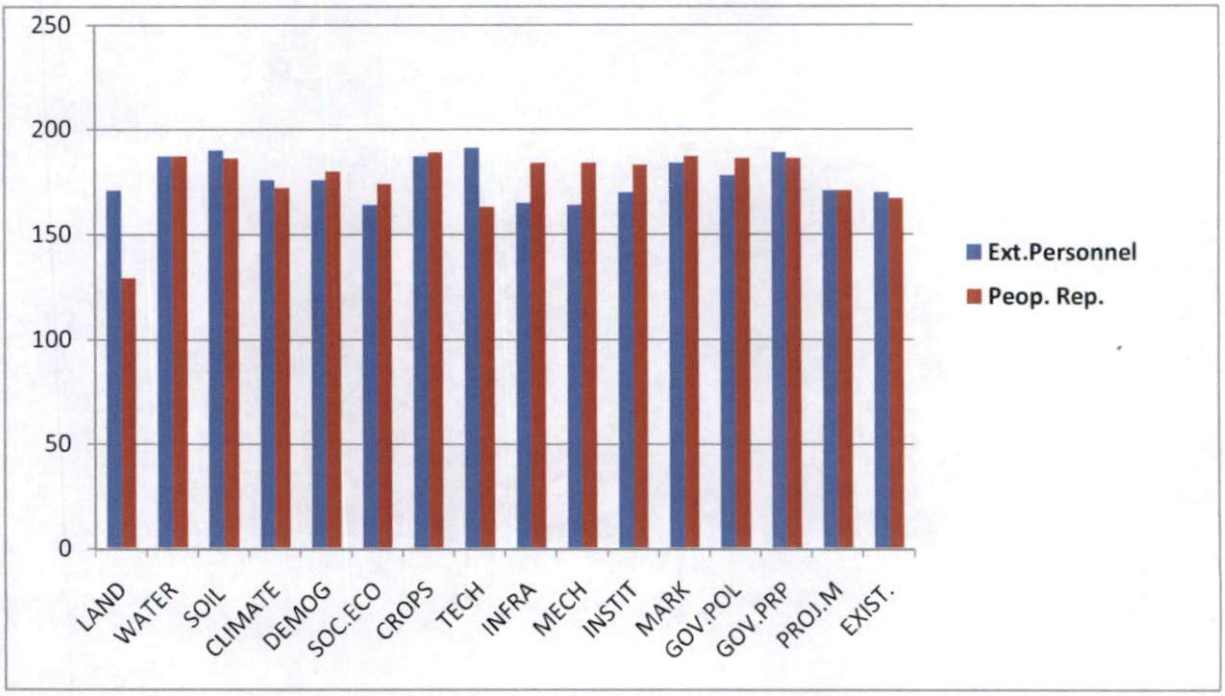


Fig. 4. Component wise information requirement of Extension Personnel and People's representatives in 'planning'

The graph in Fig. 4 shows that the most important information requirement for Extension Personnel in the planning phase was technology followed by information on soil and government programmes for agricultural development. Information requirement on crops, water, market and government policies were listed only afterwards. In the case of People's Representatives, the information requirement on crops bagged highest value followed by information on water and government programmes for agricultural development. Information on soil, infrastructure, mechanization and institutions were the other items in the same order of importance.

The graph also highlight that in the planning stage, Extension Personnel expressed high requirement on information on land, while People's Representatives had low information requirement on this component. The information requirement on soil, climate, technology,

government programmes for agricultural development, project monitoring and existing perspective plans were more for Extension Personnel. People's Representatives had high information requirement on water, demographic characteristics, socio-economic characteristics, crops, infrastructure, mechanization, institutions, market and government policies than Extension Personnel.

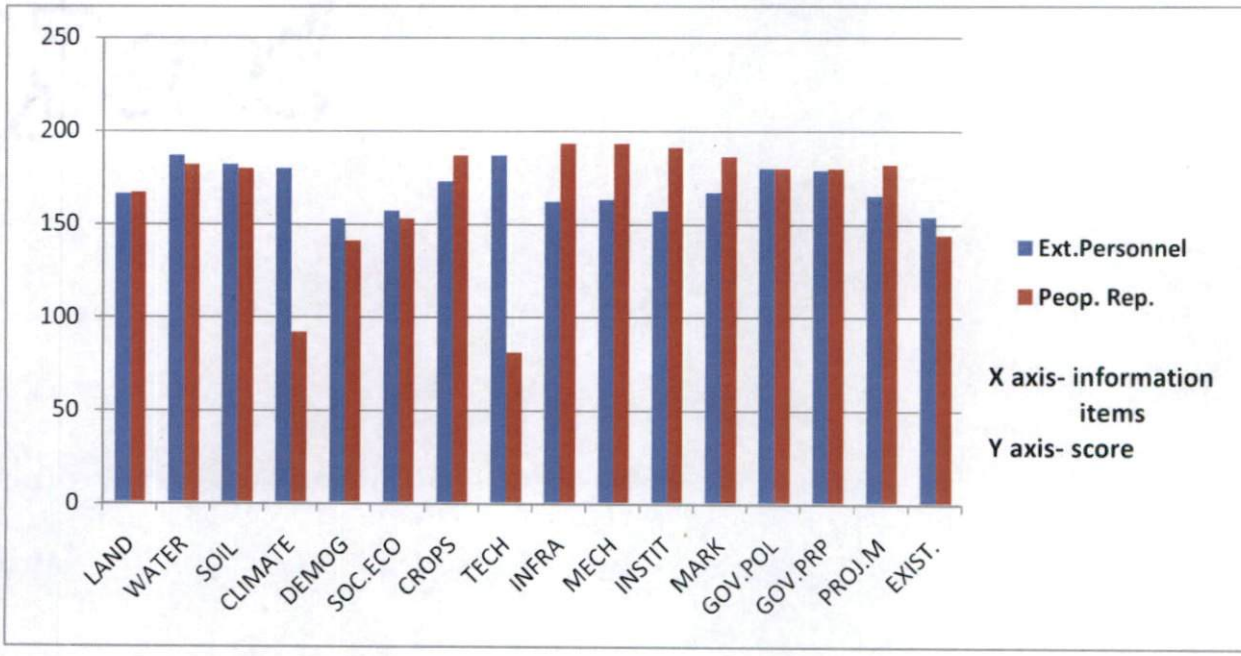


Fig. 5. Component wise information requirement of Extension Personnel and People's Representatives in 'implementation'

The information requirement of Extension Personnel and People's Representatives at implementation stage is depicted in Fig. 5. The information requirement of Extension Personnel was found to be high for information on technology and water, followed by soil, climate, government policies and government programmes for development.

The information requirement of People's Representatives was found to be the highest for infrastructure and mechanization, followed by institutional details and information on market. This seemed to indicate that the stakeholders visualized the process of implementation through tangible outputs like machines and other forms of assets. This genre of information required by the People's Representatives point to the nature of social

issues in which they are usually engaged. Quite obviously, People's Representatives are mostly consulted and approached by the members of the farming community for financial assistance on infrastructure development. They might also get engaged in formulating public opinion on institutions in the field of agriculture, and issues on marketing. This direct relationship with the lives of people could be the reason for this pattern of information requirement expressed in the case of People's Representatives.

However, as far as Extension Personnel are concerned, the information requirement is mostly on issues related to crops, selection of suitable beneficiaries, state of the art technology and the perspectives based on which local plans are to be formulated.

On comparing with People's Representatives, the information requirement of Extension Personnel was high for the items *viz.* water, soil, climate, demographic characteristics, socio-economic characteristics, technology and existing perspective plans. Extension Personnel being responsible for drafting the plan document in spite of the fact that there are working groups meant for this purpose, it is quite likely that they felt the scarcity of adequate information for drawing up realistic plans for the local body.

In the case of all other items like land, crops, infrastructure, mechanization, institutional factors, market, government programmes for agricultural development and project monitoring, the information requirement of People's Representatives was higher than that of Extension Personnel. People's Representatives are not intensely involved in the implementation, as the technical details of project implementation are dealt almost exclusively by Extension Personnel. However, it would be better if the People's Representatives also had adequate access to information on various components of agricultural development. Being untrained and non-technical persons, they are unlikely to have adequate information on the status of natural resources and technologies.

Though monitoring is an important aspect of meticulous project administration, it is not carried out with much rigour in local bodies, as find out by Oommen (2009). The mechanism of monitoring is inbuilt in the process of micro level planning, by instituting a monitoring committee which consist of the implementing officer, chairman of working group (ward member) and members of working groups. Though People's Representatives are supposed to be part of this process, monitoring is a weak link, which is not given due care by

implementing officers or other personnel. Monitoring phase in fact requires details of the project being implemented and information on various programme indicators, and how to measure them properly. However, monitoring of local body projects are not undertaken that seriously. Though social audit could be another methodology that also is not widely used to monitor the performance of projects.

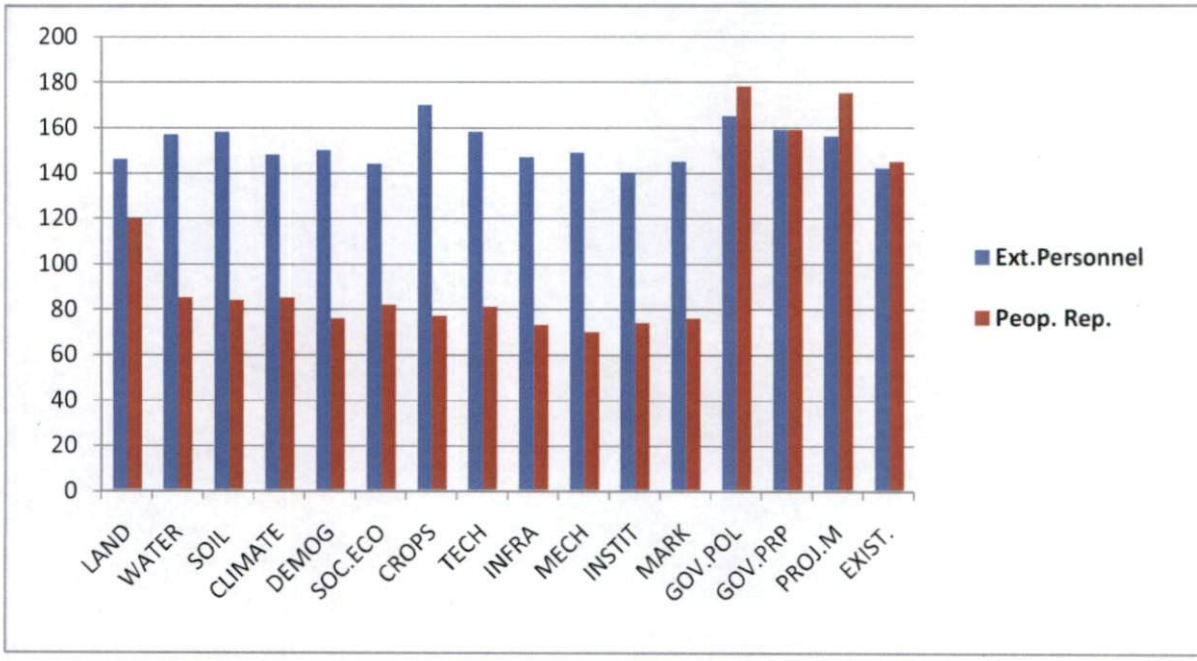


Fig. 6. Component wise information requirement of Extension Personnel and People's Representatives in 'monitoring'

The information requirement of Extension Personnel and People's Representatives at the monitoring stage is provided in Fig. 6. The information requirement of Extension Personnel was the highest for information on crops, followed by government policies, government programmes for agricultural development, soil, water and on project monitoring.

The highest value of information requirement of People's Representatives was on government policies, followed by project monitoring, government programmes for agricultural development and existing perspective plans.

On comparing the information requirement of stakeholders, it could be seen that for items like land, water, soil, climate, demographic characteristics, socio-economic characteristics, crops, technology, infrastructure, mechanization, institutions and market, the Extension Personnel required more information.

The People's Representatives had high information requirement than Extension Personnel for items such as government policies, project monitoring, and existing perspective plans.

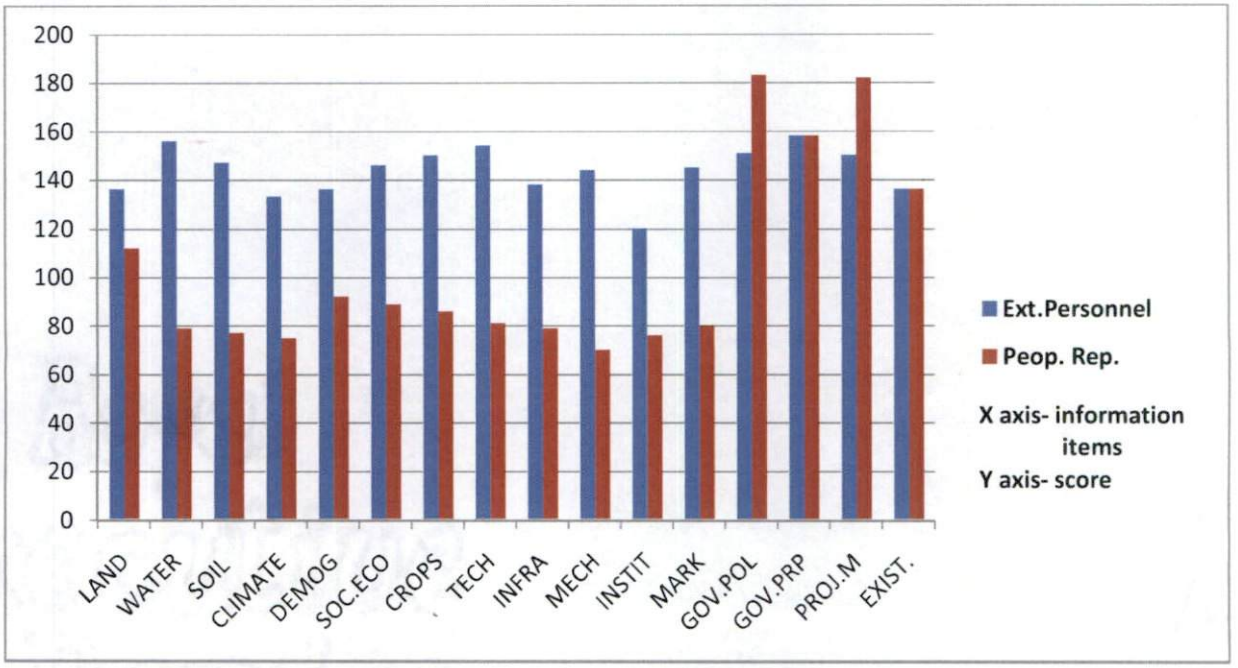


Fig. 7. Component wise information requirement of Extension Personnel and People's Representatives in 'evaluation'

Information requirement of Extension Personnel and People's Representatives at evaluation stage is clearly depicted in Fig. 7. Information on water, soil, socio-economic characteristics, crops, technology, government policies, government programmes for agricultural development and project monitoring was found to be highly needed by Extension Personnel. People's Representatives on the other hand required information on government policies, project monitoring, government programmes for agricultural development and existing perspective plans.

A comparison of the information requirement of Extension Personnel and People's Representatives show that there is perceptible difference between the two categories with respect to the information required by them in each phase of micro level planning.

The information requirement of Extension Personnel was high compared to People's Representatives for 12 items *viz.*, land, water, soil, climate, demographic characteristics, socio-economic characteristics, crops, technology, infrastructure, mechanization, institutions and market. For two of the items *viz.*, government policies and project monitoring. People's Representatives had high information requirement compared to Extension Personnel. The information requirement on government programmes for development existing perspective plans were equal for both stakeholders.

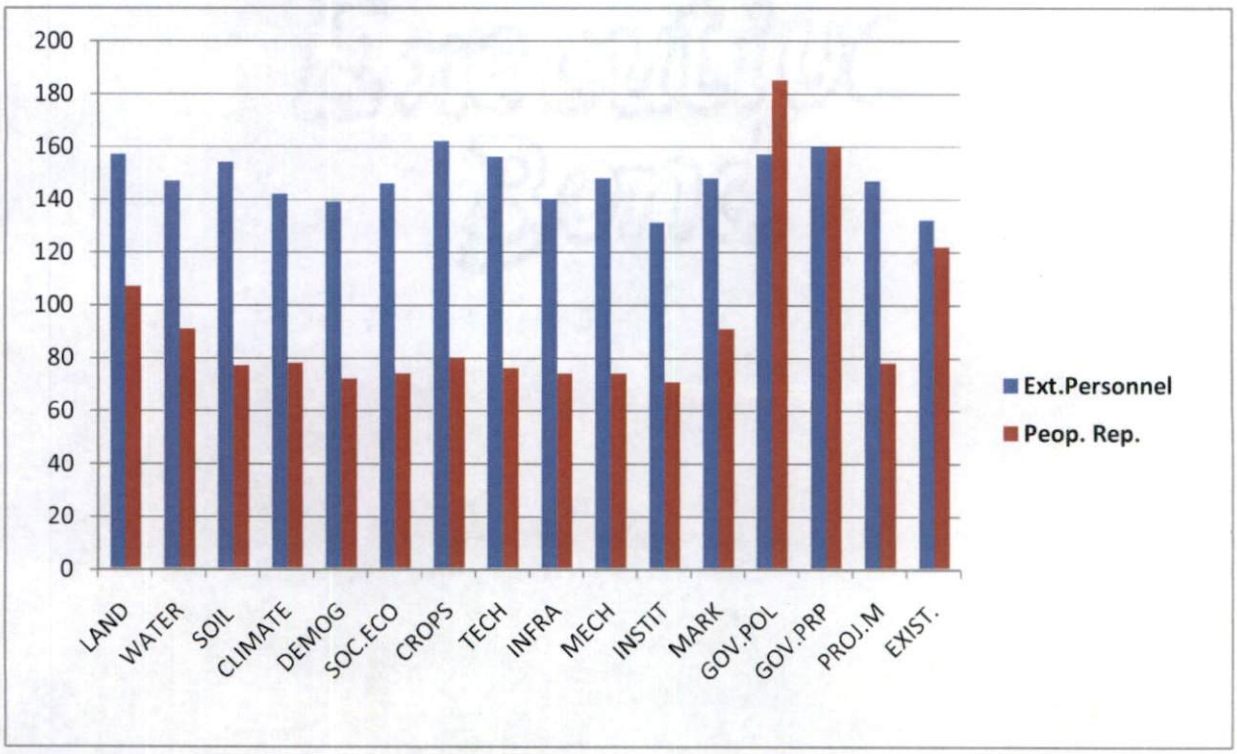


Fig. 8. Component wise information requirement of Extension Personnel and People's representatives in 'follow-up'

The information requirement of Extension Personnel and People's Representatives in 'follow-up' stage is depicted in Fig. 8. The information requirement for all the items such as crops, land, water, soil, climate, technology etc. was perceptibly higher for Extension Personnel.

