

**A COMPARATIVE STUDY OF TRIBAL AND  
NON-TRIBAL AGRICULTURAL PRACTICES AND  
ITS EFFECTS ON AGRICULTURAL DEVELOPMENT.**

( A CASE STUDY OF LAKHIMPUR BLOCK )

***A Dissertation***

SUBMITTED

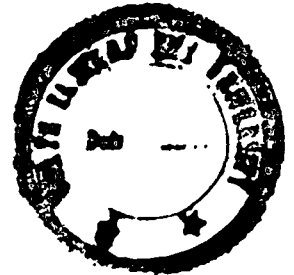
IN

PARTIAL - FULFILMENT OF THE REQUIREMENT FOR THE DEGREE OF

MASTER OF PHILOSOPHY

IN

ECONOMICS



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Certified that the subject matter of this dissertation is the record of work done by Mrs. Banti Gogoi How Bora, that the contents of this dissertation did not form a basis of the award of any previous degree to her, or, to the best of my knowledge to anybody else, and the dissertation had not been submitted by her for research degree in any other University or institution.

In habit and character, Mrs. Banti Gogoi How Bora is a fit and proper student for the degree of MASTER OF PHILOSOPHY (in Economics).

SHILLONG  
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PREFACE

(i)

This dissertation is a record of the experiences undergone by me while studying the agricultural practices in vogue among the tribal and non-tribal farmers of the Lakhimpur Block of Assam, and associating these practices with the performance of those farmers in raising crops and utilising land and other resources at their disposal. Initially, my outlook was quite traditional, typical of a student trained in the traditional branch of economics, with my ears turned deaf and eyes turned blind to the messages of Institutionalism. It was the constant hammering of my Supervisor, Dr. S.K. Mishra, that I could be awakened from my slumber and I started looking into my research problem from a new viewpoint, with a new methodology.

Initially, after I woke up from slumber, I could hardly understand why my Supervisor was decided to initiate me in 'Institutionalism' and why, looking at my research topic through the coloured glasses of "institutionalism", I won't necessary produce a thoroughly biased research findings. When I expressed this fear to my Supervisor, he suggested me to read Myrdal's "The Political Element in the Development of Economic Theory". It took me long time to read and comprehend what Myrdal writes in the said book. But after a great deal of effort, when I

(ii)

could grasp the imports of that book, I was dismayed. I could hardly believe how much biased a student of traditional economics might be, and how ignorant of his bias!

I realised that biases in social science cannot be erased simply by keeping to the facts and by refined methods of statistical treatment of the data. Facts, and handling of data, sometimes show themselves even more pervious to tendencies toward bias than does pure thought. I was convinced that the chaos of possible data for research does not organise itself into systematic knowledge by mere observation. Hypotheses are necessary. We must raise questions before we can expect answers from the facts and the questions must be significant.

There is no way of studying social reality other than from the viewpoint of human idea. A disinterested social science has never existed and, for logical reasons, can't exist. The value connotation of our main concepts represents our interest in a matter, gives direction to our thought and significance to our inferences. It poses the questions without which there are no answers.

Hence I made up my mind. Instead of going to the field and collecting data with a bias of which I am ignorant and work with a make-believe that I am unbiased, it

is better to be fully aware of my ideological precepts and ask questions and ask significant questions knowing fully well why do I ask certain questions. If a disinterested social science can never exist, then I must know my interest. If a researcher must have biases, then they should be explicit in his approach. The research work, then, will remain biased — there is no way to purge a social science research of the ideological biases — but explicit biases add honesty to research. I believe that a biased and dishonest research is worse than a biased but honest research.

A reader of this dissertation will find the tint of institutionalism explicit throughout the text. Disregard for institutional variables and bereftment of the elementary considerations of social psychology are the sine qua non of research in the traditions of the establishment economics. I wonder if economists ever think of what C.G. Jung said of the social psychology — the collective subconscious. It is indeed a fact that need seriously be taken care of. Every community has a collective subconscious. Most of the social and economic behaviour are guided not by the individual consciousness, what one calls rationality, but by the collective subconscious, an impression of which is there in the minds of every individual

member of that particular community. Of course, there is something called individual subconsciousness. The thought and acts are guided by individual subconsciousness also. Thus, there are two components of the unconscious behaviour: one that is guided by the collective subconsciousness and has a regularity and communality at the societal level, and the other that is purely personal and works out to be random at the societal level. The conscious behaviour added to these two unconscious behaviour make up the total of behaviour.

Economic behaviour, the endeavours of a man directed toward meeting the material requirements of life, is a complex of three types of behaviour – collective subconscious behaviour, individual subconscious behaviour and individual conscious behaviour. For traditional economics, the first two are non-existent; for an institutional economist, all the three are existent and the first one is dominant.

Then the explanation of economic behaviour must look into the mores, customs, traditions, beliefs, attitudes and social norms which an individual is subject to. No simple "economic explanation" will do.

Ever since Adam Smith, the establishment economics has continuously made great efforts to mould its methodology on the line of physical sciences, and more Newtonian an economist has been, more scientific he has been considered by the profession. To be "scientific" then, it is required to assume a man an object under the push and pull of extraneous forces and the economy to strive continuously for an equilibrium in a physicist's sense. Rationality in this sense is an induced gravitational force. To be 'scientific' is to be Newtonian and to purge economic analysis of all values, habits, subconscious tendencies and make the economic science an "objective" study. We have parted with this "objectivity" in our approach, since we sincerely believe that economics can neither be moulded on the lines of physical sciences, nor can it be value-free. Economics is the study of man and society and it must involve itself into a study of the set pattern of habits of thinking and acting and its repercussions on human behaviour in general and economic behaviour in particular. Hence our "institutional approach" incorporating sociological, economic, anthropological and social psychological considerations of economic behaviour.

In Chapter I, we have presented the objective of our study and the methodology adopted. We have presented the

odds against our methodology, and after presenting a critique of the Schultzian methodology, we have justified our own. We have provided an outline of our research work, the procedure of data collection and concept of agricultural practice.

In Chapter II, we have presented the characteristic features of our study area, the sample villages, the typical agricultural practices carried out in these villages and thus we have provided a background for an empirical research.

In Chapter III, we have analysed our sample data and found out the discernible patterns in the data. We have found how tribals and non-tribals differ among themselves and in which dimensions.

In Chapter IV, we have searched for the determinants of agricultural productivity and utilization of land resources. We have shown how institutional variables are significant in explaining agricultural performance of farmers in our study area.

In Chapter V, we have gone in for suggesting some policy guidelines for agricultural development, provided a summary of the study and closed the investigation.

This research work has been a pleasant experience for me. It is better not to mention my gratitude to my Supervisor; to remain silent is a more impressive expression of my intense feelings.

I acknowledge my sincere feeling to my father-in-law, mother-in-law and brother-in-law for their silent sacrifices without which I could not have dreamt of completing this work.

I would like to express my gratitude to all my teachers in the Department of Economics for their valuable suggestions and inspirations from time to time.

I am obliged to the Principal, Lakhimpur Girls' College who encouraged me to take up the research work.

Besides, I would express sincere thanks to my sisters, Swapna, Tilu, Raju, Javeen, Mrs. Bina Sarmah, Sumitra, Mayashree and brothers Biswambhara, Atul, Tultul, Tripti, Horen, Nitul & other friends for their helpful attitude and refreshing company.

I take this opportunity to put on record my heartfelt **thanks** to Mr. Joseph F. Khongbuh for typing out my dissertation with utmost care.

(viii)

The completion of my study is the result of affection, co-operation and inspiration of my worthy husband Mr. Premananda How Bora, for which no words are sufficient to express my heartfelt gratitude to him.

Our little baby "Pranju" has been a great source of encouragement and inspiration while finishing this research work.

In spite of the best and most valuable that I could receive from all whom I have offered my gratitude by name, and many others whose name could not be mentioned here on account of the human weaknesses of which, I believe, I share the larger portion, there may be errors and omissions betraying my consciousness. For such errors and omissions I and I alone should be put to blame and criticism.

*Mrs Banti Gogoi How Bora*

(BANTI GOGOI HOW BORA )

SHILLONG

THE 15th JULY 1987.

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Discriminant Analysis: Tribal  
vs Non-tribal Farmers -  
Discrimination between non-tribal  
and Mishing farmers - Discrimina-  
tory Classification of village  
wise, community wise observations  
- Elasticities of Discrimination  
- Concluding remarks.

CHAPTER - IV : DETERMINANTS OF AGRICULTURAL 73 - 92  
PERFORMANCE

Opening remarks - Institutional  
factors and agricultural practices  
- Interrelationships among Insti-  
tutional factors and agricultural  
practices - Some interesting rela-  
tionships - Two principal compo-  
nents - Determinants of Kharif  
Productivity - Determinants of  
intensity of cropping - A summary  
- References.

CHAPTER - V : POLICY IMPLICATIONS AND CONCLUDING 93 -106  
REMARKS

Opening remarks on social planning  
- Some guidelines for agricultural  
planning - Concluding remarks -  
References.