However information on government policies and government programmes for agricultural development were required mostly by People's Representatives.

4.16. Difference in information requirement of Extension Personnel and People's Representatives

Information requirement of the two categories of stakeholders at different stages of micro level planning was further analysed to find out whether there existed any significant difference between them. Though it is logically evident that the type of information would differ at different stages of planning, it was interesting to find out whether information requirement was different among the personnel statistically. This inference has profound implication as far as the design of an integrated information system in micro level planning is concerned.

4.16.1. Comparison of Extension Personnel and People's Representatives using Cohen's Kappa

The information requirement of Extension Personnel and People's Representatives at various stages of micro level planning was assessed using Cohen's Kappa (see Table 56 for details).

Table 56. Comparison between Extension Personnel and People's Representatives on information requirement at various stages of micro level planning

Sl. No.	Stages of micro level planning	Cohen's Kappa
1	Planning	0.105
2	Implementation	-0.023
3	Monitoring	0.03
4	Evaluation	0.069
5	Follow-up	0.147

The computed *Cohen's Kappa* value for planning phase is 0.105 which is near to zero. This shows that there is no agreement between Extension Personnel and People's Representatives on information requirement at the time of planning. Similarly the *Kappa* values for implementation and monitoring are -0.023 and 0.03 respectively. These values also reflected the disagreement of stakeholders on information requirement. During evaluation stage and follow-up, the *Kappa* values are 0.069 and 0.147 respectively. These values are also near to zero

which implies the non-agreement of Extension Personnel and People's Representatives on information requirement at evaluation and follow-up stages.

4.17. Process of micro level planning

The project formats prescribed for formulating micro level plans in local bodies require information on various aspects at the planning stage. The major items of the formats for project formulation include identification details, project management particulars, objectives, technical specification of the work components envisaged in projects, details of time frame, resources required, man power, physical and financial targets, monitoring mechanisms, details of approval etc. There are also provisions to formulate integrated projects in various sectors. The process of project formulation is well organized and has to undergo different stages. The different stages of micro level planning are listed below, with details of the stakeholders involved.

Micro level planning is a fairly complex process, with a definite itinerary of processes and decisions taken mandatorily. These procedures have evolved over a period of time, with several deliberations by People's Representatives and experts in micro level planning. The processes include a series of action from formulation of projects to monitoring and evaluation.

4.17.1. Working groups for situation analysis and participatory resource appraisal

The processes involved in different stages of micro level planning and the database requirement thereof are different. In the first stage of micro level planning working groups are formed for situation analysis. There will be 12 to 15 working groups in each Grama Panchayat based on the specific requirements of the locality.

Working groups are entrusted with the responsibility of analyzing the status of development in a given sector based on data of previous development intervention. For this the working groups have to make a status report by analyzing previous year's development reports and registers. The working groups also have the responsibility of formulating the project plans in the concerned development sector. The reports of the working groups and their proposals are presented in Grama Sabhas prior to formulation of development projects. This stage is found to require the following types of information (Table 57).

Table 57. Data support required for working groups for situation analysis and participatory resource appraisal

Sl. No.	Processes	Type of data support required
1.	Analysis of existing situation by preparing a status paper of the sector by the working group	Geographical features of the locality Natural resources Details of projects tatus of implementation of projects Physical and financial targets accomplished in previous years
2	Compilation of the suggestions put forward by Grama Sabha	Details of previous beneficiaries Details of beneficiaries and prospective users
3	Facilitating the village council in discussions Preparation of draft proposals	Different indicators of development such as yield, area, poverty alleviation, nutritional status, Public distribution system coverage etc. Reports on completion of projects

4.17.2. Village Council (Grama Sabha) for citizen consultation

Grama Sabhas or village councils are the fora in which consultation with citizens takes place. Village councils are convened three of four times every year. There are also provisions for convening special Grama Sabhas on special occasions. Village councils are appraised of the progress in implementing previous year's projects. Proposals for projects are also solicited from the village council. The village council also hold the responsibility of identifying the beneficiaries of various development programmes. Proposals and reports of the working groups are presented in village councils. Since it is the most important grass roots level forum for participatory consultation, the facts that are presented at the forum should be substantiated by adequate data and information. Based on the consultation done at the Grama Sabha, projects will be formulated by the implementing agency and the sectoral working groups. Each development sector will have its own special features. The database requirements for the various processes involved in Grama Sabha are given in table 58 below.

Table 58. Data support required for conducting Village Councils for citizen consultation

Sl.No.	Processes	Type of data support required
1	Facilitating the village council in discussions	Details of projects
2	Preparation of draft proposals	Geographical feature of the locality
3	Compilation of the suggestions put forward by Grama Sabha	Natural resources Human resources
4	Identification of beneficiaries	Status of implementation of projects
5	Evaluation of implementation	Details of beneficiaries and prospective users
6	Impact of project implementation	Reports on completion of projects

4.17.3. Projectisation by implementing agency

This is the phase in which the proposals of the Grama Sabhas are drafted in the form of projects. It is based on the reports of the working group, the project objectives are set. The members of the working groups are responsible for preparing the project proposals. Each of the twelve subject areas has a task force to convert various project concepts into specific proposals.

The project has a definite objective, a limited location, and a specific time frame. It is also insisted that the project document should contain identification details such as name of the sector to which the project belongs. Besides, the project document contain brief description of objectives, sources of capital, types of linkages, time frame, description of the physical targets and financial targets accomplished, budget, criteria of beneficiary selection, details of beneficiaries, details of the phases of implementation, monitoring mechanism etc. The multitude of information to be added in a project proposal warrants substantial amount of data which will have to be obtained from different sources. The most important type of databases required during this stage is listed in Table 59 below.

Table 59. Data support for projectisation by implementing agency

Sl.No.	Processes	Type of data support required
1	Working Groups prepare the projects	Technological options, Institutions and services Socio economic status of citizens in the locality Geographical features
2	Identification and description of beneficiaries based on eligibility criteria	Natural resources, climatological factors and socio-economic condition of beneficiaries Data pertaining to the specific development sector
3	Methods of technical analysis	Eg: crops, cropping history, soil maps, cadastral information, etc.
4	Time frame	Schedule of different phases of implementation in previous years
5	Description of implementing agencies	Beneficiaries, selection criteria, cost of materials, technical specification of physical targets envisaged, duration of implementation, different agencies of implementation, suppliers of materials etc.
6	Financial analysis	Economic viability
7	Proposed monitoring mechanisms	Market data

4.17.4. Panchayath Development Seminar for consolidation of project ideas

Subsequently, project proposals will be presented in a development seminar for second level consultation by the people. Representatives of the Grama Sabhas, important local level officers and experts from within or outside the Grama Panchayat would be invited for creative suggestions in finalizing development seminars (Isaac and Franke, 2002). This seminar discusses the development vision and goal of the local body and emphasis in each sector. Alternate propositions would also be invited from the seminar.

The database required for conducting development seminar cannot be specifically mentioned as information based on the changes suggested will be required to improve the projects. Hence all the information pertaining to each of the project component will be required for improving the project in response to suggestions raised in the development seminar. The processes involved in this stage are shown in Table 60 given below.

Table 60. Data support for Panchayath Development Seminar for consolidation of project ideas

Sl.No.	Processes	Type of data support required
1	Panchayat Development Reports (PDR) and Seminars	Details of projects Status of implementation of projects
2	Development Seminars to discuss the PDRs and to finalize them	Information on alternatives to project proposals Database on institutions for technological support Database on financial institutions Details of beneficiaries and prospective users Plan outlay Sectoral allocation of funds Infrastructural facilities Market facilities

4.17.5. Plan finalisation and approval by the local body

Projects that have been prioritized in the development seminar would be finalized and approved by the local body for onward transmission to the block level expert committees. It is in this stage, projects are verified for technical soundness and viability. The databases required for this purpose are many, as the process of preparing the development plan involves consideration

of several options. However, the type of data/ information required is found to be almost similar to the kind of information required in earlier stages (see Table 61).

Table 61. Database support for plan finalisation and approval by the local body

Sl.No.	Processes	Type of data support required
1	Finalisation of projects and preparation of plan by the local body	Institutions and services Eg. Public and Private Sector Agencies, Financial Institutions History of interventions Schemes and programmes of governments Socio economic status of citizens in the locality Geographical features Natural resources Credit facilites Climatological factors Data pertaining to the specific development sector like crops, cropping history, soil maps, cadastral information, etc. Environment of the locality and surroundings

4.17.6. Approval by Expert Committees

The project proposal is submitted to the block level expert committee for finding out whether the project observed the guidelines of plan formulation issued by the State Planning Board and the Government from time to time. Infact, there would be differences in the norms and criteria adopted for project formulation from sector to sector. Mostly these differences are about the ceiling of expenditure in a given sector, or the minimum mandatory expenditure stipulated for a sector, as the case may be.

The expert committee should also have complete details of the technical programme included in the project. This would include the dimensions of contracts, rates of raw materials, price of materials and equipments required, policy guidelines etc. Though the process of approval by expert committees has undergone several changes over time, this scrutiny process at the block level is still an important phase that would trim any proposal appropriately. Then the project would be submitted to the District Planning Committee (DPC) for final approval. Finally, approved projects would be returned to the implementing officer through the local body for implementation. The details of data and information required in this stage are given in Table 62.

Table 62. Data support for approval by Expert Committees

Sl.No.	Processes	Type of data support required
1	Technical Advisory Groups (TAGs) at the Block and the District Planning Committee (DPC) at the District Level consisting of official and non-official experts	Institutions and services Schemes and programmes of governments Feasibility criteria, legislations, orders and circulars by the Government Departments History of previous projects Data pertaining to the specific development sector Policy guidelines- technical specification, costs of materials etc. Data on environment

4.17.7. Administrative Sanction by District Planning Committee

Quite similar to what has been observed in the case of approval by expert committees, this phase also requires complete information on projects, thrusts given by the government on different sections from time to time and policy guidelines issued in connection with plan formulation. Process of approval is a very important phase, as the project will have to be redrafted and submitted if the project is modified or rejected by the DPC. The types of information and data support required during this phase are listed below in Table 63. The DPC gives approval to the plans developed by all the panchayats and municipalities coming under its jurisdiction. The block level plans are integrated to make district plan. District level perspective plans are also prepared by compiling these local level plans.

Table 63. Data support for administrative Sanction by District Planning Committee

Sl.No.	Processes	Type of data support required
1	Approval of plans by District Planning Committees (DPCs)	Project details of all the grama panchayats and blocks in the districts Institutions and services
2	Sanction for local governments to start implementation	Schemes and programmes of governments Feasibility criteria Legislations and government orders History of previous projects Data pertaining to the specific development sector

4.17.8. Implementation by the implementing agencies

Implementation of projects approved by the DPC is carried out by the concerned implementing agency, and by the implementing officer, designated by the development department concerned. Since implementation is solely done by the implementing agency, all the details required during the formulation phase would be needed at this level as well. In this stage, the projects are implemented in a step-by-step manner for which funds will be released periodically.

Implementation in agricultural sector may mostly require technical information and socio economic data. It may also require spatial and temporal data, as the case may be. The major type of processes and information required thereof are given below (Table 64).

Table 64. Data support for implementation by the implementing agencies

Sl.No.	Processes	Type of data support required
1	Releasing funds	Technological options, Institutions and services
2	Phased implementation of the project	Socio economic status of citizens in the locality
3	Monitoring	Geographical features
4	Record keeping	Natural resources
5	Training	Data pertaining to the specific development sector
6	Disbursement of aids and subsidies	Physical and financial targets of the project
7	Technology demonstration training	Prevailing technology practiced
8	Accounts, reporting of progress etc.	Details of natural calamities
		Labour force/ labour shortage, Market details

4.17.9. Participatory monitoring and evaluation

Micro level planning as implemented in Kerala envisages constant monitoring of the programme implementation, evaluation and impact assessment based on specific indicators as well as bench mark details. Efficient monitoring and evaluation require adequately sensible measures against which the performance is measured. Monitoring and evaluation can be done in each process. In micro level planning, the project would be monitored by monitoring committees that include People's Representatives and beneficiaries as members. Monitoring and evaluation in ideal situations would require definition of bench mark indicators and their measurement. It would also include comparison of resultant data with bench mark data. The key processes involved in monitoring and the data support required are given in Table 65.

Table 65. Database support for participatory monitoring and evaluation

Sl.No.	Processes	Type of data support required
1 2 3	Observe the criteria for evaluation Assess the performance of projects Prepare monitoring reports	Details of projects Processes and phases of implementation Technical specifications of the physical targets Details of financial targets Price of inputs/ market

4.18. Stakeholders involved in micro level planning mechanism

Information requirement of different categories of stakeholders are different, as the roles and related perceptions are different. The different institutions involved in micro level planning in agriculture and allied sectors are listed below. Each of these stakeholders requires different types of data in their respective domain. They also maintain different types of databases that could be used for micro level planning.

1. Krishi Bhavan
2. Grama Panchayat
3. Soil Survey Department
4. Kerala State Land Use Board
5. Village Office
6. Veterinary Hospital
7. Minor Irrigation Department
8. Anganwadis
9. Primary Health Care Centre
10. Ground Water Department
11. Vegetable and Fruit Promotion Council of Kerala
12. Block Panchayat
13. District Panchayat
14. Office of the Assistant Director of Agriculture
15. Office of the Principal Agricultural Officer
16. Department of Economics and Statistics, Government of Kerala

17. Census of India (District Census Handbook)
18. Survey of India
19. Department of Survey and Land Records, Government of Kerala

Details of data support that can be provided by different departments involved in the process of micro level planning are given below. This was done by examining the fields of legacy databases and registers that are traditionally maintained by these agencies and comparing it with the possible data requirements for micro level planning as understood from project proposals and interaction with personnel involved in micro level planning.

4.19. Data support provided by Soil Survey Department

I. Watershed Atlas

Watershed Atlas is one of the most important legacy database maintained by the Department of Soil Survey. The atlas gives exhaustive information on soil and land features, socio economic status, water availability and some important features of climate. These information are utilized in delineation of watersheds and development interventions in watersheds.

Table 66. Details of Watershed Atlas

Sl.No.	Topics	Data available
1	Soil and land features	Slope, erosion, vegetative cover, agricultural land percentage, soil depth, soil texture, physiography, drainage, hydrologic group, rock outcrops, stoniness
2	Socio economic condition	Agricultural labourers, SC/ST population, marginal and small farmers, livestock population, backwardness of the area
3	Water	Availability of water for drinking and irrigation purposes
4	Climate	Rainfall

II. Report on watersheds

Detailed reports on watershed development are the second important sources of information provided by the Department of Soil Survey. This is an authentic document that provides benchmark information on the following parameters that could be utilized in formulating micro level development plans in agriculture.

1. General description of the area
   1.1. Location and extent
   1.2. Physiography, relief and drainage
   1.3. Geology
   1.4. Climate
   1.5. Natural vegetation
   1.6. Ground water
   1.7. Water supply and irrigation
   1.8. Socio economic conditions
2. Land use and agriculture
   2.1. Present land use
   2.2. Major crops and agronomic practices
   2.3. Livestock
   2.4. Evaluation of present cropping system
3. Soil survey methodology
4. Soils of the area
   4.1. Soil series identified
   4.2. Morphological description of soil series
5. Soil map legend
6. Soil survey interpretation
   6.1. Land capability classification
   6.2. Land irrigability classification
   6.3. Crop suitability classification
   6.4. Soil fertility status
   6.5. Soil conservation priority
   6.6. Hydrologic soil grouping

III. Digital data processing

Digitized data sources available with the Department of Soil Survey, are highly useful in watershed delineation and spatial planning. This is done using a GIS platform, with cadastral level information integrated into digitized maps. Cadastral level interventions

can be planned by employing this data. They also give ample information on the nature and course of natural resources such as water sources as well as other infrastructure facilities as listed below:

1. Soil polygons
2. Survey plots
3. Rivers
4. Streams
5. Canals
6. Tanks and accessories
7. Roads
8. Railway
9. Administrative boundaries
10. Labels
11. Point locations of schools, hospitals, buried grounds, wells

4.20. Data provided by Land Use Board

Land Use Board provides a wide range of data and information on geographical features of the locality, demographic features, agro ecological features, public assets and human resources, the details of which are given below.

1. Cadastral maps of 1:5000 scale
    a. Survey number
    b. Soil
    c. Soil capability
    d. Slope
    e. Existing land use
    f. Water resources
    g. Elevation
    h. Existing crop
2. Thematic maps on land use
3. Details of water resources- streams, drains, ponds, wells and tube wells
4. Soil series data
5. Forest area
6. MGNREGS workers
7. Land use map of whole Kerala State
8. Data on disease incidence

9. Price of plant protection chemicals
10. Maps on assets- government offices, schools, industries , roads- tarred, untarrred, foot paths
11. Land capability map
12. Micro level watershed atlas is prepared
13. Maps on geo morphological units at 1:50000 scale which contain information on structural hill, pediment, valley, valley hill etc. Evolution of land, residual mountain, deposition hill and soil data
14. River basins

4.21. Data provided by Village Office

The Village Office mandatorily maintains numerous basic registers and records which can provide crucial data for micro level planning. The legacy registers at the Village Office provide us with details of land ownership, agrarian relations, cadastral information, tax details etc. These data can be of use in spatial planning and identification of beneficiaries. The details of data available from the registers maintained by Village Office are given in Table 67.

Table 67. Data provided by Village Office

Sl. No.	Name of register	Data provided by the register
1	Basic Tax Register	Details of owner, acreage of garden land, wet land, fallow land, amount of tax, details of
2	Basic Tax Register- supplementary	-do-
3	Field map	Pages of A3 size. It's a map/ sketch showing district, taluk, field no., village no., name of owner and area
4	Booth level register	For issuing identity card. Details of tax and address
5	Cash book	Details of amount remitted
6	Register for luxury tax	Details of person remitting tax
7	Building tax-Assessment order register	Survey No., name and address, amount remitted
8	'Thandapperu' register-T.P. No. register (Ownership Register)	Details of land - area, 'thandapperu' account no., name and address, amount of tax
9	Register of surveyor	Name and address of person, area and details of each and every plot of the person
10	Transactions register	Details of person: survey no., sub division no., address of owner, previous owner etc.
11	Lithomap	Map with survey no. of plots, schools, ponds etc.

The data available from Village Office mostly pertain to land ownership and hence is the fundamental record. These data would be of immense use in land use planning, as we get cadastral level information.

4.22. Data provided by other agencies

Other transferred institutions also maintain vital data required for micro level planning. These data are useful in integrating the projects in agriculture with other sectors. For instance, the data from Veterinary Hospital would be of help in determining the availability of organic manure in a village. Similarly, the data from Minor Irrigation department would be helpful in scheduling agricultural operations. Data available with other institutions at the village level are listed below in Table 69.

Table 68. Data provided by other agencies

Sl.No.	Name of the institution	Data support provided
1	**Veterinary Hospital**	Records of artificial insemination given to livestock and the medicines, general morbidity pattern of livestock and the trends in artificial insemination, livestock census give data on livestock population in the panchayat.
2	**Minor Irrigation department**	Details of irrigation schemes and ayacut areas, acreage of irrigated area in a panchayat
3	**Anganawadis**	Records of death registration, feeding mothers and schedule of immunization programmes for children. Also details of teenage girls which include their educational qualification, job, health aspects like haemoglobin content, blood group etc.
4	**Primary Health Care Centre**	Nutritional status of children, pregnant women and lactating mothers,and the extent of immunization.
5	**Ground Water Department**	Record of ponds, open wells, tube wells and water table of specific locations. They keep observation wells for recording water level at monthly intervals. The sanction for tube wells are given by this authority, also digging tube wells for private, government and corporate parties.
6	**Vegetable and Fruit Promotion Council of Keralam**	Details of inputs (seeds, organic manures) distributed to farmers; market details of vegatables like type of vegetables, quantity marketed, price of vegetables, processing of vegetables etc.

4.23. Constraints perceived by stakeholders in maintaining and updating databases

Extension Personnel and People's Representatives involved in micro level planning have expressed difficulties in maintaining and updating databases. Open ended questions were asked to the respondents to know the constraints faced by them. As described in the chapter on methodology, the constraints were ranked based on the score obtained by multiplying the scores of importance attached to each one with the frequency of citation of the responses by respondents. Ranking of constraints has revealed that lack of mechanisms for regular updating was considered to be the most severe constraint in maintaining registers. This is infact the result of shortage of staff and heavy work load; which was ranked second in the list of constraints.

Lack of coordination among different departments was reported to be the third most important constraint experienced by respondents. Lack of standardized formats for collecting data was reported to be the fourth important constraint experienced by personnel involved in maintaining databases. It was also been observed that databases were given least preference in the process of planning as the people involved in the process were not concerned about informed decision making. It was also observed that keeping records was a time consuming activity and hence records were not maintained and updated properly. The ranks assigned to the major constraints listed are given below (Table 69):

Table 69. Constraints perceived by Extension Personnel and People's Representatives in maintaining and updating databases

Sl.No.	Item	Rank
1	Lack of mechanism for regular updating	I
2	Difficulty by staff shortage and work load	II
3	Keeping records is time consuming and require constant updation	VI
4	Lack of co-ordination of different government departments	III
5	Maintenance and updating of databases are given the least priority by the departments	IX
6	A complete, adequate and systematic format is not available for maintaining the dabases (need of softwares for updating data)	IV
7	Lack of awareness regarding the modern tools for maintenance and updation of databases	VII
8	Databases are given the least priority in micro level planning which leads to negligence of databases (lack of experts in handling data)	V
9	Computerization is not completed in all departments	VIII
10	The relationship between block level and gram panchayat level agencies are to be smoothened and streamlined	X
11	Lack of supervision	XI
12	The department schemes are not decentralized and do not have micro level planning	XII

Lack of awareness regarding the modern tools for maintenance and updation of databases was another constraint reported by the respondents. As computerization had not been completed in all departments during the reference period, data handling was found to be difficult to the stakeholders.

In addition to these constraints, the respondents expressed that maintenance and updating of databases had been given the least priority by the departments. It could be in this context, lack of smooth relationship between block level and gram panchayat level agencies had been cited as the next important constraint.

Lack of supervision was also perceived as another constraint in keeping databases. The state sponsored and centrally sponsored schemes are allotted to particular Krishi Bhavan by the Department of Agriculture. It was also made clear that the modes of operation of these schemes were different from that of projects in micro level planning and there were no standards with respect to maintenance and use of databases. Moreover, state sponsored and centrally sponsored schemes did not permit decentralization beyond a particular level because the mode of implementation is prefixed, irrespective of its suitability to be adopted everywhere.

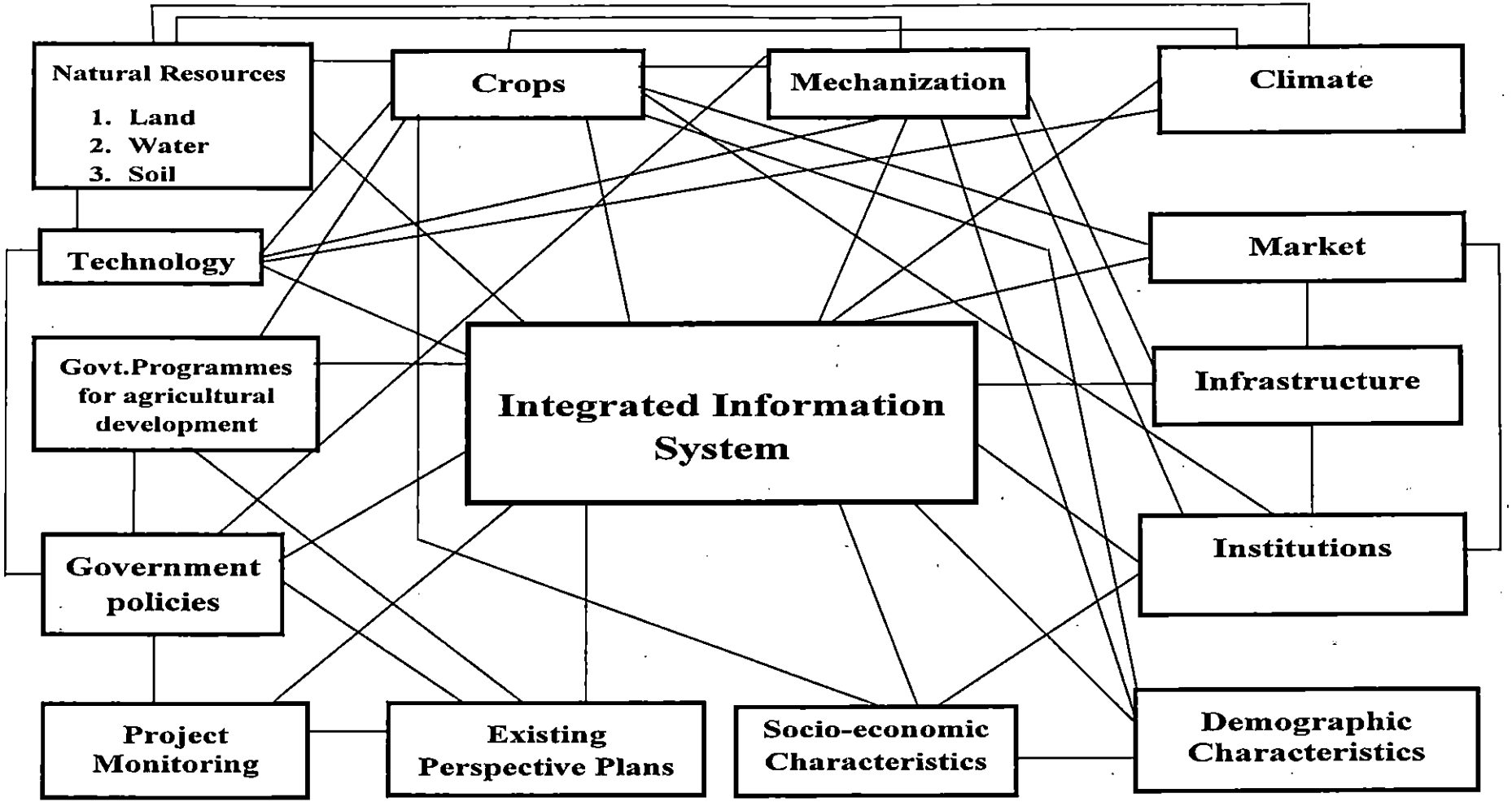
4.24. Suggested framework of the content and hierarchy of Integrated Information System for Micro Level Planning in Agriculture

Observations on the pattern of information requirement in micro level planning and the gaps thereof have necessitated a new pattern for Integrated Information System for Micro Level Planning in Agriculture. Based on the above inferences, a new framework is suggested for a prospective Integrated Information System in Agriculture which can be used for obtaining access to various data and information for ideal micro level planning in the context of decentralized planning. A pictorial representation of the framework suggested is provided as Fig. 8.

The major framework consists of information on 14 different domains of knowledge/ information/ data required to plan development interventions at the micro level. Each domain shall be considered as a repository of data and information on various related aspects. The major domain about which data are required for micro level planning are: natural resources, technology, government programmes, policies, crops, mechanization, climate, market, infrastructure, institutions, demographic characteristics, socio-economic characteristics, existing

perspective plans, project monitoring etc. All these domains have been found to be important by the judges selected for evaluation. The relevance of these domains could be substantiated by exploring the possibilities of using these types of information in micro level planning. As stated in the chapter on methodology, the projects formulated by local bodies were examined in detail to assess the existing database support as well as the possibilities of data support for planning them in ideal situations. This has revealed the type of data that could be used in planning developmental projects and has helped the researcher formulate the conceptual framework of the proposed Integrated Information System for Micro Level Planning in Agriculture.

The types of information/ data that are relevant to the major domains of micro level planning in agriculture are pictorially represented in Fig. 9 to Fig. 22. The possibility of linkages between different domains is depicted in the form of lines connecting each domain with the other. The lines do not represent the degree of importance or direction. Instead, they indicate only the logical linkages between different types of data. The conceptual framework gives possible linkages among the different domains of data/ information required for micro level planning in agriculture. An integrated information system would contain data sources of all these domains logically linked together so as to enable the user to draw useful information as and when required. These databases can be spatially oriented to find out the specific location and the unique interactions required in each location.


Natural Resources
1. Land
2. Water
3. Soil
Crops
Mechanization
Climate
Technology
Market
Govt.Programmes for agricultural development
Integrated Information System
Infrastructure
Government policies
Institutions
Project Monitoring
Existing Perspective Plans
Socio-economic Characteristics
Demographic Characteristics