BIBLIOGRAPHY 107 -110

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CHAPTER - I

INTRODUCTION

## 1. The Subject Matter of the Present Study

This study is a modest attempt to analyse the differences in agricultural practices carried out by tribal and non-tribal farmers of the Lakhimpur Block of the District of Lakhimpur, Assam, and recognise the effects of these practices on the overall development of agriculture sector of the Block.

The classification of the farmers in tribal and non-tribal categories has much to do with the patterns, conventions and attitudes of the farmers of the Block. We hold that conventions and attitudes of tribal and non-tribal farmers are significantly different and due to this, agricultural practices carried out by them differ significantly. These differences have significance with regard to utilisation of land and other material inputs for raising crops and, in turn, the overall development of agriculture sector in the Block.

## 2. Some Doctrines at Odds

In the literature on agricultural economics there has been rather a convention to scoff at the approach that we have adopted in this study. To quote T.W. Schultz, a widely acknowledged authority on agricultural economics stimulating a vast research work in India:

The niggardliness of agriculture in poor communities is frequently attributed to particular cultural values.... As a rule, however, it is not necessary to appeal to differences in such cultural values, because a simple economic explanation will suffice.<sup>1</sup>

No less amount of criticism has been faced by us when we had discourses with a number of scholars on our approach of study. Frequently, it was argued that we are illicitly assigning the causes of low productivity to "tribality". It was alleged that the views held by us are reminiscences of the Western views on the causes of underdevelopment of colonials.<sup>2</sup>

It is felt necessary, therefore, to discuss in detail why we hold a particular opinion and to substantiate it by empirical evidences. This study is motivated to attempt at the same.

### 3. T.W. Schultz's "Simple Economic Explanation"

The gist of "Simple Economic Explanation" of low productivity of agriculture forwarded by Schultz is as follows:

In a particular community the low productivity of agriculture is due to (a) unfavourable attitude towards work, (b) contempt of literate youth towards manual work, (c) lack of thrift and wasteful consumption, (d) the lack of the virtue of being industrious. Due to the factors

enumerated above low input of labour and capital in agriculture is made and thus it results into low productivity.

But the four factors noted above are none of the cultural variables as they can be well explained by economic arguments.

Differences in work, thrift and industry related to economic activities can be handled as economic variables. It is not necessary to appeal to cultural differences to explain particular work and thrift behaviour because economic factors provide a satisfactory explanation. Incentives to work more than these people do are weak because the marginal productivity of labour is very low, and incentives to save more than they do are weak because the marginal productivity of capital is also very low.<sup>3</sup>

Now, let us see what Schultz has to say on the reasons of the observed low marginal productivity of labour and that of capital.

It is an equilibrium at which agriculture gradually arrives over a long period, provided particular conditions prevail.... The critical conditions underlying this equilibrium are as follows: (1) the state of arts remains constant, (2) the state of preference and motives for holding and acquiring sources of income remains constant, and (3) both of these states remain constant long enough for marginal preferences and motives for acquiring agricultural factors as sources of income to arrive at an equilibrium with the marginal productivity of these sources viewed as an investment in permanent income streams and with net savings approaching zero.<sup>4</sup>

As agriculture approaches the particular equilibrium..., the marginal productivity of investment in additional agricultural factors continue to decline. There then comes a point when the rate of return is so low that there is no longer any incentive to save for additional investment in these factors.<sup>5</sup>

The low level equilibrium postulated by Schultz implies that "there are comparatively few significant inefficiencies in the allocation of factors of production in traditional agriculture."<sup>6</sup> This implication has been empirically substantiated by him through the findings of Sol Tax in "Penny Capitalism" which shows that farmers of Guatemala are very poor traditional farmers and they are very efficient in allocating their resources. One more case has been cited: the study by W.D. Hopper, "The Economic Organisation of a Village in North Central India" which shows that the farmers of Senapur are poor but efficient allocators of resources.

Based on the two case studies referred to above, Schultz concludes:

The community is poor because the factors on which the economy is dependent are not capable of producing more under existing circumstances. Conversely, ... the observed poverty is not a consequence of any significant inefficiencies in factor allocation.<sup>7</sup>

4. A New Question: Can it be explained by Schultz's Hypothesis/Theory?

Now let us think of a situation as depicted here: There are two communities living for generations in quite identical geographical economic, political and meta-social environment. Both of them are exposed to the same market situations for selling their products as well as for purchasing material inputs. Both are equally free to allocate their resources to raise crops, spend their income frugally or thriftily as they desire, adopt agricultural practices as they think fit; but productivities on their farms differ significantly. These communities are open to each other — each can learn unconstrainedly from the other if one thinks fit to do so. Ownership of resources among these communities also is not dissimilar. Then too, one community produces less per area cultivated while the other community produces more. Both of them are traditional farming communities - but one produces less than the other. For Schultz,

The people are obviously hard working, thrifty and acute in selling their crops, renting land, and buying things for consumption and production. The community is not an isolated subsistence economy, but is closely integrated into a larger market economy. Yet, hoes, axes, and machetes are not replaced by better tools and equipments. There is not even a wheel. Coffee leaves used as fertilizers are not replaced or supplemented by chemical fertilizers. Traditional varieties of corn are not replaced by hybrid seeds.... The traders and firms in the

towns that serve this community are not offering for sale any of the superior factors. If one wanted to plan a community like Panajachel that would go on for decades without any change in the state of arts on which it was dependent, it would strike one as impossible within the market economy of Guatemala. Yet Panajachel has been doing the impossible in this respect for generations.<sup>8</sup>

is a great puzzle. For us: Two communities working under identical, political, economic, geographical and meta-social situations, endowed with same resources produce significantly different amounts per bigha of land they cultivate: is the puzzle. Our puzzle is more intriguing because Schultz's economic explanation proves of no avail to help us solve the puzzle. Naturally, our hypothesis is: what Schultz has emphatically denied to be of any relevance and what his followers have scoffed at, are the real explanations, and the observed differences in productivity are explainable only in terms of "cultural differences".

##### 5. An Institutional Approach to Economic Analysis

We would not, however, call them "cultural" differences — rather we will use the term "Institutional" differences. By "Institutions" we mean the settled habits of a community with regard to thinking and acting.<sup>9</sup> In this study we will empirically corroborate the stand that the settled habits of thinking and doing have decisive impacts on the

economic performance of the farmers and hence, without taking these facts into account no analysis of economic behaviour can really make a point. We will show how the tribals of our study area believe that sowing by women gives larger amount of product. They worship the mother of earth and spread paddy seeds ceremonially. The dance sequence is performed and it is believed that it appeases the divine power who bestows upon them a good harvest. In the middle of cultivation they perform rituals so that ancestral spirits may protect the flowering sprouts from pests and other natural calamities.

It may be noted that due to the beliefs mentioned above, female participation in agriculture is increased. Now, in the family farming the explicit cost of cultivation is low and it affects the "cost-sensitiveness" of the farmer. This, in turn, affects "return-sensitiveness" also. On the whole it adversely affects the efforts of the farmer to improve agricultural practices.

Such beliefs as a good harvest or otherwise is due to the wishes of God or gods (observing Ali Ai Ligang) also indicates that on the part of the tribals there will be few efforts to seek the earthly causes of good harvest or bad harvest and to improve upon the existing practices of

cultivation. Such a system of believing and acting accordingly is the characteristic feature of tribal farming which results into low yield.

#### 6. Schultz's Thesis of Allocative Efficiency Examined

The thesis of allocative efficiency is primarily based on the postulate of rational economic behaviour. Secondly, it is based on so many other assumptions which often do not come out in explicit statement and thus remain tacit. Ashok Rudra has dug out these tacit assumptions.

If each farmer is using inputs and producing crops in such a fashion as to maximise profit, if farmers are not subject to constraints which are different for different farmers, if they are subject to the same production function, and if they are faced with the same product and factor prices.... No observer has, however, come and reported such a perfect heavenly harmony in any part of Indian agriculture ... that there is a certain size distribution, and that different farms even with the same soil quality use inputs in different quantities and produce crops in different combinations is sufficient to demolish the said analytical framework for being fantastic and absurd.<sup>10</sup>

Further, Rudra shows how the use of geometric average as used in testing the efficiency hypothesis is a sure proof (under the condition of different holding size of different farmers) of their allocation being inefficient by the very implication of the model itself. By pointing out the inherent contradiction in the method how efficiency

hypothesis has been tested in the literature Rudra draws our attention to the fact that no considerate analyst will seriously make any attempt to test the hypothesis of allocative efficiency in the prevailing situation. But this issue is not our central point of discussion.