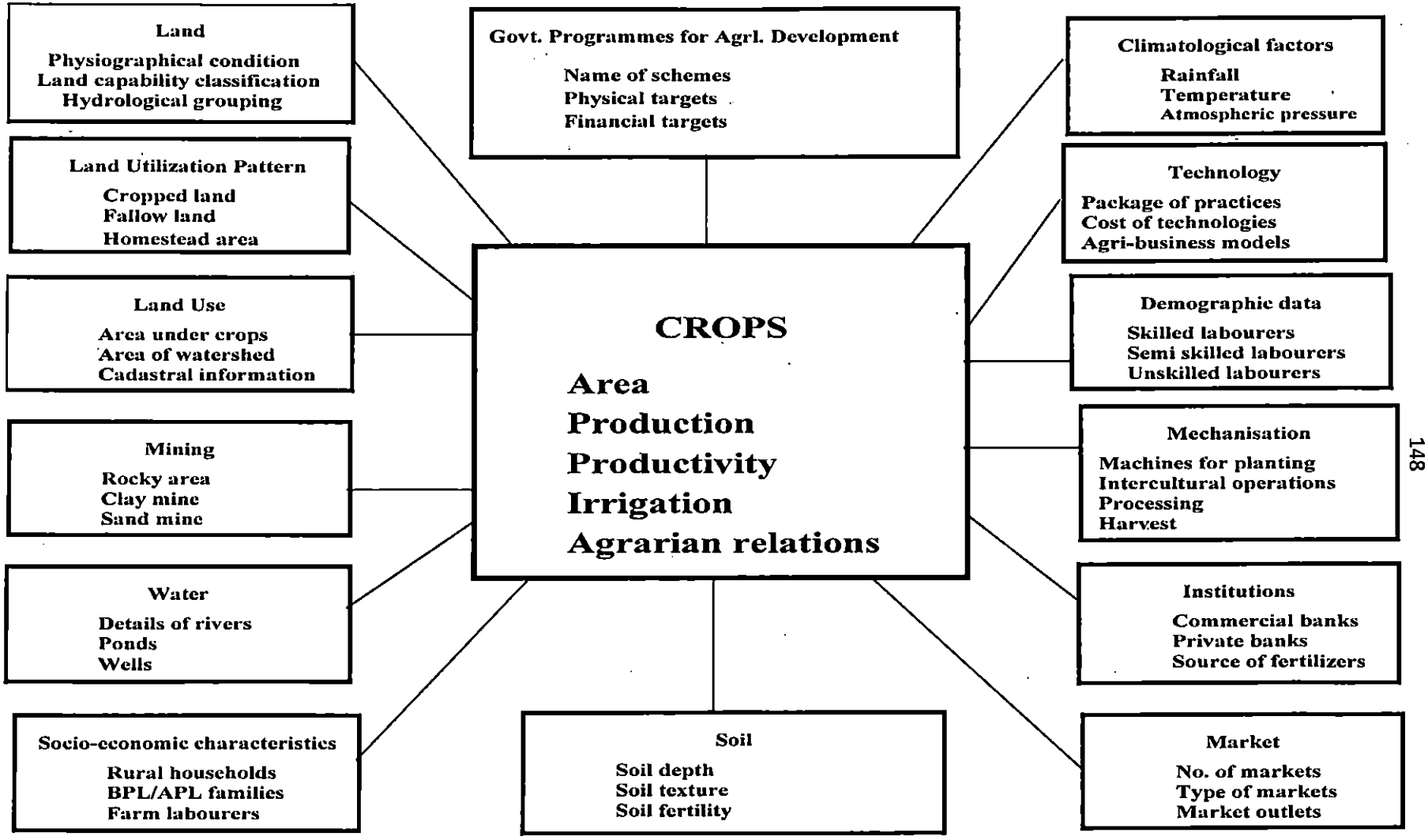


Fig. 10. Data components related to crops

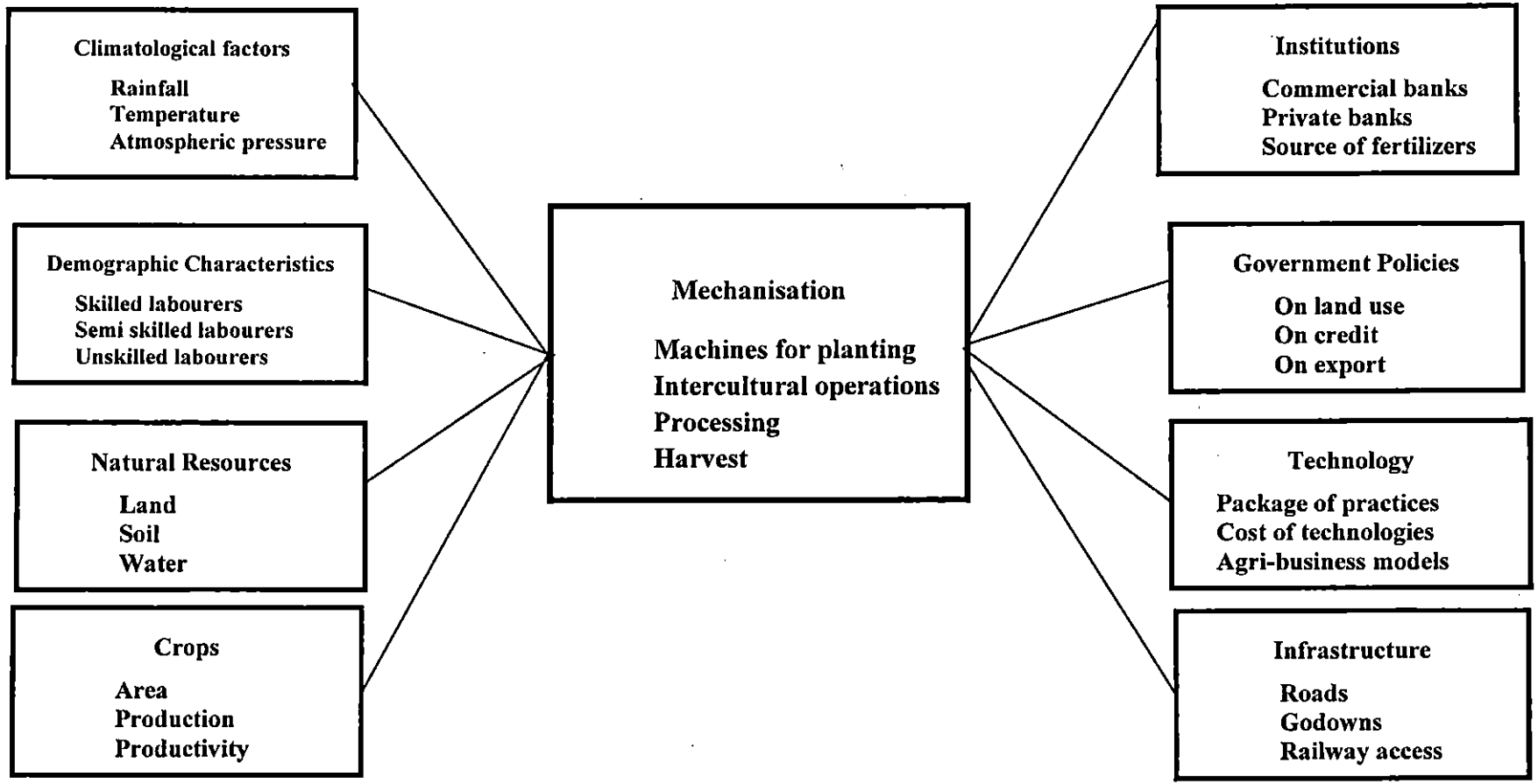


Fig. 11. Data components related to mechanization

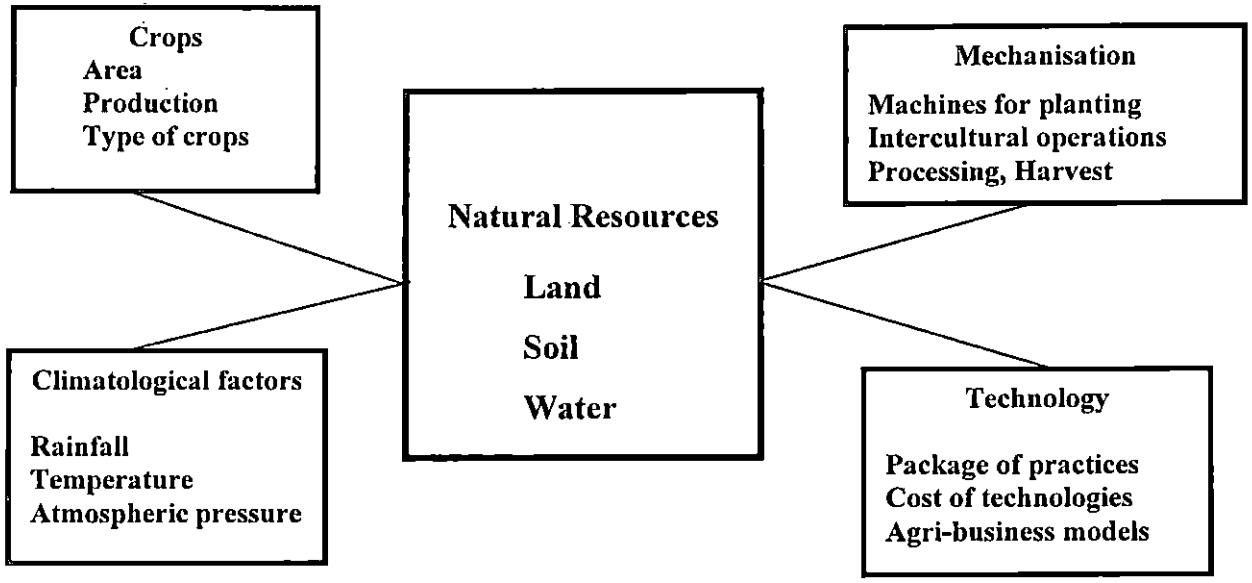


Fig. 12. Data components related to natural resources

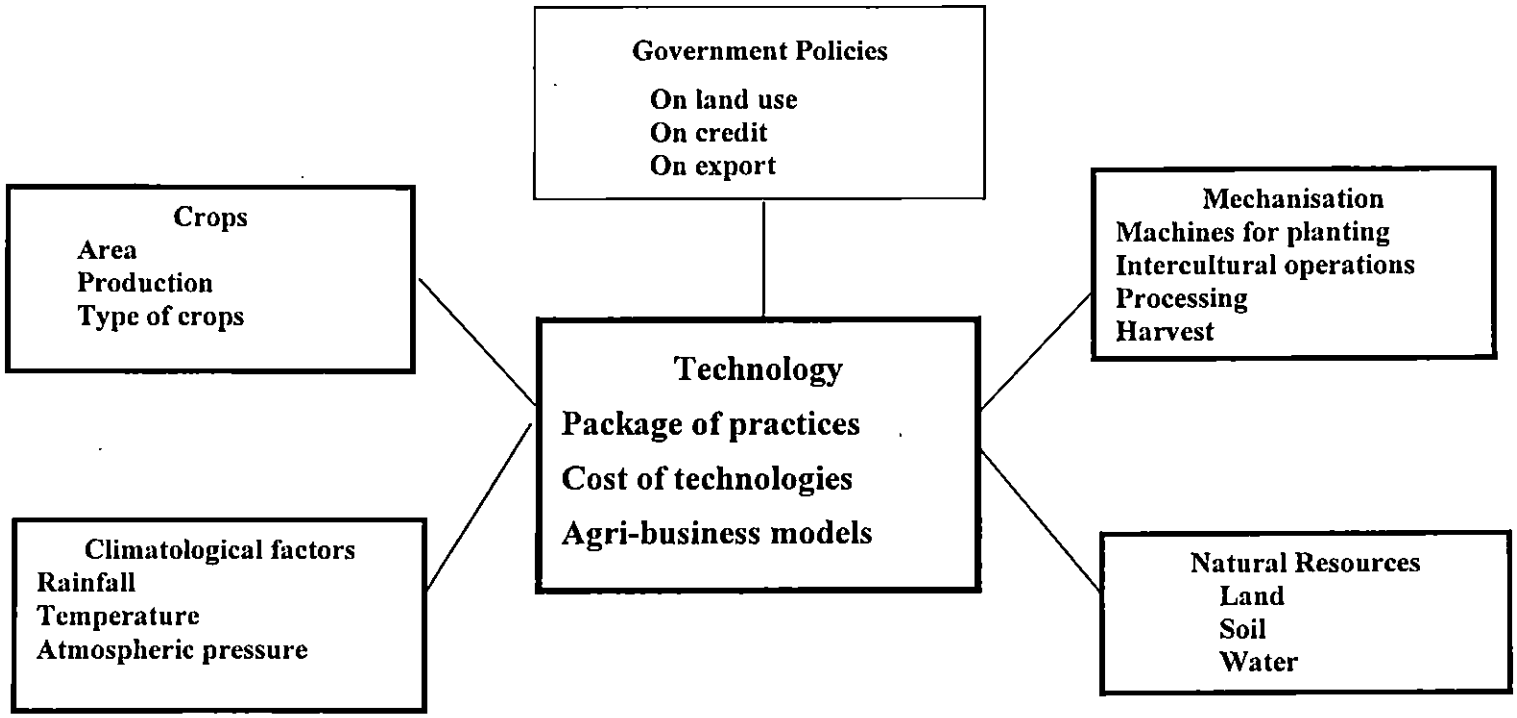


Fig. 13. Data components related to technology

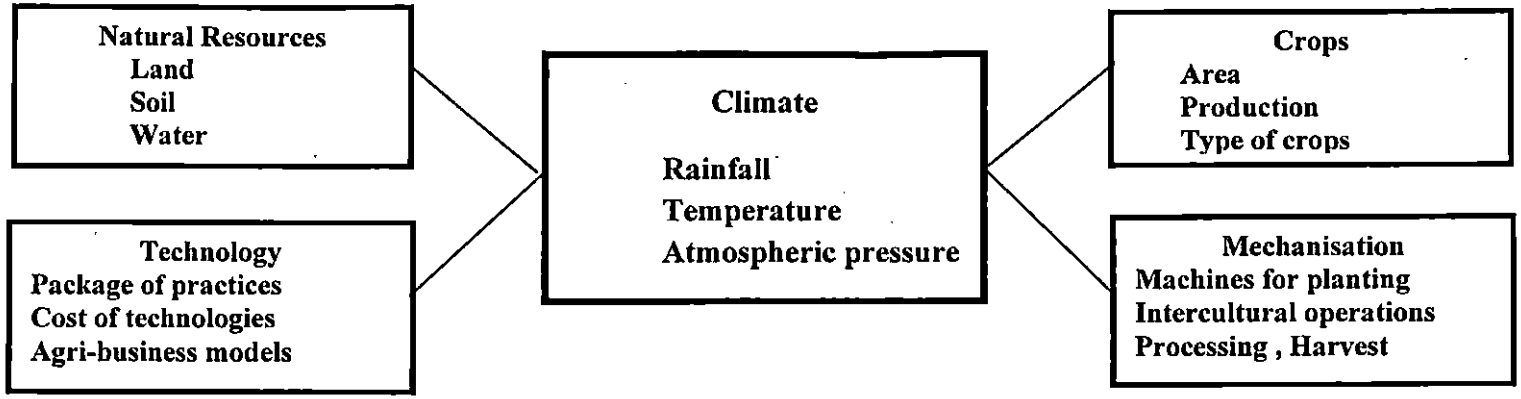
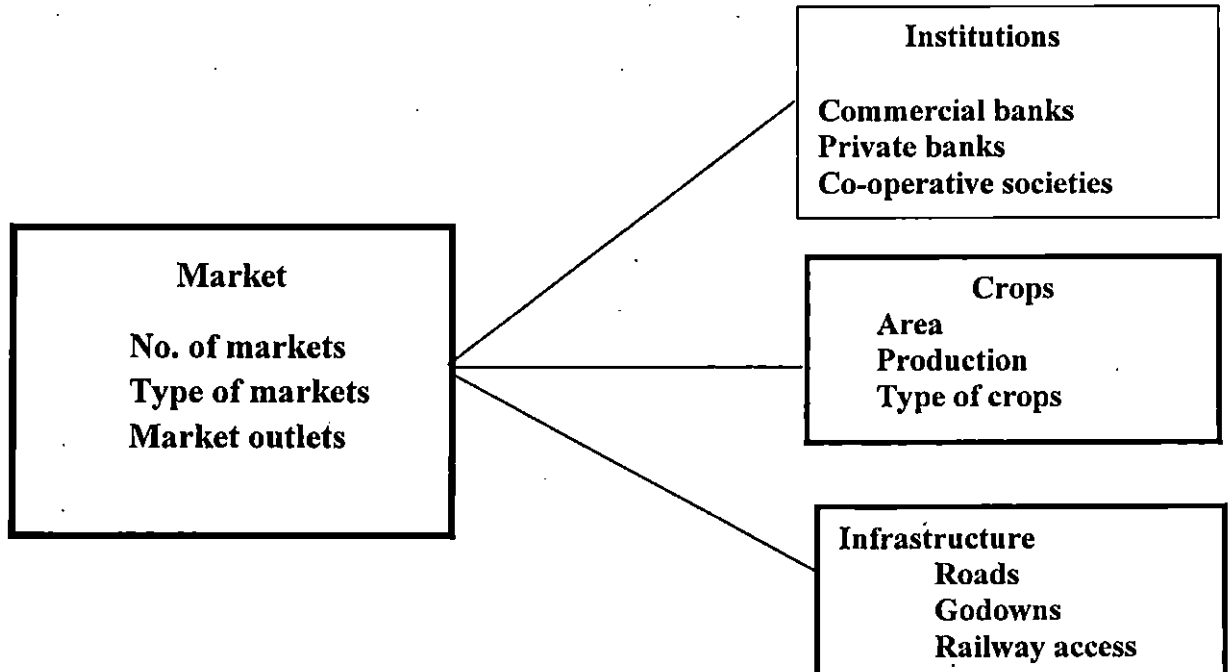