We will rather embark upon the first and primary postulate of "rational behaviour." Let us see what T. Scitovsky<sup>11</sup> opines about rational behaviour:

Economics, having originated in the age of reason, has adopted the rationality of man as one of its basic postulates. Today, in the age of unreason, psychologists and psychoanalysts have gained a lot of understanding of the dark, irrational forces that motivate men; but while the general public has readily accepted their interpretation of human motivation, the economist - perhaps only among social scientists - still clings to the assumption of human rationality ... whatever psychoanalysts may say to the contrary ... man is neither wholly rational nor wholly irrational. From the proven rationality of a limited aspect of his behaviour one cannot deduce that he is rational in everything - just as one cannot generalise from the manifest irrationality of some of his behaviour characteristics either .... Not surprisingly, perhaps, economists are human. They sometimes do and sometimes do not find what they are looking for; but very seldom do they find what they are not looking for. Their faith in man's rationality is almost absolute.<sup>11</sup>

Viewed as such, there is no reason to believe why a particular community will behave extremely rationally in allocating resources such that farming will produce the

maximum amount of output per unit area of land or allocate resources perfectly rationally between consumption and investment and so on.

Alternatively, one may think of humanity as a species of animal which got its substantial biological type definitely established thousands of years ago. But since then while the race, this species of animal, has been keeping substantially the original type, there have been enormously large changes in the way in which the species has lived.

The change is:

Due substantially not any improvement in the human brain, but to the gradual accumulation of certain habits of thinking. The reason why the life the people live now ... is that men have gradually through their minds acquired certain ways of utilising the world around them to satisfy their needs. In that process there have been built up elaborate societies .... They have acquired queer tastes .... Men acquire habits of thought unconsciously through the exercising of their powers, which means that the kinds of thoughts that men get is shaped by their daily activities.<sup>12</sup>

Rationality of human behaviour as postulated by economists is one among those habits of thought which are characteristic of a modern age and mainly abstracts the habit of business calculation. They are drilled into the part of the population which is engaged in the task of business management.

What the orthodox economists following Bentham have been doing substantially is to impute this particular habit of thought, this institution, to mankind at large, and to argue about how people would behave in case this is the only economic institution of consequence in contemporary societies. One may say, therefore, that the orthodox economic theory can be regarded as a monographic treatment of the logical implications of one set of economic institutions.<sup>13</sup>

From what has been noted above, one thing is clear. If two communities have developed two sets of institutions — two sets of settled habits of thinking and doing — productivities on their farms may differ significantly, irrespective of the fact that the economic, political, geographical and meta-social environments they live in are identical. The only difference that would be observed among these communities is the way they carry out farming and why they carry out farming as they do would be explained only by what are the differences in their institutional set up. If one makes an effort to seek the causes of the observed differences in Schultzian style, nought will be explained.

#### 7. A Consideration of X-efficiency

We have already noted that the thesis of allocative efficiency rests primarily on the axiom of rationality and

rationality in Economics is synonymous with "market rationality". That is to say that farmers allocate their resources in such a way that the economic benefit over and above costs are maximised.

Now we want to raise some fundamental issues. We would like to examine the concept of optimality. Notionally, optimality is a state attained (or possibly attainable) by a decision maker, by choosing appropriate levels of certain decision variables, which represents the most desired level of the aspiration function consistent with a set of constraints impinging on the aspiration function directly or indirectly through the decision variables. Operationally, such a state can be attained only if the aspiration function is clearly, unambiguously, determinately and statically defined. But now let us think of a situation in which aspiration function is fuzzy, stochastic or dynamic. These qualifications may be equally effective for constraints also. Under such a situation, the most rational decision maker will make discounts for fuzziness, stochasticity and dynamicity of the whole decision field. But an unconsiderate analyst may, however, try to test his optimality hypothesis unduly considering the aspiration function and constraints crisp, deterministic, static and well defined. There will be now a difference between what the analyst is seeking and

what he really gets. This gap may be, in some sense, recognised as X-efficiency.

Why then must we think that the farmers in a particular community must allocate their resources so as to maximise their net benefits over costs of inputs in the light of the knowledge of product and factor markets? To be purely Benthamite, the farmers must indulge in a calculus of pleasure and pain, and going against the set values and practices may be felt more painful and much less pleasure-some. If the farmers of a community feel happier in rationalising the farming practices adopted by them both when they produce more and when they produce less, how can one hold for sure that they act irrationally? In this sense, rationality becomes a metaphysical concept that defies empirical testing altogether.

Most business firms fail to minimise costs per unit of output either because some of the inputs they employ are not marketed or because the production function, the technical relationship between inputs and output, cannot be completely specified or fully known; more generally, 'X-efficiency', or rather the non-allocative aspects of inefficiency, is due to inertia, a conservative desire for manoeuvring room, and imperfections in markets for knowledge.<sup>14</sup>

Economic agents are typically non-maximisers but gradually adopt maximising behaviour as external pressure on them increases.<sup>15</sup>

Now, in a family farming, as has been noted earlier, cost-sensitiveness as well as return sensitiveness of farmers is rather poor and blunt. Due to subsistence farming there is hardly any external pressure felt by these farmers. It is no surprise then, that much is left for X-efficiency to explain. The contribution of X-efficiency on productivity may be suitably explained by "Institutional" factors, which cannot be explained by the Schultzman theory or economic arguments.

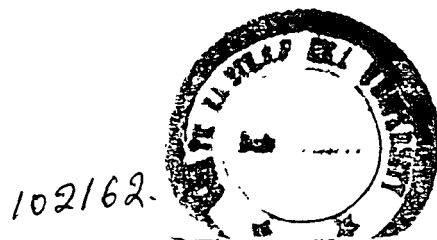
The belief system of a particular community may be untrue and such a system of belief would, epistemologically, not be considered as knowledge. Actions based on such a belief system may not lead one to the goals aspired for; at worse, they may detract the achievements farther from the goals that could otherwise have been met. From this point of view such a belief system may either be considered as an absence of knowledge or a misplaced confidence. Nevertheless they are apt to be rationalised and not to be improved in the light of experiences.

#### 8. A Revisit to the 'Tribality' argument

If tribality argument labeled against our approach is based on the suspicion of racial prejudice that might be germane to such an approach, we must explicitly declare that we do not hold any particular institutions to be intrinsically and characteristically associated with any particular

race. Nor we hold that a particular set of institutions prevalent in a particular community at a given time will necessarily continue to prevail in future also. But a particular set of people (and their offsprings) belonging to a particular tribe will remain members of that particular tribe for ever. No Santhal will ever become a Munda and no Missing can become a Boro. But no set of institutions are such as to be characteristically and unalterably associated with Santhals, Munda, Missing or Boro or any other tribal community or any non-tribal community for that matter. Beliefs and attitudes change. They change automatically with changing economic, technological, political and meta-social environment and they can be moulded deliberately and in a planned way.

What we want to stress, however, that a particular community, tribal or non-tribal, has a particular set of beliefs, attitudes and valuations — institutions prevailing at a given point of time and these institutions may be different from those prevailing among other communities. These differences — their nature and genesis are what the social scientists study. These differences have relevance with regard to explanation of differences in economic behaviour and performance of different communities. We shall try to remember throughout our enquiry that material facts



in large measure are the product of what people think, feel and believe.<sup>16</sup>

#### 9. A Note on Agricultural Practices

As it has already been proclaimed in the opening section of this chapter, the present study aims at analysing the differences in agricultural practices carried out by tribal and non-tribal farmers in Lakhimpur Block of the District of Lakhimpur, Assam, and recognise the effects of these practices on the overall development of the agriculture sector in the Block. It is necessary, therefore, to describe what we mean by "agricultural practices" in the present study.

"Agricultural practices" refers to a multifaceted entity. It has four major facets, namely, (1) technical, (2) economic, (3) institutional, and (4) coercive.

The 'technical' facet of agricultural practices comprises of the types of inputs used, types of agricultural output produced, the structure of input and output mix, rotation of crops, single or multiple cropping, the techniques used for harvesting, sowing, storing, transportation to market, etc.

The 'economic' facet of agricultural practices comprises of the exchange relations of the farmers in product and factor markets and how the farmers use explicit, imputed or expected prices as signals for his allocative decision-making.

The 'institutional' facet of agricultural practices comprises of the beliefs, attitudes, values and social relations held by the farmers in general which motivate, justify, and rationalise the technical and economic aspects of agricultural practices carried out by the farmers as a particular community.

The three facets of agricultural practices above have a full scope for individual wishes or desires to operate. There is nothing in them that compels or restrains a farmer by force or authority to choose one or to discard another type of agricultural practice. But the coercive facet, sometimes at work, forces a farmer to adopt one type of practices and to discard another type of practices against his volition, on the instructions given to him by some human agent. For example, if a tenant farmer cultivates a particular crop not because he finds it fit, but because his landlord wishes him to do so and disobeying him may result into ejection. In such a case, the agricultural practices adopted by the farmer in example has a coercive facet also.

It is obvious that these facets of agricultural practices are not unrelated with one another. They cut across each other and influence each other significantly. These facets of agricultural practices change their structure under the influence of changes in property rights, creating incentives for economic action; technology, creating possibilities for changes in the process of production and resource utilization; and ideology, the system of moral and ethical beliefs which influences how the perception of individuals and a community are translated into action.<sup>17</sup>

#### 10. The Methodology of the study

We purport to study the differences in agricultural practices and their impacts on agricultural development in the Block of Lakhimpur empirically through selecting some villages from the Block. The selection of villages is based on our proclaimed objective of distinguishing the tribal agricultural practices from the non-tribal ones. For such a study we have selected two villages; one inhabited by tribals exclusively and another inhabited by non-tribals exclusively. Nevertheless we want to study the stability of tribal agricultural practices under the condition of an explicit exposure to the non-tribal agricultural practices. Hence we select a third village inhabited by a mixed population - where tribals and non-tribals form approximately a ratio of two to one.

Mahaijan (Mishing), the village that is exclusively inhabited by tribal population has 65 households, while Sonari village, exclusively inhabited by non-tribal population has 92 households. Badhakora, the village inhabited by the mixed population has 224 households, out of which 148 are tribals and 76 are non-tribals.

In Sonari village about two-third of workers are engaged in farming and about one-third of the workers are engaged in non-primary occupations or activities, the majority of whom are in service in the North Lakhimpur town. A few are engaged in trade and commerce in the village. In Mohaigan and Badhakora villages over 90% of the worker population are engaged in farming and the rest are engaged in commerce and traditional household industries.

In view of the limitations that we face, we have selected thirty households from each village for collecting data. For Mohaigan and Sonari villages we prepared two separate lists of households exclusively dependent on agricultural activities (not engaged in secondary or tertiary sector occupations) and order-listed them (separately for both villages) according to the first name of the head of the household. From these lists we identified thirty households in both the villages using the systematic sampling

procedure. In case of each village, the first household was selected by random selection. But for the village Bodhakora we prepared two lists, one for tribal farmers household and the other for non-tribal farmers household. Both lists were ordered in accordance with the first name of the head of the household. Again, from each list we selected proportionate samples following the systematic sampling procedure.

Table 1.1.

Name of the vil- lage	No. of house- holds inhabi- ting	House- holds exclu- sively engaged in farming	No. of sample house- holds inter- viewed	Sample as % to total popula- tion house- holds	Sample from tribal house- holds	Sample from non- tribal house- holds
Mohaijan Mishing	65	58	30	52	30	0
Sonari	92	52	30	58	0	30
Bodhakora	224	209	30	14	18	12
Total	381	319	90	28	48	42

A gist of the sampling strategy adopted by us is represented by the figures in table 1.1. It may be observed that we have tried to represent tribal and non-tribal farming households in the mixed village by our samples proportionate to their populations and moreover, we have tried

to draw almost equal number of tribal samples as the non-tribal samples so that their proportion is quite even in the total samples drawn.

We have thought it unnecessary to keep up proportions with regard to number of households in each village. Were we to keep up these proportions, either we had to draw too few samples from Sonari and Mohaijan, or too many samples from Bodhakora villages as the numbers of households in the three villages are largely uneven. The last alternative would have strained us on account of our limitations while the first alternative would have been inadequate to represent purely tribal agricultural practices. Moreover, we have considered it unnecessary to represent villages; for our purpose, representation of tribal farming households and non-tribal farming households is more important.

After the sample households in each village were identified, we approached them with a pre-tested questionnaires. We filled in the questionnaires by the direct interview of the head of the household.

After filling in the questionnaires, we tabulated them and constructed required measures to facilitate our analysis. Throughout our study we have relied considerably on statistical analysis of multi-variate type. Justifica-

tion for these statistical methods used by us are elaborated as and when they have been applied in the subsequent chapters.

Applicability of very sensitive and rigorous statistical methods might be very limited in the present analysis in view of the inflexibility and poor sensitivity of the system which we are trying to study and a great deal of reporting inaccuracies and poor quantifiability of data that could be collected by us. Hence, wherever possible we have preferred to use more robust statistical methods and to avoid using sensitive statistical methods. In testing the hypotheses as well, we have been less stringent in matters the level of significance chosen. We hold that in face of the problem and data we are dealing with, such an approach is justifiable.

After the exercises of analysis, we have attempted to suggest some guidelines for the development policy with regard to the agriculture sector of the Block. These suggestions are partly based on the present study and partly on extraneous studies the author is aware of. In making these suggestions we have kept in mind that it is not enough to provide modern inputs, irrigation facilities and finance to the farmers; they must be motivated to change

their attitudes and value system. We recognise the community mores to be an important determinant of economic achievements of a community. Mores change through time, but usually the rate of change is very slow. For rapid change in them in a desirable direction a great effort of educational planning is required. That is what we have suggested.

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CHAPTER - II

THE STUDY AREA, THE SAMPLE VILLAGES, THE  
TYPICAL FARMERS AND THE FARMING PRACTICES

### 1. The Study Area

Our study area, the Lakhimpur Block, is one of the Development Blocks in Lakhimpur District, Assam. The District Lakhimpur is situated on the North Bank of Brahmaputra River. The District is bounded on the north by Subansiri and Siang Districts of Arunachal Pradesh; on the east by a part of Lohit district of Arunachal Pradesh and parts of Dibrugarh and Jorhat districts of Assam; and on the west by Sonitpur District, Assam.

Lakhimpur district is comprised of two subdivisions; North Lakhimpur and Dhemaji. The Lakhimpur Block is in the North Lakhimpur Subdivision.

The Lakhimpur Block is bounded by Arunachal Pradesh in the north, Tehasi Mauza and Nowboisa Block on the south, Subansiri river and Dhaknakhara Development Block on the east and river Kanganadi on the west. The Headquarters of the Block is situated at Konwargaon, three kilometres away from the district headquarters, Lakhimpur town.

The Development Block was initially set up on 1.10.1961 and started functioning at project stage since 1.4.68. Now it is recognised as stage II Block. Under the developmental jurisdiction of this Block, there are 244 villages covering the geographical area of 832 square kilometers.

According to 1971 Census, the total population of the Block was 102,824, of which 54,146 were males and the rest females. The total number of scheduled caste population was 3,704 while the total number of scheduled tribe population was 72,634. Thus, 3.61% of the population was scheduled caste and 25.7% of the population was scheduled tribe. Among the tribal population, the majority belongs to the Mishing tribe. Other two important tribes are Damis and Kacharis.

According to 1971 Census, about 96% of the people were engaged in primary sector activities, mainly cultivation. The total cultivable land in the Block is around 50 thousand acres, supporting over a 100 thousand of population; the per capita cultivable land amounts to  $\frac{1}{2}$  acre.

The Block is comprised of six Gram Panchayats and four Mauzas. The Block Headquarters is located at a distance of three kilometers from the railway station and the district headquarters. Within the Block there are four railway stations and seven post offices. Evidently, one post office serves 35 villages located in an area of over 100 square kilometers.

Three roads pass through the Block and are motorable. The total length of roads within the Block is 111 kilometers, out of which 52 kilometers are pucca and 61 kilometers are

gravelled. Out of 244 villages in the Block, 89 villages are connected by pucca road and are located within a distance of three kilometers the nearest railway station.

The Block is endowed with only one primary health centre and one rural dispensary. It is evident that provisions of health facilities in the Block is very poor.

There are 150 primary schools, 19 middle and secondary schools and 11 high schools in the Block. There are 9 adult literacy centres working at present in the Block.

Though about 96% of the people are engaged in cultivation, there is hardly any major or minor irrigation project functioning in the Block. As a result, the degree and extent of multiple cropping is very poor (1.12), that is to say that about 12% of the total area is doubly cropped. Provisions of institutional finance for agricultural and allied activities are very poor. There are numerous primary agricultural credit and multipurpose societies in the Block, but their poor status can be reflected by some statistics about them. The total number of memberships of these societies is 3605, the share capital is Rs. 36050, the total deposits Rs. 59,303, the loan advanced by them is Rs. 90,593. The outstanding loan amounts to Rs. 1,85,484 and the loan overdue is Rs. 85,316. These statistics show

that the financial and credit need of the farmers in the block served by these societies is indeed insignificant.

We have selected three villages from this Block for the purpose of the study at hand. These villages are: Mohaijan (Mishing) village, Sonari village and Bodhakora village. The first village is exclusively inhabited by tribal population, the second is exclusively inhabited by non-tribal population, and the third is a mixed village, inhabited by both tribal and non-tribal population. Now, we undertake to present a general description of these villages.

## 2. Mohaijan Mishing Village

Mohaijan Mishing village is situated in the eastern side of the Block headquarters. The village is inhabited by Mishing tribe population. The distance between the village and North Lakhimpur town is about 8 kilometers and the nearest railway station is 10 kilometers away from the village. The North Lakhimpur town is connected with the village by a PWD gravelled road which is not a public bus route. The usual modes of transportation to and from the village are bicycle, jeep, bullock cart, etc. It may be mentioned that the village, like most of the tribal villages of Assam, is not in an advantageous location. The distance

between the village and the river Dholnadi is about  $\frac{1}{2}$  kilometer only. During the rainy season, flood occurs very often and the villagers face serious transportation and communication problems.