Fig. 14. Data components related to climate



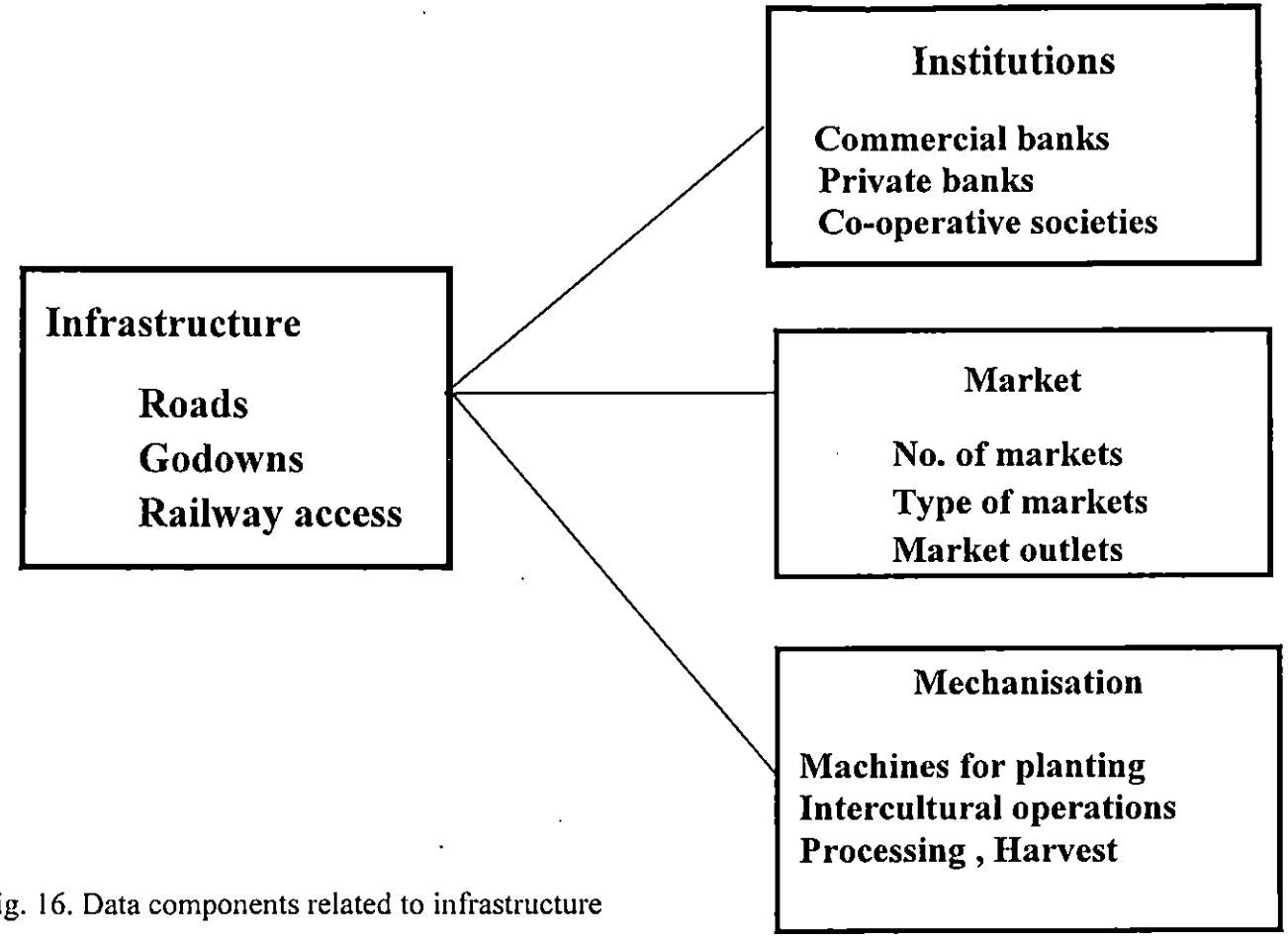


Fig. 16. Data components related to infrastructure

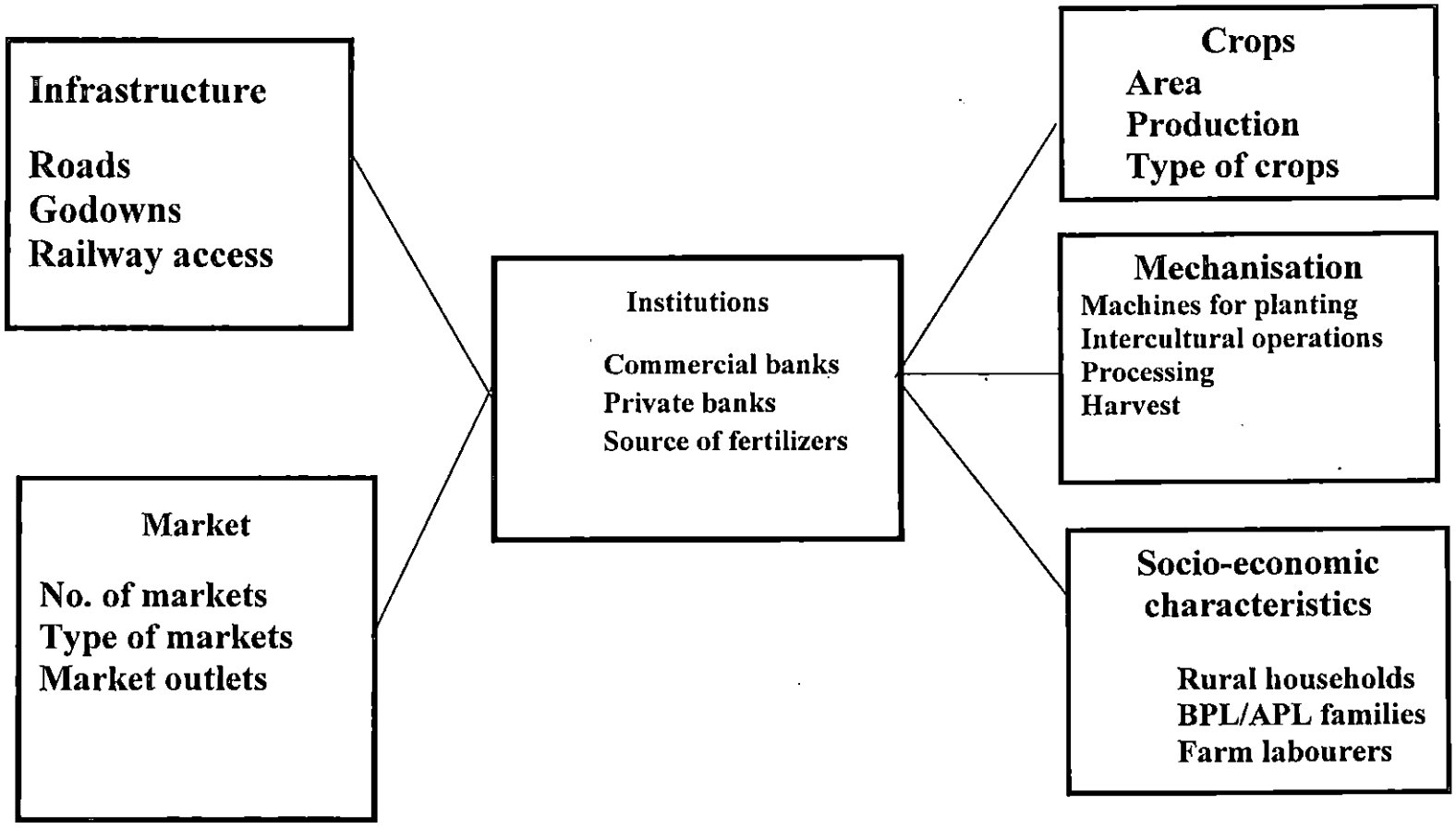


Fig. 17. Data components related to institutions

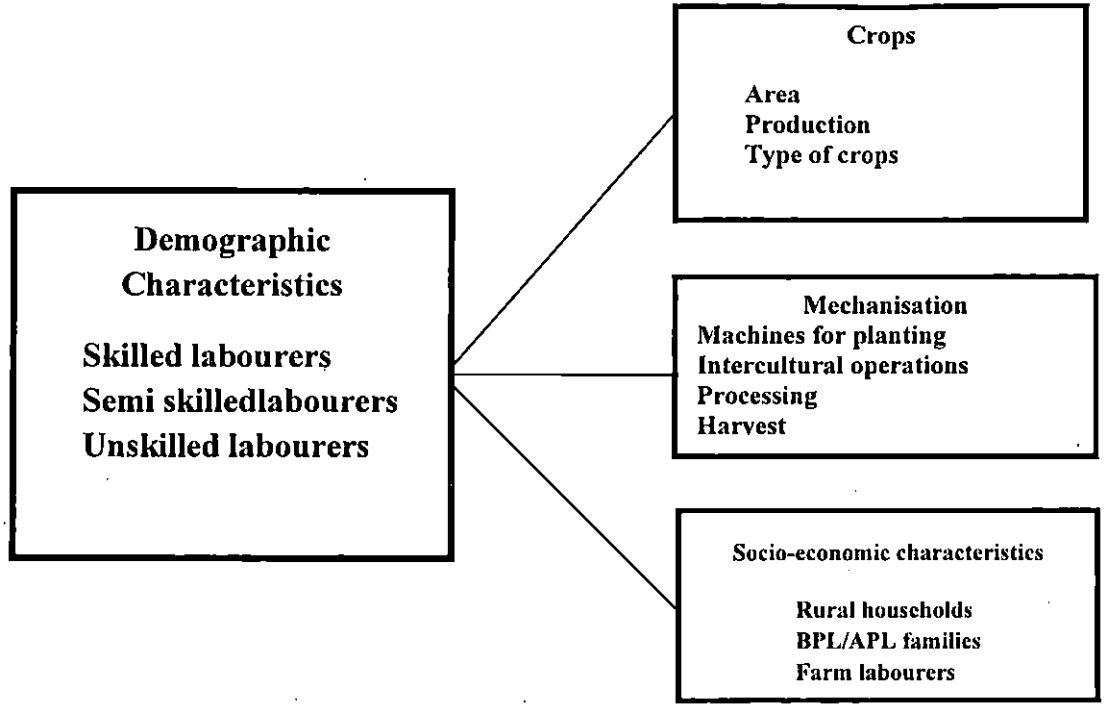


Fig. 18. Data components related to demographic characteristics

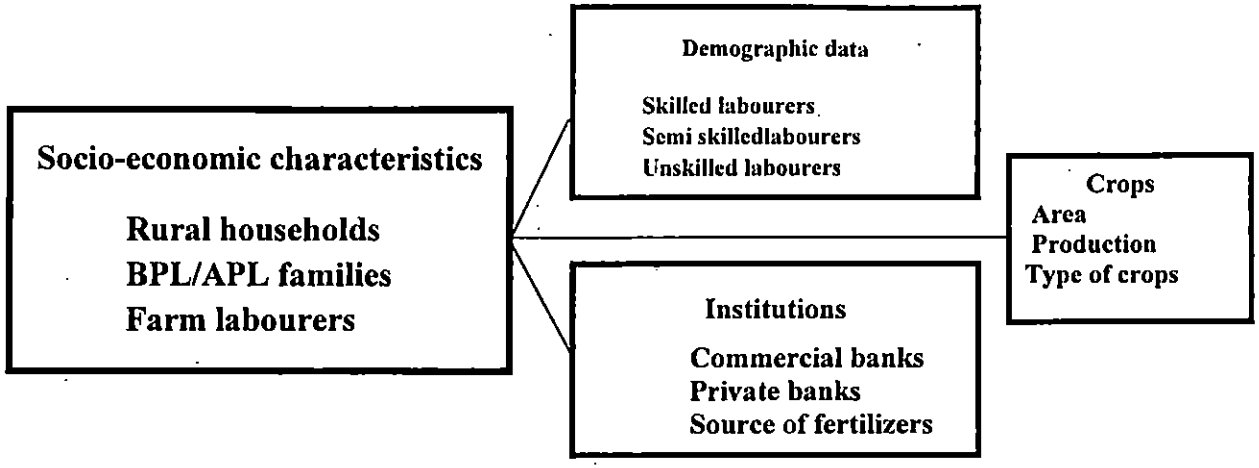


Fig. 19. Data components related to socio-economic characteristiccs

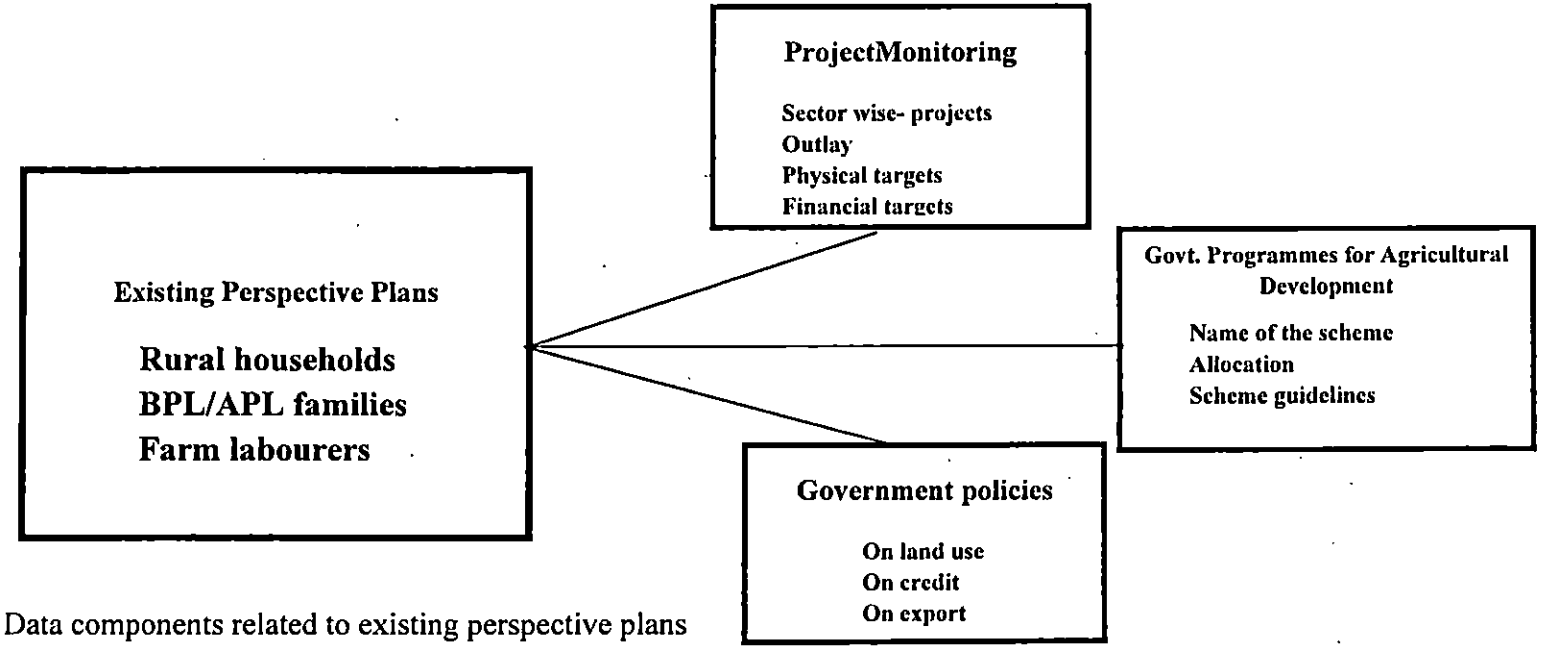


Fig. 20. Data components related to existing perspective plans

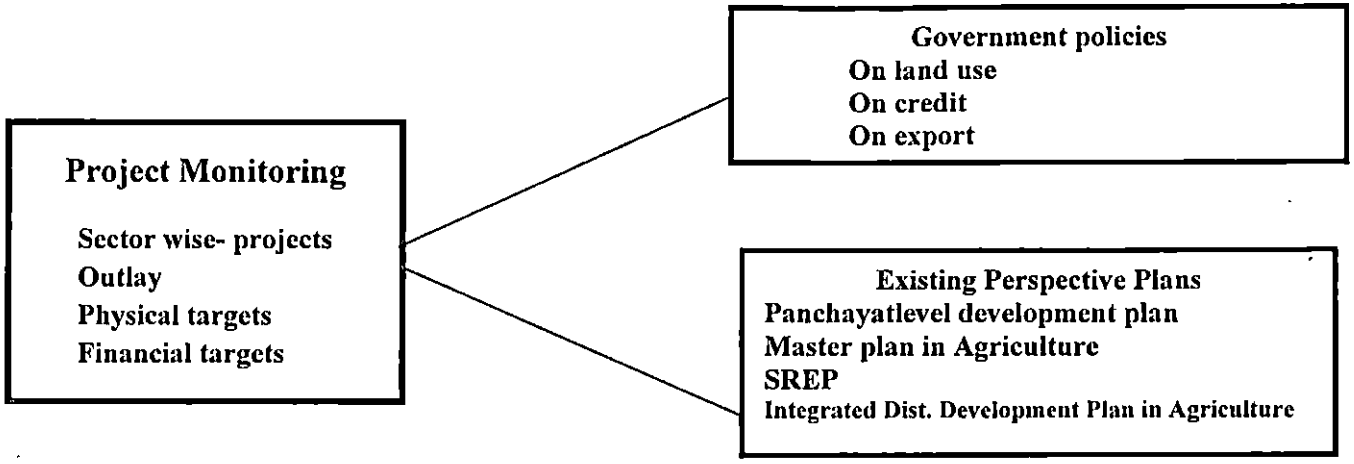


Fig. 21. Data components related to project monitoring

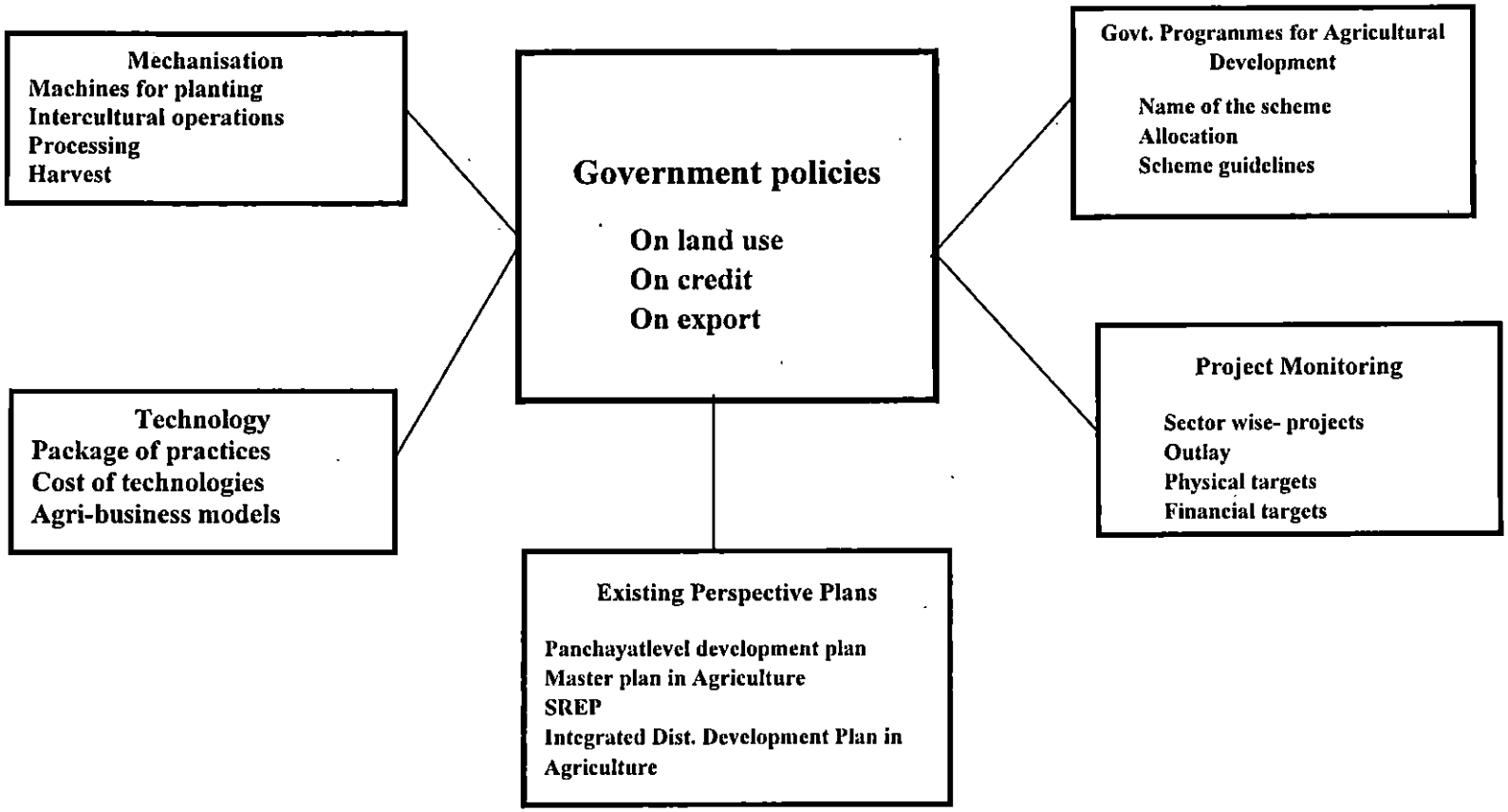


Fig. 22. Data components related to government policies

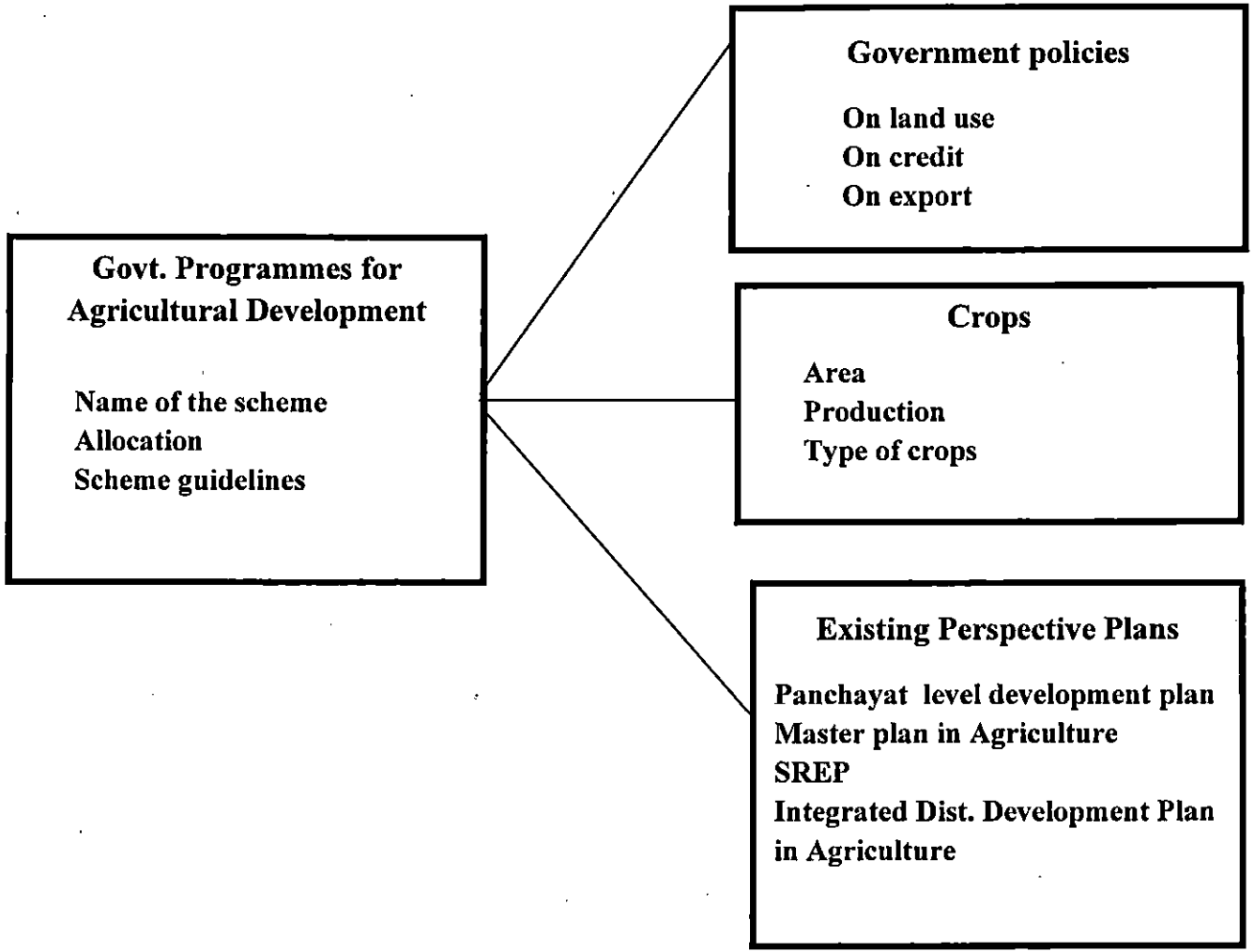


Fig. 23. Data components related to government programmes for agricultural development

SUMMARY

SUMMARY

Though centralized planning, a major feature of Indian economy, is consultative, iterative, and involves several stakeholders, it has been criticized on the ground that it has failed to yield the expected results. On the other hand, micro level planning, which is highly contextual and location specific has been suggested as the best way to plan development projects.

Micro level planning in agriculture warrants generation, maintenance and use of micro level data on a large scale. However, use of development databases for local level planning is currently limited and the existing legacy databases in mandatory registers and records that are traditionally generated and maintained as part of the administrative process are not fully utilised. At the same time initiation of e-governance has created several micro level databases in electronic form, which also could be utilised for micro level planning.

It is in this backdrop, the study proposes to appraise the current status of micro level planning in agriculture in Kerala with respect to use of databases and information. The study would also try to characterize the legacy databases and types of information used for this purpose, with focus on availability and completeness of data. Along side, the study would attempt to evolve a typology of information and data required for micro level planning. The study would also formulate specifications regarding the content and hierarchy of an integrated information system for micro level planning in agriculture.

An *ex-post* facto design was employed to suit the objectives of the study. From each of the five agro climatic zones and from Onattukara region, one district was selected. Two blocks were selected at random from each district. Further, four Grama Panchayats were selected from each block randomly. Sample of respondents consisted of 132 respondents, with 66 officers of the Department of Agriculture working with the Grama Panchayat, Block Panchayat and District Panchayat at the rate of one from each of the selected local bodies and 66 People's Representatives who were Chairmen of the working groups on agriculture in Grama Panchayats at the rate of one from each local body.

Variables of the study were selected based on the objectives, review of literature, discussions with experts and observations made by the researcher. Categorization of databases was done by analyzing the registers and documents maintained in Local Self Government

Institutions (LSGIs) and the development departments transferred to them. Variables such as perception of stakeholders on efficacy of micro level planning, perception of stakeholders on efficacy of legacy databases, perception of stakeholders on an Integrated Information System in Agriculture and awareness of stakeholders on rural databases were selected for the study. The responses of stakeholders were collected using Likert scales on five point continuum. The constraints faced by stakeholders on maintaining databases and using them in micro level planning were also explored. The second part of the study emphasized on the information requirement of stakeholders at various stages of micro level planning *viz.* planning, implementation, monitoring, evaluation and follow-up. The important information items required at each stage were studied in detail by collecting responses along a three point continuum that indicated the importance attached to each item. The questionnaires for measuring perception were standardized after relevancy rating, by means of Thurstone scales, for which 15 extension personnel and elected people's representatives each were selected as the judges for rating the items. Similarly, information items proposed for the integrated information system for micro level planning were also subjected to judges' rating by 90 experts including extension scientists, officials of Department of Agriculture and experts in the field of micro level planning. Measures of central tendencies, Kendall's co-efficient of concordance, Mann-Whitney U statistic, Spearman's rank correlation and Cohen's Kappa were employed for analyzing the data by using Statistical Package for Social Science (SPSS).

In order to find out the legacy databases available at the local level, details of various registers kept in Krishi Bhavans and Grama Panchayats were compiled and classified. It was observed that Krishi Bhavans maintained 140 registers under six major categories viz., account based, establishment based, social security service based, registers on comprehensive development, basic registers and project management/ scheme registers. The Grama Panchayats maintained 171 registers under 23 categories viz. establishment registers, account based, finance registers, tax registers, public works registers, office procedure registers and scheme registers.

The registers in panchayat were classified based on practical use or purpose into ten categories such as civil registration, taxes, licenses, finance, accounts, public works, social security, development plan, service delivery and development schemes. The registers in Krishi Bhavans and Grama Panchayats were classified based on the nature of data entry as 'manual',

'digitized' and 'hybrid'. In Grama Panchayats, 73 per cent of registers were found to be manual while 27 per cent followed hybrid system, which involves both manual and electronic data entry. In the case of Krishi Bhavans, only 32 per cent registers were maintained manually while 68 per cent were kept in hybrid system.

Registers were also classified as mandatory, non-mandatory and project based, based on the obligatory nature of the data entry prescribed by existing rules. Mandatory registers came to only 22 per cent in Krishi Bhavans in contrast to 96 per cent in Grama Panchayats. Seventy four per cent of registers in Krishi Bhavans were project based whereas this category accounted for only four per cent of the registers in Grama Panchayats.

Registers in Krishi Bhavans were classified into 10 categories based on their purpose. The purposes included knowing the area, production and productivity of crops, details of beneficiaries, details of employees, natural resources, organizations, input sources, source of services, administrative reports and details of cash transactions.

Registers could be again categorized based on the frequency of updating, which showed that about 95 per cent of registers in Krishi Bhavans and 90 per cent of registers in Grama Panchayats were updated as per transaction. The nature of entry in the register was another criterion adopted for classification of registers. Proportion of transaction based registers in Krishi Bhavans was found to be 92 per cent and that of Grama Panchayats was as much as 94 per cent.

Analysis of registers also showed that their data fields varied from three to ten. In terms of completeness of data entered in these fields, 58 per cent registers in Krishi Bhavans and 64 per cent in Grama Panchayats were found to be complete altogether. The rest were found to be incomplete in several respects. It was also found that 96 per cent of registers in Krishi Bhavans and 98 per cent in Grama Panchayats were 'dynamic', their content got updated regularly based on transactions.

To find out the type of data that would be required for micro level planning in agriculture, the distribution of project based registers across subsectors in agriculture was examined. It was found that the projects belonged to 26 subsectors of agriculture. While rice related projects accounted for 16 per cent, projects on vegetables accounted for 13 per cent and those on

pumpsets, sprayers and agricultural implements formed 10 per cent of the total number of projects.

Data support and information back up on micro level planning provided by 81 per cent of the registers maintained at Krishi Bhavans and 76 per cent at Grama Panchayats were adjudged to be 'adequate'. Further, analysis of the data support provided by legacy registers for different stages of micro level planning *viz.,* resource appraisal, planning, beneficiary selection, implementation, monitoring, evaluation and follow up revealed that about 83 per cent of registers could be used in resource appraisal; 76 per cent in planning, and 73 per cent in implementation of micro level projects. Existing data support for each of these stages was found out by analyzing data available from various registers and their prospective uses. It was also found that the number of projects and the content did not differ from each other significantly in response to the specific features of the agro-climatic zones and Onattukara region.

The second section of the study dealt with the analysis of the socio economic and psychological profile of respondents, which included attributes such as age, education and experience in micro level planning. While 64 per cent of Extension Personnel belonged to the category of low age group, 76 per cent of People's Representatives belonged to medium category. The mean age of Extension Personnel was found to be 40 years and that of People's Representatives was 55 years. As regards educational qualification, while about 62 per cent of Extension Personnel selected for response had Bachelor degree in Agriculture, 47 per cent of People's Representatives held Bachelor degree and 29 per cent had education only upto pre-degree.

The mean number of years of experience of Extension Personnel and People's Representatives in micro level planning were found to be 9.6 years and 7.6 years respectively. It was also found that there was significant difference between the number of years of experience of Extension Personnel and that of People's Representatives.

Perception on efficacy of micro level planning, which included four dimensions such as 'planning', 'participation', 'implementation' and 'impact' assessment was found to follow a distribution with 48 per cent of the Extension Personnel in high category and 61 per cent of People's Representatives in medium category. Planning was perceived as the most important dimension by Extension Personnel while participation was perceived as the most important by

People's Representatives. In the case of Extension Personnel, the second important component was 'implementation' and for People's Representatives, it was 'planning'.

Significant difference was observed between Extension Personnel and People's Representatives in their perceptions on the efficacy of micro level planning as revealed by the estimates of Mann Whitney U test. Analysis showed that Extension Personnel had a greater degree of unanimity among the various responses regarding the relative importance of four dimensions of efficacy, as understood from the measures of Kendall's W. Further analysis showed that perception on dimensions such as 'planning' and 'participation' differed significantly, whereas in the case of 'participation' and 'implementation', no significant difference could be observed. In the case of People's Representatives, they had a greater degree of unanimity among the various responses regarding the relative importance of four dimensions of efficacy.

Perception on efficacy of legacy databases was analysed based on four dimensions *viz.*, completeness, adequacy, reliability and updatability. The respondents were categorized as low, medium and high for all the four dimensions and for aggregate score. The aggregate scores showed that majority (77 %) of Extension Personnel and People's Representatives (70 %) fell under medium category.

Comparison of different dimensions showed that 'reliability' was perceived as the most important dimension by both Extension Personnel and People's Representatives, followed by 'adequacy'. Results of Mann-Whitney U test showed that there was no significant difference between Extension Personnel and People's Representatives in their perception on efficacy of legacy databases as a whole, but showed variation in their perception on dimensions *viz.*, 'adequacy' and 'reliability'.

Extension Personnel had a greater degree of unanimity among the various responses regarding the relative importance of four dimensions of efficacy of legacy databases. Similar results were shown by People's Representatives also.

Perception on the proposed Integrated Information System for Micro Level Planning in Agriculture was studied under four dimensions viz., comprehensiveness, usability, updatability and spatial and temporal orientation. Extension Personnel and People's Representatives were

classified as low, medium and high category. The aggregate scores showed that 60 per cent of Extension Personnel and People's Representatives belonged to medium category.

Both groups of respondents perceived 'usability' as the most important dimension followed by 'comprehensiveness' and 'spatial and temporal orientation'. The comparison of the scores of Extension Personnel and People's Representatives showed that there was no significant variation in the scores on overall perception. On verifying the agreement of Extension Personnel on different dimensions separately using Kendall's coefficient of concordance revealed that Extension Personnel had a greater degree of unanimity among the various responses regarding the relative importance of four dimensions. The result was quite similar for People's Representatives also, as they had a greater degree of unanimity among the various responses.

Scores on the awareness of stakeholders on rural databases and information systems showed that 75 per cent of the respondents were in medium category followed by an approximately equal allocation on low and high categories. The comparison of stakeholders revealed that there was no significant variation in the perception of two groups of respondents.

No significant correlation was found between age and perception on efficacy of micro level planning, perception on efficacy of legacy databases and awareness on rural databases. However, significant negative correlation existed between the perception of People's Representatives on integrated information system and their age. Similarly, experience in micro level planning and the dependent variables of the study, *viz.*, perception on efficacy of micro level planning, perception on efficacy of legacy databases, perception on integrated information system and awareness on rural databases were not correlated.

The information items required for micro level planning could be grouped into 16 categories which include land, water, soil and climate under natural resources. The other categories were demographic characteristics, socio-economic characteristics, crops, technology, details of infrastructure, mechanization, institutions, market, government policies, government programmes for agricultural development, project monitoring and existing perspective plans. In each category, there were sub-categories and a number of information items.

Extension Personnel and People's Representatives differed significantly with respect to their information requirement at various stages of micro level planning.

Information on government policies was found to be the most needed data for micro level planning, followed by data on government programmes for agricultural development and project monitoring. Extension Personnel and People's Representatives mostly required information on technology during the planning phase, followed by information on soil, water and crops. People's Representatives on the other hand mostly required information on government policies followed by information on government programmes for agricultural development.

While Extension Personnel required information on technology and water the most, during implementation phase, People's Representatives required information on infrastructure, followed by mechanization at this stage.

In the monitoring phase Extension Personnel required information on crops the most, followed by information on government policies. However, the People's Representatives regarded information on water as the most important followed by that on crops and soil.

Analysis of the information requirement of Extension Personnel and People's Representatives at evaluation stage showed that for the former, information on water availability was the most important, followed by soil and socio-economic characteristics. People's Representatives expressed high information requirement with respect to government policies followed by details for project monitoring.

In follow-up stage, Extension Personnel mostly required information on crops followed by land, technology etc. People's Representatives at this stage required information mostly on government policies and government programmes for agricultural development.

The study identified the different stakeholder institutions involved in micro level planning mechanism and the data support provided by each. Soil Survey department was found to provide detailed information on soil and land features, socio economic condition, water and climate. The report on watershed also provided details of land, land use patterns, crop details, socio-economic features etc.

Land Use Board provided huge amount of data for micro level planning in the form of different maps which included cadastral maps, thematic maps on land use, details of water resources, soil series data, forest area, MGNREGS worker data, land capability map etc. Cadastral maps provided data on survey number, soil, soil capability, slope, existing land use, water resources, elevation and existing crops. Village Office also provided information on land ownership, land use etc. The other institutions at village level that could provide data for micro

level planning included Veterinary Hospital, Minor Irrigation Department, Anganawadis, Primary Health Care centre, Ground Water Department and Vegetable and Fruit Promotion Council of Keralam.

The concluding section of the study identified the constraints perceived by Extension Personnel and People's Representatives in maintaining and updating databases. Lack of proper mechanisms for regular updation of data was the most severe constraint identified by the respondents. Staff shortage, work load, lack of co-ordination of different government departments etc. were ranked as prominent constraints in the order of the degree of severity.

Policy recommendations

In view of the observations and inferences, the study proposes the following policy recommendations

- Streamline the process of data entry in legacy registers and records so that the data could be used for information systems in the future
- Standardize data collection process in offices so that necessary data is available for various micro level planning functions
- Collect and digitize legacy databases so as to integrate them with emerging information systems
- Extension Personnel and People's Representatives should be trained on the importance of informed decision making and significance of development databases
- Initiate steps to formulate e-governance applications and decision support systems with comprehensive development databases for micro level planning
- Integrate the data obtained from legacy data bases with georeferenced maps and other GIS applications

Conclusion

The study shows that micro level planning in agriculture is an information intensive activity which requires reliable data on several aspects of crop production, natural resources, human resources, policies etc. However, in practice, the process of micro level planning is not supported with adequate data. It is also understood that the stakeholders of micro level planning at Local Self Government Institutions do not depend much on micro level data to formulate

development plans. In fact, several databases are being generated and maintained by government offices as part of their daily transactions. The information required for micro level planning can be easily met by the data available from these sources. Since quality of micro level planning can be improved by using data support, it would be appropriate to develop an Integrated Information System which can ensure easy access to data at the micro level. This information system shall contain all possible information and data on natural resources, financial resources, inputs, technology, human resources and so on. The information system can also be oriented spatially and temporally so that micro level planning becomes more efficient. However, this task is not going to be very easy as the collection of reliable data is a complicated process. This can be overcome by making use of the legacy databases that are generated and maintained at different agencies at the local level. The data in such registers and records could very well be compiled, codified and entered into the information system to enable transaction based updating of resultant databases in the future. This study proposes the different domains that could be included in an Integrated Information System for Micro Level Planning in Agriculture.

REFERENCES

REFERENCES

Abissat, M. K. 2008. Taking ICTs to rural people in Ghana [on line]. Available: http://www.ginks.org/cms pages/Get Biz Form [7Aug. 2012]

Adesope, O. M., Okwusi, M., and Nwachukwu, I. 2010. Nigeria. In: Saravanan, R. (ed.), *ICTs for Agricultural Extension. Global Experiments, Innovations and Experiences*. New India Publishing Agency, New Delhi, 557p.

Ahanene. E. M. 1991. Use of library and information services in development planning – case of local government decision makers in IMO state, Nigeria. *Ann. Library Sci. Documentation.* 38(2): 74-78.

Alex, J. P. 1999. Participatory planning for agricultural development through local self governments: A study of the Kerala experiment. Ph. D (Ag) thesis. Indian Agricultural Research Institute, New Delhi, 192p.

Alex, J. P. 2011. E- governance as a pre-requisite for development: rhetoric and reality. *Indian J.Social Work.* 72(4): 563-588.

Alex, J. P. and Sulaja, O. R. 2012. Knowledge management for participatory planning at the grass roots: dimensions, prospects and issues. *Indian Res. J. Ext. Educ.* 12(1): 87-93.

Andrew, W. and Brian, D. 2000. Measuring efficiency in local governments' planning and function. *Public Productivity Mgmt. Rev.* 23(4): 468-485.

Au-Yeung, A. 1995. *A Guide to Keeping Business Records*, Inland Revenue Department, Hong Kong, 26p.

Ayala, R., Becerra, A., Iribarne, L. F., Bosch, A., and Diaz, J. R. 1999. GIS system as a decision support tool for agricultural planning in arid zones of Spain. *Agric. Engng Int.* [on line]. Available: http://www.cigrjournal.org/ /index.php/Ejounral [27 Nov. 2013].

Babu, A. R., Singh, Y. P., and Sachdeva, R. K. 1997. Establishing a management information system. In : Swanson, B. E., Bentz, R.P., and Sofranko, A. J. (eds.), *Improving Agricultural Extension- A Reference Manual.* FAO, Rome. Available: http://www.fao.org/docrep/w5830e00.htm [30 Oct.2011].

Bell, D. 1979. Communication technology: for better, for worse. *Harvard Business Rev.* 57 (95): 4.

Bhatnagar, S. 2004. The role and responsibility of government in ICT for development. In: Sayo, P., Chacko, J. G., and Pradhan, G. (eds.), *ICT Policies and e-Strategies in the Asia-Pacific, UNDP-Asia Pacific Development Information Programme.* Elsevier India Pvt. Ltd. p.222. Available: http://digitalknowledgecentre.in/files/2012/02/ICT-Policies-and-e-Strategiesin-the-Asia-Pacific.pdf [20 June 2014].

Bhatnagar, S. 2000. Social implications of information and communication technology in developing countries: lessons from Asian success stories. *Electronic J.Inf. Syst. Developing Countries. EJISDC* [on line]. 1(4): 1-9. Available: http://www.ejisdc.org/ojs2/index.php/ejisdc/article/view/4. [4 Jan. 2014].

Bhatnagar, S. C. and Patel, N. R. 1988. Decentralized computing for rural development, OMEGA, *Int. J.Mgmt Sci.* 16(2): 165-170.

Blair, H. 2003. Participation and accountability at the periphery; Democratic local governance in six countries. *World Dev.* 28(1):21-39.

British Columbia, 2014. Official web page of Ministry of Agriculture, British Columbia [on line]. Available: http://www.agf.gov.bc.ca/resmgmt/sf/aap. [07 Dec. 2013].

Byrd, W. A. 1990. Planning in India: lessons from four decades of development experience. *J. Comp. Econ.* 14:713-735.

Charvak, 2000. From decentralization of planning to people's planning: experiences of the Indian states of West Bengal and Kerala. Discussion paper No.21. Kerala Research Programme on Local Level Development, Centre for Development Studies, Thiruvananthapuam. 168p.

Cheema, G. S. and Rondinelli, D. A. 1983. *Decentralization and Development : Policy Implementation in Developing Countries.* Beverly Hills, London. 319p.

Coleman, A. L. and Galbraith, J. M. 2000. *Using GIS as an Agricultural Land-Use Planning Tool.* Virginia Agricultural Experiment Station, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 93p.

Crook, R. C. and Severrisson. A. S. 2003. Decentralisation and poverty alleviation in developing countries: a comparative analysis or, is West Bengal unique. *Public Administration Dev.* 23: 77-88.

De, R. 2006. The impact of Indian E-Government initiatives: Issues of poverty and vulnerability reduction. *Regional Dev. Dialogue.* Vol.27.No. 2. Pp.88-100.

Department of Planning and Co-ordination, 2006. Planning & Co-ordination Department, Nagaland [on line]. Available: http://nagaland.nic.in/planning&coord /index.htm. [03 Feb. 2013].

Devadas, V. 2007. Microlevel Planning: Part II—Impact Analysis Through Scenarios. *Energy Sources*, 19(6): 635-642. Available: http://dx.doi.org/10.1080/00908319708908878. [11 Nov. 2013].

Dutta, D., Acharya, P. S., and Singh, B. 1997. Natural resources data management system approach to water management at local level. In: *Proceedings of National meet on S & T inputs for water resources management*, April 8- 10, 1997, Indian Institute of Technology, Delhi, pp. 87- 98.

Dutta, U. and Singh, Y. 2007. Micro-level planning using spatial database. *Curr. Sci.* 93(7): 921-926.

Environmental Systems Research Institute, 1999. *Getting to Know ArcView GIS* (3rd Ed.). Environmental Systems Research Institute, Redlands, California.567p.

FAO [Food and Agriculture Organization]. 1995. *Planning for sustainable use of land resources, Towards a new approach.* FAO Land and Water Bulletin 2, FAO, Rome, 60p.

FAO [Food and Agriculture Organization]. 2012. Action Plan of the Global Strategy to improve agricultural and rural stratistics in Latin America and the Carribean. *Twelfth meeting of the Executive Committee of the Statistical Conference on the American of the Economic Commission for Latin America and the Carribean;* 24-26 April 2013. Available: www.cepal.org/deype/ publications/externas/8/49728/CE12_ROOM_Agriculture-rural-st.pdf. [14 Jan. 2014].

Gandy, M. 2006. Planning, anti-planning and the infrastructure crisis facing metropolitan Lagos. *Urban Studies* [on line]. 43(2): 371-396. Available: www2.geog.ucl.ac.uk/-mgandy/urbanstudies.pdf. [12 Feb 2013].