According to 1971 Census, the village Mohaijan is reportedly a big village. But in fact, at present, the village is territorially divided into two villages, one inhabited by the tribal population exclusively and the other by a mixed population. The mixed village is ethnically heterogeneous, inhabited by non-tribals and tribals of different communities. But the Mahaijan Mishing village, that we selected for the study at hand, is ethnically one, inhabited exclusively by Mishing tribe. Mohaijan Mishing village is inhabited by 65 households and the number of population in the village is 385.

The Mishing tribe is a riverine tribe. This tribe is living amidst the Assamese people since the last seven centuries as far as the historical records are available. Amidst a chain of political, social and religious changes, which Assam has undergone in the last seven centuries, the Mishing tribe has been able to keep its own distinct identity. It has kept up its own dialect of language. Withstanding the influence of all changes, this tribe still maintains most of its characteristic social customs, mores, traditions, and religious beliefs.

The Mishings, now inhabiting the riverine areas of the Upper Assam Valley especially in the districts of Lakhimpur, Dibrugarh, Sibsagar and Darrang, are blood-relations of the tribal people living in the Abor Hills, now in the Arunachal Pradesh. Although there is no recorded historical evidence to ascertain the exact date and the causes of the Mishings coming down and settling in the plains of Assam, there is no dearth of folklore and folktales among the Mishings tracing their origin to the Abor Hills and the people now living there. The very distinct and main characteristic feature of a Mishing village is its location on the side of river. Because of such a location, these villages have to confront all the evils of natural calamities, such as flood, soil erosion, etc.

Like any other Mishing village, Mohaijan also is typically located on the side of river. Agriculture is the principal means of support of this village. A few varieties of paddy is cultivated here. The cultivation of other crops is insignificant.

The institution of hiring labour is not yet evolved in this village. This is because of the institution of mutual help and cooperation among the households of this tribe living in the village. These tribal families extend mutual help and cooperation in cultivation — sowing and

harvesting, and construction of house, etc. This institution refrains the development of the typical market economy in which labour is sold and purchased.

It has been observed that the people of this village are strongly animistic in their religious beliefs and practices. To have a good harvest, to protect the life of the members of the family and domestic animals, they have to perform quite a number of rituals throughout the year propitiating the spirits.

Their consumption requirements are defined not only in terms of the day-to-day needs, but also in terms of the requirements for social and religious functions which involve a considerable amount of food materials. Retention of food grains for the next year in defence of the possible poor agricultural returns is hardly any matter of concern for them. In terms of both, food materials and human labour, the tribal religion and social functions are considerably expensive, which, consequently, affect retention of food grains. It has been observed that whatever this tribal community produced in a year, is totally exhausted within the same period as they observe social and religious functions several times a year. For the production of the necessities of life, the Mishings have to depend solely on the bounties of nature and the blessings of their deities.

They almost absolutely depend on agriculture. The family members are almost always engaged, along with all the resources at their disposal, for producing food from the land. They hardly take care for educating their children who, instead, are engaged in farming and allied activities, wherever they fit into the system. Lack of education makes them unfit for non-agricultural occupation outside the village. Their little concern for education is revealed by the thinness and irregularity of attendance of students in the primary school located in the village.

As regards the use of agricultural tools and implements by the farmers, they are typically traditional. They use wooden ploughs, spades, seed drill harrows, khanti, sickle, etc. They use bullock cart for carrying their agricultural products to the market.

Farming is absolutely rainfed. There is no facility developed for irrigation. As a result, no summer crops are cultivated. Almost all farmers cultivate the Ahu and Bao varieties of paddy that grow in the Kharif season.

It is to be noted that in general Ahu and Bao are cultivated by "spread" method, which is a specific practice of sowing paddy seeds. The field is ploughed and paddy seeds are spread in the field and the soil is lightly levelled.

The alternative practice (which Mishings seldom adopt) is of growing the paddy seedlings and when they are some 5 weeks old, uprooting them and transplanting them in prepared fields. This last practice is almost associated with cultivation of Sali variety of paddy (that Mishings seldom cultivate). Due to several technical reasons, in spread method more seeds are required per area of land cultivated. Secondly, a good number of seeds do not germinate at all as they are pressed underneath a heavy load of soil and some lie on ground and cannot take deeper roots. Again, since the plants are haphazardly distributed on the land, they cannot be easily freed from weeds. In general, they take longer time to grow and bear lower yield in comparison to transplanted plants. The "spread" practice prevalent among Mishings is one of the reasons why they reap poorer crops.

They solemnly believe that sowing by women gives larger amount of product. They worship the mother of earth and spread paddy seeds ceremonially. The dance sequence is performed and it is believed that it would appease the divine power who would bestow upon them a rich harvest. In the middle of cultivation they perform rituals so that ancestral spirits may protect the flowering sprouts from pests and other natural calamities.

Many of the ceremonies of sowing and harvesting are time bound. There are specific days and periods for performing them. It is very natural that it would affect their effectiveness. Since the farming is absolutely rainfed and rainfall is not very timely quite often, the time boundedness of sowing often does not concord with the technical requirements. The discordance between the timings of their ceremonial sowing and the opportune time suiting the rains that makes sowing most effective, is one of the reasons why they reap a poor harvest very often. But all this is due to some fault that they have committed by not being able to appease the spirits, they believe. To their mind it is not due to the fact that they have gone very far to appease their gods in observing ceremonial sowing when the technicalities did not quite warrant them. But whatever may be the reason, their belief in observing the sowing ceremonies more carefully next year is reinforced.

Their unshakable belief in sowing by women increases family involvement in farming. Harvesting also is done mainly by women. Further reinforced by the institution of mutual help and cooperation among the neighbours, their farming is cost-insensitive. They hardly use any input that they buy from the market. Hence they develop but weak and quite robust feeling about the "calculus of cost and

benefit." The induced insensitiveness makes them less indulgent in seeking out new methods and practices of cultivation and reinforces the existing practices of cultivation.

Their firm belief in the mercy and anger of spirits and gods as the causes of good or bad harvest does not allow them to protect their crops from pests and allied crop diseases by the use of chemicals. Obviously, other farmers living in surrounding villages use chemicals to protect their crops from pests (as we will see in case of the farmers in Sonari village)- they know this, but they do not like to adopt this practice. Nor they use any chemical fertilizers or manures like cowdung, etc.

The description that we have made above clearly shows that one of the reasons why the farmers of Mohaijan are likely to perform poor in raising crops is that the agricultural practices carried out by them are not efficient, though they have a system of rationalising beliefs that keeps them contented with the low yeild and poor living standard. Naturally, no system of belief enters directly in the production function, which is a technical relationship between inputs and output. But the system of belief enters into the production function via making the allocation inoptimal and affecting the X-efficiency. We have

elaborated how Mishings of our study village do not make optimal use of the resources at their disposal and what are the reasons for such inoptimal utilization.

### 3. Sonari Village

The Sonari village is situated in the south eastern side of North Lakhimpur town. The village is inhabited by non-tribal population exclusively. This village is located at a distance of 3 kilometers from the town of North Lakhimpur.

The village is fairly large with 92 households. The total area of land owned by the households is 315 acres. The economy of the Sonari village is agricultural in the main, though about 40% of the worker population goes out to the town as industrial workers, artisans, shopkeepers and other professionals. Around 60% of the total workers is directly engaged in cultivation.

Winter paddy, locally known as Sali, is widely cultivated as the major crop. Ahu variety of paddy is the next popular crop. Some cultivators have deep tube wells for irrigation purpose. These cultivators grow Rabi crops also. Use of manures is very common. Cowdung is often piled up and spread as manure in the field a few weeks before sowing. Except in case of a few farmers, the use of

chemical fertilizers is not in vogue in general. Use of chemical fertilizers is frequent in Rabi cultivation. Use of pesticides is made by some farmers, but it has not yet been very popular.

Female participation in farming activities is, in general, not in vogue. A few families have been, nevertheless, observed in which women work in harvesting season. Children are not participating in farming activities at any stage. Almost all of them attend schools and colleges depending on their age. Hiring of labour for ploughing, sowing, weeding, harvesting, thrashing and carrying home from the field is very common. In the village there are a few landless households. But they supply only a small fraction of the total labour force hired by other farmers. The main supply of hired labour is from the workers inhabiting in surrounding villages. In a few families, there are no adults free to work on farms. They all are engaged in service in the town. For cultivating their land they depend solely on hired labourers.

Some farmers grow potatoes and green vegetables. Obviously they do not grow them for their own consumption. They are marketed to the town, which is located at a distance of three kilometers only. Cultivation of green vegetables is highly paying to them.

Cultivation of high yielding variety or improved variety of seeds has not yet been adopted. It may be so probably because most of the farmers do not have any irrigation facilities. Some farmers who have such facilities have not yet shown any interest in adopting the HYV cultivation.

There is nothing special to note with regard to the tools and implements being used in farming. They use wooden plough and other traditional tools. Thrashing is carried out in the traditional manner.

#### 4. Bodhakora Village

The Bodhakora village is situated in the south eastern side of the town, Lakhimpur, at a distance of about 9 kilometers. The nearest railway station is at about 12 kilometers away from the village. A tributary of Subansiri is running by the side of the village.

According to 1971 Census, Bodhakora was inhabited by 1523 people out of which 1040 were tribals. The people of this village are the immigrants from various parts of Assam. Among the tribals, there are Sonowals, Kacharis, Lalungs, Deuris and Mishings. Although this is a village of mixed ethnicity, there is no observable impact of one community on the social customs, mores, traditions and beliefs of any other community living in the village.

Although the village is located at a little distance from the district headquarters, no marked diversification of occupation is noticeable in the village. The economy of the village is predominantly agricultural and subsistence oriented.

Though the village is located at a short distance from the district headquarters, there is no direct approach road to the village. From the town side, three kilometers of PWD gravelled road leads to the village. After that one embankment is constructed by the side of the village which serves the purpose of embankment-cum-road to the village. During the rainy season, floods occur very often and the villagers face acute problems in transplantation and communication. In fact, the village occasionally remains cut off from the rest of the place around for several days during rainy season. Almost all households own boats to be used on various occasions during rainy season.

Ahu variety of paddy is the major crop cultivated by the farmers in Bodhakora. Many farmers sow Ahu paddy in the month of June-July in the midst of floods and use boats to reach their field for sowing. On occasions, seeds are washed away by the flood water.

In the village two practices of paddy cultivation prevail. One in which paddy seeds are sown and when seedlings become about five weeks old, they are uprooted from the soil and transplanted in other fields. The other practice is of sowing seeds by spreading them in the field, and let them grow there till they bear paddy and are harvested. The yield rate of paddy in the first type of practice is rather higher than that in the second type of practice.

Use of fertilizers and pesticides is not prevalent. Even manures like cowdung are not used by the majority of farmers.

Hiring of labourers in farming activities is prevalent. Usually, tribal farmers do not hire labourers. This is partly because they get enough supply of labour from the womenfolk and children. They get cooperation from the other households belonging to their own community. Such a practice of cooperation and help is not observed across the community. However, female participation in farming is less frequent among non-tribal farmers. Hence they often hire labourers. But the major supply of labourers is from outside the village.

Apart from social relationship that may be expected to grow among the residents of the same village, the economic relationship across the communities is observed in Bodhakora. This economic relationship is mainly established due to lending of money. Some non-tribal farmers are professional money-lenders. Money-lending across the tribal communities is not observable.

There is a distinct difference in tribal and non-tribal communities with regard to their values about educating their children. These values are reflected in the fact that while no non-tribal children aged seven years were seen not going to schools, such cases in tribal communities in the village are many. The general literacy among the non-tribal adult population is higher than that among the tribal population.

Shop-keeping is the most important non-primary occupation in the village. But in shopkeeping only non-tribals are engaged. They sell the commodities of daily use. Prices of all commodities they sell are quite high in comparison to those prevailing in the Lakhimpur town. Shopkeeping and money-lending are often dealt in by the same family.

## 5. A Summary of the Typical Agricultural Practices in Sample Villages

In what we have presented as introductory notes on the villages that we have selected for our study, it is worth noting that two distinct types of agricultural practices are prevalent. One type of agricultural practice is associated with the tribal farmers and the other is associated with non-tribal farmers. The characteristic features of the first type of farming practice are:

- (a) Absolutely subsistence-based farming; no trace of cash crops that may be sensitive to prices in the market.
- (b) Exclusively Kharif cultivation and hence single cropping practice.
- (c) Cultivation of Ahu and Bao varieties of paddy seeds.
- (d) Cultivation by 'spread' method and absence of transplantation practice.
- (e) Absolutely rainfed farming; no provision for irrigation.
- (f) Supply of labour from family members and neighbours on cooperative and mutual help basis; absence of the institution of hiring labourers.
- (g) Involvement of children in farming activities.
- (h) Observing ceremoniality in sowing and harvesting. Rationalisation of good/bad harvest on various non-material reasons.

- (i) Necessary involvement of womenfolk in sowing.
- (j) No use of chemical fertilizers, cowdung and any other manures, no use of pesticides.
- (k) Compulsion in following certain community norms about observing ceremonies in sowing, harvesting, etc. Such compulsions are social in nature and are administered by the respectable men of the community.

In contrast, the second type of farming practice is featured with:

- (a) Predominantly subsistence-oriented farming; cash crops cultivated by some farmers mainly for selling in the market.
- (b) Predominantly kharif cultivation, but Rabi crops are cultivated by some farmers. Double-cropping is not general, but some farmers do it.
- (c) Cultivation of Sali variety of paddy.
- (d) Cultivation by transplantation method.
- (e) Predominantly rainfed farming, but some farmers have irrigation facilities.
- (f) Male family members are working in the field, assisted by hired labourers. Absence of the institution of mutual help and cooperation for meeting the demand for labour in farming.
- (g) No involvement of children in farming.

- (h) No ceremonialities in sowing and harvesting. No rationalisation of good/bad harvest on the ground of non-material reasons.
- (i) Rare involvement of womenfolk in sowing and harvesting.
- (j) Use of fertilizers, manures and pesticides is in vogue, though not very extensive.
- (k) No compulsion in adopting new practices and breaking away with prevalent practices of farming.

The two typical farming practices that we have identified above have more or less definite relationship with agricultural productivity. As we have already mentioned earlier, institutional and coercive aspects of agricultural practices do not directly affect productivity, but they do affect agricultural productivity by strictening or relaxing certain constraints on the choice of the pattern of allocation of resources and their exploitation for raising crops. Many of the aspects reinforce each other. We cannot help but note, moreover, that these practices are distinctly associated with particular communities. The association is not necessary, we concede; however, as the matter of empirical reality, they are at present coexisting. We believe that the association of communities with particular practices can be altered by deliberate planning efforts.

We do not believe the dictum: stateways cannot change folkways. Stateways need not always be coercive, formal and rigid. They may be planned to be persuasive, elastic and variable, and through them it is possible to modify the folkways by slow and long continued effort if the rituals are changed by minute variations.

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CHAPTER - III

A PRELUDE TO THE SEARCH OF DETERMINANTS OF  
AGRICULTURAL PERFORMANCE: AN ELEMENTARY  
ANALYSIS OF SAMPLE DATA

## 1. The Opening Remarks

In the preceding chapter we have already mentioned that for studying the effects of different agricultural practices on the performance of the agricultural sector of the economy of the Block of Lakhimpur, we have collected data from three purposively selected villages of the Block. In this chapter, we present the data collected by us. For the said presentation we have organised the data on the criterion of agricultural productivity. Since our analysis is motivated to find out discernible association between agricultural practices and agricultural performance, and agricultural productivity is one of the most important measures of agricultural performance, we have organised our sample data on the said criterion.

In view of the fact that only a small number of farmers in our study villages cultivate Rabi crops, we have decided to measure agricultural productivity only with reference to the winter or kharif crop. Further, since the paddy is the sole crop cultivated in kharif season, by agricultural productivity we mean productivity with reference to paddy cultivated in winter. Operationally, we thus define agricultural productivity as the amount of kharif paddy raised per unit area (bigha) of land cultivated by a farmer.

After a scrutiny of the organised data we have gone in for some elementary statistical analyses. Our main objective in carrying out these statistical analyses is that we want to know whether tribal and non-tribal farmers can be discriminated on the criteria of the correlates of agricultural productivity, and if so, which correlates are capable of being identified as discriminant variables. In a way, these analyses are a prelude to the search for the determinants of agricultural productivity and differences observed in agricultural productivity associated with different agricultural practices.

## 2. The Organisation of Data

In table 3.1 we have presented the organised data classified according to kharif productivity. Agricultural productivity of farmers ranges from 4 (monds per bigha of land cultivated) to 10. Of course, there are very few farmers falling in 4-6 range and as such, they may be considered to be outliers.

We have already noted that we selected thirty samples from each village. However, a number of sample farmers have not raised any crops on their land in the reference year (1986). Farmers of this type are mostly owning very meager areas of land. In Mohaijan Mishing village such

Table 3.1: Correlates of Agricultural Performance Classified in Productivity Classes.

Correlate Variables	Productivity Classes (monds per bigha)					
	4 - 5	5 - 6	6 - 7	7-8	8 - 9	9-10
No. of farmers	2	1	18	16	22	17
No. of NT farmers	2	0	2	5	18	14
No. of T farmers	0	1	16	11	4	3
Mishing farmers	0	1	16	11	3	1
Non-Mishing T farmers	0	0	0	0	1	2
Average size of Landholding (bigha)	14	12	22.61	11.81	19.55	20.30
Average size of NT Landholding (bigha)	14	0	28.50	9.00	20.83	21.36
Average size of T Landholding (bigha)	0	12	21.90	13.10	13.75	15.30
Average size of Mishing Landholding (bigha)	0	12	21.90	13.10	15.00	20.00
Average size of Non-Mishing T Landholding (bigha)	0	0	0	0	10.00	13.00
Average family size	6.50	9.00	10.22	7.69	6.91	6.47
Average T. family size	0	9.00	10.81	8.54	9.00	7.00
Average NT family size	6.50	0	5.50	5.80	6.44	6.36

Table 3.1 (Contd.)