Garcia-Molina, H., Hammer, J., Ireland, K., Papakonstantinou, Y., Ullman, J., and Widom, J. 1995. *Integrating and Accessing Heterogeneous Information Sources in TSIMMIS.*

Technical Report. Stanford University. Available: http://pciteseerx.ist.psu.edu.[25 Oct. 2011].

Ghobrial, R. A. 2010. Sudan. In: Saravanan, R. (ed.), *ICTs for Agricultural Extension. Global Experiments, Innovations and Experiences.* New India Publishing Agency, New Delhi, 557p.

Ghosh, A. , Ghosh, P.K. and Dutta, D. 2011. Development of Spatial Databases for Sustainable Micro-level Planning of Chandanpur Mouria, Purulia, West Bengal. *e-Travere. J. Spatial Sci.* 2(2), pp.10-20.

GOI [Government of India]. 2006. *Evaluation Report on Decentralised Experience of Kerala. Programme Evaluation Organisation. Planning Commission. Report No. 195.* Government of India. New Delhi. P.168. Available: www.gangothri.org. [02 Feb. 2013].

GOI [Government of India]. 1987. *District Informatics Programme of National Informatics Centre. DISNIC home page* [on line]. National Informatics Centre, Ministry of Agriculture, Government of India. Available: http://disnic.nic.in/informaticsforgrassrootdev.htm. [4 Feb. 2014].

GOI [Govt. of India]. 2008. *Eleventh report. Second administrative reforms commission. Promoting e-Governance, The smart way forward.* Government of India. Available: http://arc.gov.in/11threp/ARC_11thReport_preface_contents.pdf. [02 Jan 2014].

GOK [Government of Kerala]. 2009. *Report of the Committee for Evaluating Decentralized Planning and Development.* Government of Kerala, Thiruvananthapuram. 249p.

GOK [Government of Kerala]. 2014. *Official website of Government of Kerala* [on line]. Available: www.kerala.gov.in. [28 Dec 2014].

GOK [Government of Kerala]. 2014. *Sulekha Plan Monitoring System. L.S.G.D.* [on line]. Government of Kerala. Available: http://plan.lsgkerala.gov.in/planning.aspx. [13 Mar. 2014].

Gow, D. D. 1980. *An Information System for the Rural Area Development- Rapti Zone Project.* Development Alternatives, Inc. D.C. 20001. 67p.

Gulati, I. S. 1994. *Panchayati Raj and Development. Msgr. Thomas Nedumkallel Memorial Lecture.* [Lecture notes]. Nirmala College, Muvattupuzha, 24p.

Han, J. 2012. *Towards Efficient Induction Mechanisms in Database Systems.* School of Computing Science, Simon Fraser University, Burnaby, B.C., V5A 1S6, Canada.201p.

Haragopal, G. and Prasad, V. S. 1990. Social base of administrative culture in India. *Indian J. Public Administration*, XXXVI(3):384-397.

Harande, Y. I. 2009. Information services for rural community development in Nigeria. *Library Phil. Practice.* [on line]. Available : http://digitalcommons.unl.edu/libphilprac/271. ISSN 1522-0222. [6 Feb.2014]

Harilal. K. N. 2012, *Planning as an Instrument of Politics? Rethinking the Methodology of Local Level Participatory Planning in Kerala.* RULSG Occasional papers, Centre for development studies, Thiruvananthapuram.p.40.

Heller, P. 2000. Degrees of democracy: some comparative lessons from India. *World polit.*, 52:484-519.

Hooja, R. 2006. Evolving approaches to multi-level planning in India: a historical review. *J. Local Governance,KILA*, 2: 3, p 11.

Information Kerala Mission. 2004. *IKM Annual Report.* Information Kerala Mission, Thiruvananthapuram, Kerala. P.110. Available: http://www.infokerala.org/sites/default/files/Annual_Report/Annual%20Report%202004-2005.pdf [16 Jan. 2014].

Issac, T. M.T. and Franke, R. 2002. *Local Democracy and Development.* Rowman & little field publishers, New York, 241 p.

Issac , T. M. T., Unnikrishnan, P. V., Gangadharan, T., Chathopadhyay, S., Sathyan, L. B., and Varma, A. K. 1995. *Local Level Planning- Learning from Kalliasseri. Kerala Research Programme on Local Level Development*, Centre for Development Studies, Thiruvananthapuam. 141p.

Jackson- Smith , D. 2002. *Planning for Agriculture in Wisconsin, A Guide for Communities*. UW Cooperative Extension and Wisconsin Department of Agriculture, Trade, and Consumer Protection, 96 p.

Janssen, S., Andersen, E., Athanasiadis, I. N., and Ittersum, M. K. 2009. A database for integrated assessment of European agricultural systems. *Environ. Sci. Policy.* 12 (5): 573-587 .

Karim, A., Karim, A. H., Ahlam, M. I., Elsaddig, O., Hassan, O. I., and Ghobrial, R. A. 2004. Sudan Agricultural Information Management: Challenges and Opportunities. In : *The 1st Sudan Agricultural Information Network (SNAIN), RAIN of ASARECA and SNAIN of ARC*, 30-31, August 2004, Khartoum, Sudan. 219p.

Kerala Land Information Mission. 2014. *Official website of Kerala Land Information Mission* [on line]. Government of Kerala. Available: http://bhoomi.kerala.gov.in/ [30 Dec. 2014].

Kerlinger, F. N. 1973. *Foundations of Behavioural Research*. Holt, Renhart and Winston, New York,120p.

Khan, P. M. and Somani, L.L. 2013. *Fundamentals of Extension Education*. Agrotech Publishing Academy, Udaipur. 464 p.

Kumari, M.H.M. and Kumar.A.H. 2013. Women participation in zilla panchayat: A study of Mysore District. *Asian J. Dev. Matters*. 7(1): 84-93.

Kurbett, P. Y. and Badiger, C. A. 2013. An evaluation of job involvement of women officers of KSDA and their contributions to rural women. *Karnataka J. Agric. Sci.*, 26(2): 258-264.

Meera, S., Jhamtani, A. and Rao, D. U. M. 2004. *Information and Communication Technology in Agricultural Development: A Comparative Analysis of Three Projects from India*. Agricultural Extension Network. Overseas Development institute, London, 20p.

Mehta, P. 1995. *CP, LS, DF and E Scales, PADC Instruments*. PADC, Vasant Kunj, New Delhi.

Mishra, S. N. 1986. *Panchayati Raj, Bureaucracy and Rural Development.* Indian Institute of Public Administration, New Delhi-2. 166p.

Mohan , A. K. 2003. *Case Studies on e-governance in India. Municipal Reforms Programme.* Government of Karnataka. Hyderabad, 15p.

Moni, M. 2010. *Impact of Economic Reforms on Indian Agricultural Sector: Application of Geomatics Technology to Reduce Marginalization and Vulnerability of Small Farmers in India.* Ministry of Information Technology, New Delhi. Available: www.gisdevelopment.net/application/agriculture/production/agric0003.htm.[5Mar.2013].

Nagananda, C., Bheemappa, A., and Hirevenkangoudar, L. V. 2006. Profile of ADAs and AOs and Organizational Climate in Karnataka State, Department of Agriculture. *Karnataka J. Agric. Sci.*,19(4): 877-882.

Nair, G. 2000. People's Planning in Kerala. Discussion Paper No.16 KRPLLD, Thiruvananthapuram. In: Oommen. M. A. *Deepening Decentralised Governance in Rural India: Lessons from the People's Plan Initiative of Kerala.* Working paper No.11, ISS Occasional Paper series-33. Institute of Social Sciences, New Delhi, 40p.

NARS [National Archives and Records Service]. 2014. NARS home page, Pretoria, South Africa [on line]. Available: http://www.national.archives.gov.za/index.htm. [13 Jan. 2013].

NIC [National Innovation Council]. 2014. *Data for Development* [on line]. Available: www.disnic.nic.in/ data for development.htm. [04 May 2013].

Oladele, O. I., Subair, S.K., and Sebina, N. V. 2010. Knowledge and utilization of job enrichment techniques among district agricultural officers in Botswana. *Afr. J. Agric. Res.* 5(21): 2918-2924. Available: http://www.academicjournals.org/AJAR [08 May 2013].

Oommen, M. A. 2009. *Report of the Committee for Evaluation of Decentralized Planning and Development.* Government of Kerala, Thiruvananthapuram. 296p. Available : www.lsgkerala.gov.in/htm/PDF/report_decentralised_planning.pdf. [02 Feb.2013].

Pinet, F., Duboisset, M., Demuth, B., Schneider, M., Soulignac, V., and Barnabé, F. 2009. Constraints Modeling in Agricultural Databases. *Springer optimisation and its applications*. 25: pp 55-65.

Planning Commission, 2006. *Evaluation Report on Decentralised Experience of Kerala*. Report No. 195. Programme Evaluation Organisation. Planning Commission. Government of India. New Delhi. P.168. Available: www.gangothri.org.[27 Dec.2013].

Planning Commission, 2008. *Planning at the Grass Roots Level. An Action Program for the Eleventh Plan*. Planning Commission. Government of India. New Delhi. Available: www.planningcommission.nic.in/plans/stateplan/sp_scv2stat.pdf. [4 Mar.2014].

Prasad, L. M. 2001. *Principles and Practice of Management*. Sultan Chand & Sons, New Delhi. 783p.

Ramalingam, R. and Gulati, I. S. 1993. *Recent Experience in Plan Decentralization in Kerala*. Paper presented at the seminar on Panchayati Raj/ Nagar Palika Bills and Its Implications for Local Self-Government and Decentralised Development in Kerala. Centre for Development Studies, Thiruvananthapuram.

Ray, G.L. 1999. *Extension Communication and Management*. Naya Prokash, Calcutta, 324p.

Sachdeva, S. 2008. *Change Management for e-Governance*. Working paper on change management for e-governance. 12p. Available: http://www.indiaegov.org/knowledgeexchg/change_managementv2.pdf [6 Mar. 2014].

Santos-ong, M. 2006. *Digitization: pros and cons, Information and Communications Technology in Library Trends, Security and Ethics*. Manila, Philippines. Available: https://paarl.wikispaces.com/file/view/digitizationprosncons.doc [8 Feb. 2014].

Sau, S. 2014. *Database for planning and development in West Bengal*. 472 p. Available: www.vidyasagar.ac.in/.../Databse_For_**Planning_and_Development**.pdf. [10 Jan. 2014].

Schmidt-Kallert , E. 2005. *A Short Introduction to Micro Regional Planning*. Food and Agriculture Organization of the United Nations, Central and Eastern Europe. Available: www.fao.org/fileadmin/user_upload/Europe/documents/.../Mrp_en.pdf [11 Feb.2014].

Sharma, S. K. and Gupta, J. N. 2003. Building Blocks of an E-Government: A Framework. *Huntsville*, USA. 1(4): 15-30. Available: http://www.igiglobal.com/article/building-blocks-government/3419. [06 Mar.2014].

Shodhganga, 2014. *Gramasabha in Planning Process*. 363p. Available: http://shodhganga.inflibnet.ac.in:8080/jspui/bitstream/10603/354/14/14_chapter7.pdf. [18 Jan.2014].

Siegal, S. and Castellan, N. J. 1988. *Nonparametric Statistics for Behavioural Sciences*. McGraw-Hill Book Company, New York. 399p.

Sigauke, D. T. and Neugomasha, C. T. 2011. Challenges and Prospects Facing the Digitisation of Historical Records for their Preservation within the National Archives of Zimbabwe. *Proceedings of the International Conference on Africal Digital Libraries and Archives (ICADLA)*. 14th–18th November 2011. University of Witwatersrand, Johannesburg, South Africa.

Singh, G. P. 2014. *Srishti – A GIS Framework for Grass Root Level Planning*. National Informatics Centre, Uttar Pradesh. 8p. Available: www.skoch.in/images/stories/Governance_knowledge/GIS%20framework%20for%20Grassroot%20Level%20Planning.pdf.[2 Sept 2014].

Singh, A. K., Mahto, B., and Chandra, A. 2011. Role and scope of information technology in Indian agriculture. *Agrobios Newsl.* 10(3):68.

Smith, A. M. 2005. Data and Database Management: Centralized Versus Decentralized. *Quality Content for Data Management Professionals Since 1997*. Available: www. *TDAN.com.*[11 Jan.2014].

State Planning Board. 1997. *The Report of the Task Force on Electronic Media, Ninth Five Year Plan, 1997-2002*, State Planning Board, Thiruvananthapuram, Kerala.

Sundaram, K. V. 1997. *Decentralized Multilevel Planning, Principles and practice, Asian and African Experiences*. Concept Publishing Company, New Delhi, 510p.

Tornquist, O. 2000. Of new popular politics of development: the Kerala experience, In: Parayil, G. (ed.), *The Kerala Model*. Zed Books, London, pp.301-325.

Traunmuller, R. and Lenk, K. 1996. New Public Management and Enabling Technologies. In: Terashima, N. and Altman, E. (eds.), *Advanced IT Tools*. Chapman & Hall, London,pp. 11-18.

Unnikrishnan, P. V. 2001. *Unfolding a Silent Revolution*. Information Kerala Mission, Thiruvananthapuram. 161p.

Unnikrishnan, P. V. 2004. *Strengthening Local Self Government through IT: A Case Study of Kerala*. Available: www.iceg.net. [2 Sept 2014].

Unnikrishnan, P.V. and Chathopadhyay, S. 1997. A conceptual frame work for a Panchayat Level Information System. In: *Report of the Task Force on Electronic Media for the Ninth Five Year Plan 1997-2002*, Government of India, New Delhi.

Unnikrishnan, P. V. and Sreedharan, E. M. 2001. Information communication technologies: Towards and alternate policy framework for implementation. In: Unnikrishnan, P. V and Sreedharan, E. M. (eds.). *Information Communication Technologies for Human Development: Strategies for the Developing Economies*. Information Kerala Mission, Thiruvananthapuram. 12p.

Vanitha, G. and Kalpana, M. 2011. *Agro-Informatics*. New India Publishing Agency, New Delhi. 241 p.

Vasquez , V. 2011. *Web Focus*. Rural Development Division, United States Department of Agriculture (USDA).

Vasquez, J. M. and Rider, M. 2006. Fiscal decentralization and economic growth: A comparative study of China and India. *Indian J. Econ. Business, Spec. issue China India*: 1-18.

Vercruyssen, M. and Hendrick, H. W. 2012. *Behavioural Research and Analysis*. Taylor and Francis group, London. 279p.

Vidanapathirana, N. P. 2012. *Agricultural Information Systems and Their Applications for Development of Agriculture and Rural Community*. University of Turku, Turku School of Economics, Finland. Available: www.*niprvi@utu.fi* [11 Apr.2013].

Yadav, D. S., Thakur, S. K., Choudhary, A. K., and Sood, P. 2012. Training needs of agricultural extension officers about watershed management. *Indian J. Soil Conserv.* Vol.40 (2): 179-182.

Zaman, M. A. 2002. *Present Status of Agricultural Information Technology Systems and Services in Bangladesh*. Available: http//jsai.or.jp/afita/afita-conf/2002/part 1/p075.pdf. [24 Feb. 2014].

APPENDICES

A

Kerala Agricultural University
College of Horticulture
Department of Agricultural Extension

Project: Specifications of an Integrated Information System for Micro Level Planning in Agriculture: A User Centered Analysis
Questionnaire

1. **Name of office:** **Location:** **Date:**

2. **Collection of data on legacy databases**

Name of register/ Database	Type of register (Manual/ Digital)	Legal nature of register *(M/NM/Project based) Govt. order	Purpose of the register	Periodicity of data entry (Daily/As per transaction/ Others- specify)	Nature of updating (Transaction based/ not transaction based)	Nature of transaction	Physical nature of the register (G/L/S/D/O)	Number of data fields

Name of register/ Database	Type of register (Manual/ Digital)	Legal nature of register *(M/NM/Project based) Govt. order	Purpose of the register	Periodicity of data entry (Daily/As per transaction/ Others- specify)	Nature of updating (Transaction based/ not transaction based)	Nature of transaction	Physical nature of the register (G/L/S/D/O)	Number of data fields

*M- Mandatory, NM- Non Mandatory

G- In good shape
L- Loosely bound
S- Soiled
D- Dilapidated
O- Others if any

B

Kerala Agricultural University
College of Horticulture
Department of Agricultural Extension

Nature of data fields:

i. **Name of the register**
ii. **Name of the office**
iii. **Official who is handling this register**

Name of data field	*Whether complete / not*	*Static/ Dynamic*	*Type of errors*	*Area under which this data field is used*	*Adequacy (VA/A/NA) **	*Purpose ***	*How is the field useful - specify*

Select from the list given below
*VA- Very Adequate, A- Adequate, NA- Not Adequate
**1. Resource appraisal, 2. Planning, 3. Beneficiary selection, 4. Implementation, 5. Monitoring, 6. Evaluation, 7. Follow up

Name of data field	*Whether complete / not*	*Static/ Dynamic*	*Type of errors*	*Area under which this data field is used*	*Adequacy (VA/A/NA) **	*Purpose ***	*How is the field useful - specify*

C

e

Kerala Agricultural University
College of Horticulture
Department of Agricultural Extension

Project: Specifications of an Integrated Information System for Micro Level Planning in Agriculture: A User Centered Analysis

Questionnaire

1. Name of office: Location: Date:
2. Name of the respondent
3. Age
4. Educational qualification
5. Professional experience (in the case of AOs)

Implementing officer	Key Resource Person (level)	Member of Technical Advisory Committee	Others

6. Experience in microlevel planning (peoples' representatives)

Working group chairman	Working group member	Member of statutory committee	Chairman of statutory committee	Resource person (level)	Others

Perception of stakeholders on efficacy of micro level planning

Statements representing different components of the dimensions of the variable viz. *efficacy of micro level planning* are given below. You are requested to rate each item based on the importance perceived by you by marking √ in any one of the cells provided alongside

SA - Strongly agree, MA- Moderately agree, A- Slightly agree, D- Slightly disagree, SD- Strongly disagree

Sl.No	Items	SA	MA	A	D	SD
Planning						
1	The issues which need urgent attention are addressed while formulating projects in micro level planning					
2	Priorities are fixed based on the policy of the government					
3	Objectives of the project reflect the development concerns expressed by the people in *grama sabhas*					
4	Objectives of the project are fixed based on an appraisal of the existing situation in the sector					
5	Duplication of beneficiaries are avoided as much as possible					
Participation						
6	Participation of people in micro level planning is ensured through detailed discussions in the grama sabha					
7	Involvement of all the working group members are ensured in formulating the plan					
8	Representatives of different socio economic categories of farmers are involved in formulating projects					
9	Women representatives are consulted while projects are formulated					
10	Presence and involvement of small and marginal farmers are ensured while projects are formulated					
Implementation						
11	The annual plans are prepared within stipulated time					
12	The projects are approved by the local body within stipulated time					
13	Beneficiary list is presented in the grama sabha					

14	The different phases of the projects are completed within prescribed time limit					
15	Progress of implementation is reviewed by the working group					
Impact						
16	Financial targets of the projects are fully achieved					
17	Social objectives of the projects are accomplished					
18	Impact of the project intervention is estimated after implementation					
19	The project ensures significant changes in the livelihood options of beneficiaries					
20	The project is followed up to ensure further development of the area and the beneficiaries					

Perception of stakeholders on efficacy of legacy databases used for planning at the microlevel

Legacy databases include the formal registers maintained in the local bodies, development departments etc. *Eg: Basic data register in the KB, Semen account register in Veterinary Hospital, Birth register in Panchayat Office etc.*

Statements representing different components of the dimensions of the variable viz. *efficacy of legacy databases used for planning at the microlevel* are given below. You are requested to rate each item based on the importance perceived by you by marking √ in any one of the cells provided alongside.