Correlate Variables	Productivity Classes (monds per bigha)					
	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9-10
Average Mishing Family size	0	9.00	10.81	8.54	9.67	8.00
Average Non-Mishing T Family size	0	0	0	0	7.00	6.50
Adult Literacy rate	75.00	40.00	49.62	42.94	82.27	81.82
Adult Literacy (T) rate	0	40.00	45.40	44.50	40.74	50.00
Adult Literacy (NT) rate	75.00	0	83.35	56.67	91.50	88.64
% of $\geq 7$ years' children not attending school	16.70	0	9.22	9.38	0	11.77
% of $\geq 7$ years' children not attending school (T)	0	0	7.25	13.64	0	66.77
% of $\geq 7$ years' children not attending school (NT)	16.70	0	25.00	0	0	0
Cropping intensity	1.00	1.00	1.04	1.03	1.14	1.14
Cropping intensity (T)	0	1.00	1.05	1.02	1.06	1.00
Cropping intensity (NT)	1.00	0	1.00	1.05	1.15	1.17
Bullock per bigha of land	0.21	0.33	0.26	0.24	0.18	0.17
Bullock per bigha of land (T)	0	0.33	0.28	0.19	0.10	0.22

Table 3.1(Contd.)

Correlate Variables	Productivity Classes (monds per bigha)					
	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9-10
Bullock per bigha (NT)	0.21	0	0.10	0.36	0.20	0.16
Intensity of irrigation	0	0	0	0	0	0.13
Intensity of Irrigation (T)	0	0	0	0	0	0
Intensity of irrigation (NT)	0	0	0	0	0	0.15
Average per capita land	2.37	1.33	2.42	1.54	2.95	3.25
Average per capita land (T)	0	1.33	2.07	1.59	1.44	2.17
Average per capita land (non T)	2.37	0	5.28	1.45	3.28	3.48
Average per capita land (Mishing)	0	1.33	2.07	1.59	1.44	2.50
Average per capita land non-Mishing T	0	0	0	0	1.43	2.00
No. of farmers cultivating Sali	0	0	0	2	15	13
No. of farmers (NT) cultivating Sali	0	0	0	2	15	13
No. of farmers (T) cultivating Sali	0	0	0	0	0	0
No. of farmers cultivating Sali & Bao	2	0	2	2	3	1

Table 3.1 (Contd.)

Correlate Variables	Productivity Classes (monds per bigha)					
	4 - 5	5 - 6	6 - 7	7 - 8	8 - 9	9-10
No. of farmers (NT) cultivating Sali & Bao	2	0	2	2	3	1
No. of farmers cultivating Sali & Bao (T)	0	0	0	0	0	0
No. of farmers cultivating Ahu & Bao	0	0	16	12	4	3
No. of farmers (NT) cultivating Ahu & Bao	0	0	0	1	0	0
No. of farmers (T) cultivating Ahu & Bao	0	1	16	11	4	3
No. of Mishing farmers cultivating Ahu & Bao	0	1	16	11	3	1
No. of farmers using Dung manure	0	0	2	3	17	12
No. of farmers (NT) using dung manure	0	0	2	3	17	12
No. of farmers using dung manure (T)	0	0	0	0	0	0
No. of farmers using chemical F/P	0	0	0	0	6	8
No. of NT farmers using chemical F/P	0	0	0	0	6	8
No. of T farmers using chemical F/P	0	0	0	0	0	0
No. of farmers cultivating Rabi crops	0	0	2	2	10	7
No. of NT farmers cultivating Rabi crops	0	0	0	1	10	7
No. of T farmers cultivating Rabi crops	0	0	2	1	0	0

five farmers were there. In Bodhakora the number of such farmers was nine. In Sonari Gaon no such farmer was found. Thus, in total, 14 farmers fall in zero productivity group whom we will not include in our analysis. That is to say that we will analyse 76 samples hence onwards.

3. Mean and Median values of agricultural productivity; implications with regard to efficiency.

Here we propose a very simple index of agricultural efficiency.<sup>1</sup> This measure, may be designated by E and defined as

$$E = \frac{\text{Median (P)}}{\text{Mean (P)}} \bigg/ \frac{\text{Mean (N}_1\text{)}}{\text{Mean (N}_2\text{)}}$$

Where, Median (P) is the median value of sample observations on productivity; Mean (P) is the arithmetic mean value of sample observations on productivity; Mean (N<sub>1</sub>) is the number of observations on sample productivity with P less than Mean (P) and Mean (N<sub>2</sub>) is the number of observations on sample productivity with P greater than or equal to Mean (P).

If the value of E is greater than unity, it signifies that the universe, as represented by the samples, has more number of relatively efficient farmers. For E equal to unity, the samples are not yielding any clear suggestion.

Now, let us see why this measure may justifiably be used for the purpose mentioned above. We note that if the Median (P) is smaller than Mean (P), a larger number of farmers are producing at lower yield rates while a few farmers are producing at higher yield rates. The ratio of the numbers of such farmers is itself a measure of inefficiency of the population from which the samples have been drawn. We assume, however, that the samples are adequately representing the population from which they have been drawn. The ratio  $\text{Mean } (N_1) / \text{Mean } (N_2) < 1$  is rather a strong measure of efficiency.

It is to be noted that the formula for E may not work in two cases; first when either mean (P) or Median (P) (but not both) is negative; second, when either Median (P), or Mean (P), or Mean ( $N_1$ ) or Mean ( $N_2$ ) becomes zero. In such cases the values of P should be transformed by changing the origin suitably.

An analysis of the sample data collected by us reveals that for non-tribal farmers (41 observations) Median (P) is 8.8 while Mean (P) is 8.276. The value of Mean ( $N_1$ ) is 14 and Mean ( $N_2$ ) is 27. The numerical value of  $E_{nt}$  is equal to 2.051. For tribal farmers, Median (P) is 6.67 while Mean (P) is equal to 7.131. Mean ( $N_1$ ) is 19

and Mean ( $N_2$ ) is 16. The numerical value of  $E_t$  is 0.788. For pooled data, Median (P) is 8 while Mean (P) is 7.749. The values of Mean ( $N_1$ ) and Mean ( $N_2$ ) are 19 and 57 respectively; the value of E is, thus, equal to 3.097. Granted that E is an appropriate measure of efficiency, these statistics indicate that while tribal farming is dominated by inefficient cultivators, non-tribal farming is dominated by relatively more efficient cultivators.

4. Some distinct characteristics of tribal and non-tribal farmers.

From the sample data some distinct characteristic features of tribal and non-tribal farmers are discernible. It may be seen that invariably, Sali is cultivated by non-tribal farmers while Ahu is cultivated by tribal farmers. Family size of tribal farmer is almost always larger than that of non-tribal farmer. In case of literacy rate, tribal farmers score less than the non-tribal farmers. Cropping intensity of tribal farmers is in general lower than that of non-tribal farmers; moreover, in case of non-tribal farmers, productivity and cropping intensity are positively associated. Use of manures, fertilizers and pesticides is characteristically associated with non-tribal farmers, while tribal farmers do not use them at all. All these observations indicate strongly that productivity on tribal farms is lower than that on non-tribal farms.

Invariably, tribal farmers have reported that they believe in and practice worship of gods before sowing, adhere to observing festivities even if they are in debt, and believe that fate determines the return in harvest. They have almost invariably reported that any alteration in the practice of sowing and harvesting will irritate gods. However, such beliefs have not been reported by any non-tribal farmer.

#### 5. Discriminant Analysis: Tribal Vs. Non-tribal Farmers

Our observations in the preceding sections suggest us that we may go in for a detailed analysis to ascertain whether we can discriminate between tribal and non-tribal farmers or not. For such an endeavour we carry out discriminant analysis.<sup>2</sup>

Discriminant analysis is a multi-variate statistical method. Given two sets of samples drawn from two populations, this statistical method tries to construct an index (discriminant score)  $\underline{D}$  such that

$$\underline{D} = \underline{X}\underline{W}$$

$$\text{where, } \underline{W}' = (\bar{X}_1 - \bar{X}_2)' V^{-1}$$

$$\text{and, } X' = [X_1' | X_2']$$

- $X_1$  is in  $n_1$  observations on  $m$  variables.  
 $X_2$  is in  $n_2$  observations on  $m$  variables.  
 $X$  is in  $(n_1 + n_2)$  observations on  $m$  variables.  
 $\bar{X}_1$  is the vector of  $m$  averages of  $X_1$ .  
 $\bar{X}_2$  is the vector of  $m$  averages of  $X_2$ .  
 $V^{-1}$  is the Inverted Variance-Coveriance Matrix of  $X$ .