SA - Strongly agree, MA- Moderately agree, A- Slightly agree, D- Slightly disagree, SD- Strongly disagree

Sl. No.	Statements	SA	MA	A	D	SD
Completeness						
1	Information available from legacy databases is complete					
2	Data fields of all the legacy databases are filled up					
3	All the basic data required in a given sector are available from the legacy databases					
Adequacy						
4	Adequate data for appraising the existing situation in a given sector are available from legacy databases					
5	Adequate data for finding out the gaps in development in a given sector are available from legacy databases					
6	Adequate data for understanding the priority areas in a given sector are available from the legacy databases					
7	The data fields in the registers are useful for decision making					
8	The registers can be used for appraising the development status of a given sector					
9	Legacy registers facilitate implementation of development programmes					

Sl. No.	Statements	SA	MA	A	D	SD
10	Legacy registers enhance transparency and accountability of governance					
Reliability						
11	The data available from registers maintained in local bodies are accurate					
12	Data fields from similar databases maintained in different registers should be same					
13	Legacy registers in local bodies and implementing offices are the only authentic sources of different types data about an area					
14	Similar data registers in different locations contain the same data fields					
15	There is no variation in the procedure with which data are collected and recorded in different registers					
16	The type and number of data registers maintained at a given office are the same across the state					
Updatability						
17	There are provisions to update the data or information in a legacy register					
18	There are well laid out procedures to update information in a legacy register					
19	The registers kept in development offices are updated periodically					
20	It is easy to update data and information in a legacy database					

Perception of stakeholders on 'Integrated Information System for micro level planning in agriculture'

Statements representing different dimensions of "Integrated Information System for Micro Level Planning in Agriculture" are given below. You are requested to rate each item based on the importance perceived by you by marking √ in any one of the cells provided alongside.

SA - Strongly agree, MA- Moderately agree, A- Slightly agree, D- Slightly disagree, SD- Strongly disagree

Sl.No.	Statements	SA	MA	A	D	SD
	Comprehensiveness					
1	An integrated information system (IIS) in agriculture provides all types of information related to agriculture					
2	Data on agriculture and allied sectors are available from the IIS					
3	IIS integrates information from all the agencies in the agricultural sector					
4	IIS integrates all market information services					
5	IIS provide adequate support for decision making on development intervention					
	Usability					
6	IIS make data available for managing the specific mandatory functions of the Agricultural Officer					
7	Different hierarchical levels of officers in the implementing agency can use the IIS for their specific functions					
8	IIS provides information to the general public on the administrative decisions of the local body and the implementing agency					
9	IIS is accessible to all the stakeholders involved in micro level planning					
10	The user learns to handle the IIS quickly					
11	IIS is quick to process data and give reports in usable forms					
	Updatability					

Sl.No.	Statements	SA	MA	A	D	SD
12	The databases in IIS can be updated easily					
13	There is provision to update the information repository of the IIS					
14	Every transaction with citizens enable updating of data in the IIS					
15	IIS can be updated automatically as it is linked to other citizen databases					
	Spatial and temporal orientation					
16	Every transaction with citizens enable updating of data in the IIS					
17	Location of resources can be understood from the IIS					
18	IIS generates trends of various indicators/variables					
19	IIS generates time series data and reports					
20	IIS can make comparison of trends in a given set of time periods					

Awareness on rural databases

Given below are a set of facts on rural databases. Kindly rate the relevance of each item in a test to measure the awareness of respondents on 'rural databases' that can be employed in micro level planning. [SA - Strongly agree, MA- Moderately agree, A- Slightly agree, D- Slightly disagree, SD- Strongly disagree]

Awareness on rural databases

Sl.No.	Statement	SA	MA	A	D	SD
1	Databases for micro level planning are available from different sources within the local body					
2	Micro level planning envisages use of databases					
3	Decentralized planning cannot be done without rural databases					
4	The survey number, area and details of ownership of land are kept in the Village Office					
5	The project details of current year are available at Panchayat Office					
6	The details of all the livestock in the panchayat, are available from the Veterinary Hospital					
7	Number and status of livestock are periodically updated					
8	The area, production and productivity of all the crops are available in Krishi Bhavan					
9	The details of area periodically updated in Krishi Bhavan					
10	The information on the agro machineries in the panchayat, are available from the Krishi Bhavan					
11	The 'Field Map' kept in Village Office contains data on area and position of plots					
12	The comprehensive data on watershed programmes are kept at Soil Conservation Office					
13	Soil Survey Department collects details of soil type, soil series and soil fertility of each locality					

Sl.No.	Statement	SA	MA	A	D	SD
14	The details of water sources in the locality is available from Minor Irrigation Office					
15	The comprehensive information on irrigation of each locality is available from Minor Irrigation Office					
16	Data on fish resources in the locality can be obtained from the Fisheries Department					
17	The details of types and intensity of natural hazards are available in the Krishi Bhavan					
18	The price and market details of agricultural products are not available in the Krishi Bhavan					
19	Panchayat Office has the details of all the roads and transport facilities available in the panchayat					
20	Bio diversity of the locality is collected and registered in a local body					

List out the constraints in maintaining and updating databases

1.

2.

3.

4.

5.

Information requirement of personnel involved in planning process

1. Name of the respondent :
2. Designation of the respondent :
3. Role in micro level planning

The information requirements of personnel at various stages of microlevel planning are listed below. Please indicate the relative importance of each item as Very Important (VI), Important (I) or Not Important (NI).

Sl.No.	Major category of information	Planning (VI / I / NI)	Implementation (VI / I / NI)	Monitoring (VI / I / NI)	Evaluation (VI / I / NI)	Follow up (VI / I / NI)
I	**Natural Resources**					
1.1	**Land**					
1	Physiographical conditions					
2	Elevation					
3	Topography					
4	Land forms					
5	Land capability classification					
6	Land irrigability classification					
7	Crop suitability classification					
8	Hydrologic soil grouping					
1.2	**Land utilization pattern**					
1	Cropped land –location					
2	- area					
3	Fallow land – location					
4	- area					
5	Homestead – location					
6	- area					
7	Plantation – location					
8	- area					
9	Forest area – location					
10	- area					
11	Wasteland – location					
12	- area					
13	Residential area – location					
14	- area					
1.3	**Land use**					
1	Area under crops					
2	Rice- virippu					
3	Rice- mundakan					
4	Rice-puncha					
5	Reclaimed paddy land for nirmithi pradhesham					
6	Reclaimed paddy land for different crops					

Sl.No.	Major category of information	Planning (VI / I / NI)	Implementation (VI / I / NI)	Monitoring (VI / I / NI)	Evaluation (VI / I / NI)	Follow up (VI / I / NI)
7	Area under different crops					
8	Mixed crops					
9	Area under social forestry					
10	Fallow land suitable for cultivation					
11	Fallow land					
12	Kole lands					
13	Marshy lands					
14	Forest and sacred groves					
15	Pasture land					
16	Area of watershed					
17	Features of watershed					
18	Maps of watershed					
19	Unauthorized encroachment					
20	Cadastral information					
21	Survey number of plots					
22	Details of households					
23	Land use pattern (transition)					
1.4	**Mining**					
1	Rocky area					
2	Rock mine- (Karingallu)					
3	Rock mine- laterite					
4	Clay mine					
5	Sand mine					
6	Abandoned mine					
2	**Water**					
1	Details of rivers					
2	Amount of water flow in rivers					
3	Seasonal availability of water					
4	Catchment area					
5	Command area					
6	Ponds - number					
7	Ponds - period of water availability					
8	Wells - number					
9	Wells - period of water availability					
10	Open wells- number					
11	Open wells - period of water availability					
12	Filter point tube wells- number					
13	Filter point tube wells - period of water availability					
14	Height of water table					
3	**Soil**					

Sl.No.	Major category of information	Planning (VI / I / NI)	Implementation (VI / I / NI)	Monitoring (VI / I / NI)	Evaluation (VI / I / NI)	Follow up (VI / I / NI)
1	Drainage channels in the locality					
2	Soil types					
3	Slope					
4	Erosion					
5	Soil depth					
6	Soil texture					
7	Soil fertility status					
4	**Climatological factors**					
1	Rainfall – intensity, spread					
2	Wind speed					
3	Wind direction					
4	Relative humidity					
5	Temperature – minimum, maximum					
6	Cloud					
7	Atmospheric pressure					
8	Solar radiation					
5	**Demographic data**					
1	Men					
2	Women					
3	Children					
4	Handicapped					
5	Widow					
6	Senior citizen					
7	Skilled labourers					
8	Semiskilled labourers					
9	Unskilled labourers					
10	Youth men					
11	Youth women					
6	**Socio- economic characteristics**					
1	Number of households					
2	Rural households					
3	Urban households					
4	SC/ST colonies- location					
5	Annual income of the family					
6	BPL/ APL families					
7	Occupational status of individuals					
8	Number of farm families- large, medium, small					
9	Number of farmers					
10	Number of farm labourers- men and women					

Sl.No.	Major category of information	Planning (VI / I / NI)	Implementation (VI / I / NI)	Monitoring (VI / I / NI)	Evaluation (VI / I / NI)	Follow up (VI / I / NI)
11	MGNREGS beneficiaries					
12	Seasonal migration					
13	Employment status					
14	No. of unemployed professionals					
15	No. of unemployed under graduates					
16	No. of unemployed graduates					
17	Number of government employees					
18	Other occupations					
19	People using ecosystem services					
20	Personal details (age, sex, education, monthly income)					
7(A)	**Crops**					
1	Irrigated area					
2	Rainfed area					
3	Area under each crop					
4	Production of crops					
5	Productivity of crops					
6	Cropping systems					
7	Area under single crop					
8	Area under double crop					
9	Area under triple crop					
10	Area under traditional farming systems					
11	Source of planting materials					
12	Price/ unit of planting material					
13	Diseases- incidence of diseases					
14	Pests- incidence of pests					
15	Fertilizers/ manures					
16	Type of fertilizers required					
17	Price of fertilizers					
18	Plant protection chemicals (PPC)					
19	Type of PPC required					
20	Price of PPC					
21	Processing- facilities/ extent of availability					
22	Product diversification					
23	Machines required					
24	Agro machinery services					
25	Price of produce/ unit					
26	Details of Sericulture, Mushroom cultivation,Bee Keeping etc.					
7(B)	**Agrarian relations**					
1	Land distribution					

Sl.No.	Major category of information	Planning (VI / I / NI)	Implementation (VI / I / NI)	Monitoring (VI / I / NI)	Evaluation (VI / I / NI)	Follow up (VI / I / NI)
2	Land reforms					
3	Tenancy					
7(C)	**Animal husbandy**					
7(D)	**Poultry**					
7(E)	**Fisheries**					
8	**Technology**					
1	Package of practices					
2	New technologies					
3	Technology adoption status					
4	Technology gap					
5	Agencies that provide technological solutions					
6	Cost of technologies					
7	Providers of technology- R and D institutions					
8	Development agencies					
9	Programmes of development agencies					
10	Rural enterprises					
11	Revenue models of enterprises					
12	Agri-business models					
13	Projectisation process					
14	Cost of technologies					
9	**Details of Infrastructure**					
1	Canals					
2	Roads					
3	Schools					
4	Hospitals					
5	Primary Health Centres					
6	Private Hospitals					
7	Government Offices					
8	Type of houses					
9	Shops					
10	Village level computer centres/ Information Kiosks					
11	Internet access and facilities					
12	Telephone facilities- BSNL, Private Mobile Services					
13	Public transport facilities - routes					
14	Other vehicles –private cars, taxis, autorickshaws, bicycles, bullock cart, ambulances etc.					
15	Public distribution system					
16	Civil supplies outlets					

Sl.No.	Major category of information	Planning (VI / I / NI)	Implementation (VI / I / NI)	Monitoring (VI / I / NI)	Evaluation (VI / I / NI)	Follow up (VI / I / NI)
17	Godowns/ storage facilities for food grains					
18	Railway access					
19	Anganwadis					
10	**Mechanization**					
1	Machines for land preparation-common, private					
2	Number of machines					
3	Machines for planting					
4	Machines for intercultural operations					
5	Machines for harvest					
6	Machines for processing					
11	**Institutional details**					
1	Institutions providing credit support					
2	Commercial banks					
3	Private banks					
4	Co-operative banks					
5	Agencies providing inputs					
6	Fertilizer depots					
7	PP Chemicals depots					
8	Source of organic fertilizers					
9	Source of organic plant protection chemicals					
10	Co-operative societies					
11	Extension institutions					
12	Producers' societies					
13	Rural organizations					
14	Funding agencies of watershed programmes					
15	NGOs					
16	Agencies supporting SHGs					
17	NHGs					
18	Private Agencies					
19	Institutions dealing with consultative services					
20	Institutions dealing with Social Security					
21	Institutions of beneficiary group					
12	**Market**					
1	Number of markets					
2	Type of markets					
3	Volume of markets					

Sl.No.	Major category of information	Planning (VI / I / NI)	Implementation (VI / I / NI)	Monitoring (VI / I / NI)	Evaluation (VI / I / NI)	Follow up (VI / I / NI)
4	Commodities marketed					
5	Market outlets					
6	Wholesale markets					
13	**Government policies**					
1	On land use					
2	On land reclamation					
3	On subsidies					
4	On input supply					
5	On credit					
6	On marketing					
7	On export					
8	On import					
9	International agreements					
10	WTO provisions					
14	**Government programmes and schemes for agricultural development**					
1	Name of the scheme/ project					
2	Total allocation					
3	Sponsoring agency					
4	Implementing agency					
5	Scheme guidelines					
15	**Project monitoring**					
1	Number of projects – sector wise					
2	Outlay – year wise distribution					
3	Physical targets of previously implemented projects					
4	Financial targets of previously implemented projects					
16.	**Existing Perspective Plans**					
1	Panchayat level development plan					
2	Master plan in agriculture					
3	Strategic Research Extension Plan – SREP					
4	Integrated District Development Plan in agriculture					
Additions if any may kindly be provided below along with brief descriptions						

SPECIFICATIONS OF AN INTEGRATED INFORMATION SYSTEM FOR MICRO LEVEL PLANNING IN AGRICULTURE: A USER-CENTERED ANALYSIS

By

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ABSTRACT OF THE THESIS

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ABSTRACT

Micro level planning is a dynamic process which involves planning at the grassroots level taking into consideration the individual, family and category of the community. Considering the diversity of crops and the geographical and socio- economic characteristics of agriculture, micro level planning has been suggested as the best way to plan agricultural development projects. Kerala has evolved a robust mechanism for micro level planning through democratic decentralization. Micro level planning is highly information intensive and it requires information flow from different hierarchical levels.

This study appraised the current status of micro level planning in agriculture in Kerala with respect to use of databases and information. The study tried to characterize the legacy databases and types of information used for this purpose, with focus on availability and completeness of data. Along side, the study attempted to evolve a typology of information and development databases required for micro level planning. Specifications regarding the content and hierarchy of an 'Integrated Information System for Micro Level Planning in Agriculture' was also formulated.

The study employed an ex-*post* facto design to suit the objectives. Sample included 132 respondents, with 66 officers of the Department of Agriculture working with the Grama Panchayat, Block Panchayat and District Panchayat selected and 66 People's Representatives who were Chairmen of the working groups on agriculture at the rate of one from each local body.

In order to find out the legacy databases available at the local level, details of various registers kept in Krishi Bhavans and Grama Panchayaths were compiled and classified. Krishi Bhavans maintained 140 registers under six major categories and Grama Panchayats were found to maintain171 registers under 23 categories. The registers were classified based on practical use, nature of data entry, mandatory nature and based on purpose. Registers were again categorized based on the frequency of updating, number of data fields, completeness, subsectors of agriculture and adequacy. The data support provided by legacy registers for different stages of micro level planning *viz.*, resource appraisal, planning, beneficiary selection, implementation, monitoring, evaluation and follow up was also explored.

Analysis of the socio economic and psychological profile of respondents and their perception on efficacy of micro level planning was also attempted. Comparison of the perception on efficacy of micro level planning, which included four dimensions such as planning, participation, implementation and impact, showed that 'planning' was perceived as the most important dimension by Extension Personnel and 'participation' was perceived as the most important by People's Representatives.

Analysis of the perception on efficacy of legacy databases which included four dimensions *viz.*, completeness, adequacy, reliability and updatability showed that 'reliability' was perceived as the most important dimension by both Extension Personnel and People's Representatives.

Perception on the proposed Integrated Information System for Micro Level Planning in Agriculture was studied under four dimensions *viz.*, comprehensiveness, usability, updatability and spatial and temporal orientation. Both the groups perceived 'usability' as the most important dimension. Scores on the awareness of stakeholders on rural databases and information systems showed that 75 per cent of the respondents were in medium category.

The information items required for micro level planning were identified and grouped into 16 categories *viz.* land, water, soil, climate, demographic characteristics, socio-economic characteristics, crops, technology, infrastructure, mechanization, institutions, market, government policies, government programmes for agricultural development, project monitoring and existing perspective plans. The overall information requirement of stakeholders in micro level planning showed that information on government policies was the most needed and valuable data, followed by data on government programmes and data on project monitoring.

The different stakeholder institutions involved in micro level planning mechanism were identified and the data support provided by them was explored. Soil Survey Department, Land Use Board and Village Office were found to provide pertinent data for micro level planning. With regards to constraints, Extension Personnel and People's Representatives identified lack of proper mechanisms for regular updation of data as the most severe constraint. The study also proposed a conceptual model for an Integrated Information System for Micro Level Planning in Agriculture.