For discriminant analysis we have selected the following variables:

- (1) Holding size (in bigha) =  $X_1$
- (2) Family Size (in number) =  $X_2$
- (3) Per capita cultivable land =  $X_3 = X_1/X_2$ .
- (4) Literacy rate, i.e. the number of adult literate members in the family as a ratio to total number of adult members in the family =  $X_4$
- (5) Number of children in the family whose ages are not less than 7 years but they are not sent to school and are not literate =  $X_5$ .
- (6) No. of bullocks per bigha of land owned by the farmer =  $X_6$ .
- (7) Kharif productivity, i.e. Amount of crop (paddy) raised on a bigha of land =  $X_7$ .
- (8) Percentage of crop retained for next year, i.e. the amount of crop retained for next year as a ratio to total amount of crops (Rabi & Kharif) raised by the farmer =  $X_8$

We have 41 observations on these variables drawn from non-tribal farmers, and 35 observations drawn from tribal farmers. Thus,

$$\begin{aligned}
 X_1 &= X_{ij1} ; \left. \begin{array}{l} i = 1, 2, \dots, 41 \\ j = 1, 2, \dots, 8 \end{array} \right\} \\
 X_2 &= X_{ij2} ; \left. \begin{array}{l} i = 1, 2, \dots, 35 \\ j = 1, 2, \dots, 8 \end{array} \right\} \\
 \text{and } X &= X_{ij} ; \left. \begin{array}{l} i = 1, 2, \dots, 76 \\ j = 1, 2, \dots, 8 \end{array} \right\}
 \end{aligned}$$

The following table, 3.2 gives averages of the eight variables for tribal, non-tribal and pooled data.

In table 3.3 we have presented the variance-covariance matrix of pooled data, X, using 76 observations. The Discriminant scores have been presented in table 3.4.

The discriminant function is given by:

$$\begin{aligned}
 D_i &= 0.0263X_{i1} - 0.3808X_{i2} + 3.8668X_{i3} + 5.1808X_{i4} \\
 &\quad - 0.9132X_{i5} + 2.6928X_{i6} + 1.0235X_{i7} + 34.1778X_{i8}.
 \end{aligned}$$

where coefficients associated with  $X_{ij}$  are discriminant weights. Further,

$$\begin{aligned}
 \bar{D}_1 &= \bar{X}_1 W = 30.951 \\
 \bar{D}_2 &= \bar{X}_2 W = 14.226 \\
 \bar{D} &= \bar{X} W = 23.249.
 \end{aligned}$$

Table 3.2: Averages of Non-tribal, Tribal and pooled samples on eight discriminant variables.

Variables	Non-tribal $n_1 = 41$	Tribal $n_2 = 35$	Pooled $n = 76$	Discrimi- nandt weight
$\bar{X}_1$	19.610	17.343	18.566	0.0263
$\bar{X}_2$	6.439	9.229	7.724	- 0.3808
$\bar{X}_3$	3.260	1.830	2.601	3.8668
$\bar{X}_4$	0.875	0.444	0.677	5.1808
$\bar{X}_5$	0.073	0.229	0.145	- 0.9132
$\bar{X}_6$	0.201	0.160	0.182	2.6928
$\bar{X}_7$	8.276	7.131	7.749	1.0235
$\bar{X}_8$	0.199	0.011	0.113	34.1118

Table 3.3: Variance-Covariance Matrix of Eight Discriminant Variables.

	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$	$X_7$	$X_8$
$X_1$	86.1930	14.0642	9.7163	0.6605	-0.4766	-0.5153	1.3018	0.3293
$X_2$		9.6210	-1.5238	-0.3156	-0.0916	-0.0837	-0.8163	-0.1125
$X_3$			2.7846	0.2292	-0.0588	-0.0655	0.5932	0.0996
$X_4$				0.1143	-0.0186	-0.0010	0.1887	0.0289
$X_5$					0.1764	0.0039	-0.0191	-0.0035
$X_6$						0.0186	-0.0044	-0.0029
$X_7$							1.4566	0.1046
$X_8$								0.0165

Table 3.4: Discriminant Scores

S.No.	Score	S.No.	Score	S.No.	Score
1.	39.75	2.	30.61	3.	38.33
4.	58.53	5.	32.67	6.	17.55*
7.	18.32*	8.	46.15	9.	30.76
10.	37.38	11.	33.62	12.	32.41
13.	30.87	14.	38.86	15.	28.43
16.	37.51	17.	18.43*	18.	38.50
19.	58.24	20.	28.82	21.	34.79
22.	39.93	23.	38.89	24.	33.06
25.	26.97	26.	30.81	27.	29.48
28.	27.57	29.	33.16	30.	31.99
31.	42.42	32.	33.97	33.	15.05*
34.	11.90*	35.	13.76*	36.	25.03
37.	16.61*	38.	28.82	39.	17.50*
40.	9.81*	41.	31.70	$\bar{D}_1$	30.95
42.	15.04	43.	14.01	44.	14.43
45.	13.46	46.	12.86	47.	11.97
48.	11.55	49.	14.18	50.	13.96
51.	14.67	52.	11.44	53.	13.58
54.	14.25	55.	17.25	56.	10.13
57.	8.23	58.	9.72	59.	18.63
60.	9.26	61.	13.05	62.	11.61
63.	10.57	64.	18.06	65.	12.84
66.	16.31	67.	10.83	68.	11.64
69.	21.88	70.	19.90	71.	14.17
72.	14.07	73.	23.93*	74.	18.98
75.	16.50	76.	20.94	$\bar{D}_2$	14.23

\*signifies outlier score.

A perusal of table 3.4 immediately reveals that 9 out of 41 non-tribal discriminant scores are less than  $\bar{D}$  (23.249). However, out of 35 tribal observations, only one has scored greater than  $\bar{D}$  (23.249). Most of these (mis-classified) scores are obtained by the samples from Bodhakora.

Among the non-tribal farmers 20 obtain discriminant scores that lie below  $\bar{D}_1$  (30.951). Thus about 50% non-tribal farmers score less than the group average and the rest score more than the group average. The median score of this group is 31.702. Among the tribal farmers 23 obtain discriminant scores that lie below  $\bar{D}_2$  (14.276). Thus, about two-third of farmers score less than the group average. The median value of the score for this group is 13.576. These observations again show that tribal farmers are relatively less efficient.

#### 6. Discrimination between non-tribal and Mishing farmers.

Among the observations on tribal farmers, three pertain to Sonowal community living in Bodhakora. The rest of the observations (32 in number) are pertaining to Mishing tribal community. We have carried out discriminant analysis for non-tribal and Mishing tribal farmers. The relevant statistics are given in table 3.5.

Table 3.5: Averages, D's and Weights of Discriminant Function: Non-tribal and Mishing Tribal Farmers.

Statistic	Non-Tribal $n_1 = 41$	Mishings $n_2 = 32$	Pooled $n = 73$	Discriminant Weights
$\bar{X}_1$	19.610	17.844	18.836	0.0202
$\bar{X}_2$	6.439	9.469	7.767	-0.3992
$\bar{X}_3$	3.260	1.832	2.634	3.7154
$\bar{X}_4$	0.875	0.439	0.684	5.2630
$\bar{X}_5$	0.073	0.156	0.110	-0.6738
$\bar{X}_6$	0.201	0.155	0.181	2.9358
$\bar{X}_7$	8.276	6.970	7.704	1.2593
$\bar{X}_8$	0.199	0.005	0.114	36.1382
Ds	32.700	15.000	24.941	-

In spite of some noticeable changes in the statistics, the relative position of farmers in the two groups remain unchanged. Identically the same farmers show outlying traits.

7. Discriminatory classification of village-wise, community-wise observations.

For this analysis we augment the list of our discriminant variables with the following four dummy variables.

- (9) Dummy for indicating whether the sample has been drawn from Mohaijan village. Numerically, if the answer is yes, 1 is assigned and zero otherwise. =  $\underline{X}_9$ .
- (10) Dummy for indicating whether the sample is drawn from Bodhakora village. If the answer is yes, 1 is assigned, zero otherwise. =  $\underline{X}_{10}$

It is, then, understood that if  $X_{i9} = X_{i10} = 0$ , the  $i$ th sample has been drawn neither from Bodhakora, nor from Mohaijan and hence from Sonari village.

- (11) Dummy for indicating whether the sample has been drawn from the Mishing tribal population. If yes, then assign 1, zero otherwise. =  $\underline{X}_{11}$ .
- (12) Dummy for indicating whether the sample has been drawn from Sonowal tribal population. If yes, assign 1, zero otherwise. =  $\underline{X}_{12}$ .

We have run discriminant analysis with the 12 variables noted above. The samples have been grouped into two groups as before; 41 samples of non-tribal farmers comprising of the first group and 35 samples of tribal farmers comprising of the second group.

The averages of the first group, the second group, the pooled samples and discriminant weights are presented in the table 3.6. In the top 8 rows of table 3.7, the covariances of the dummy variables with the first eight variables have been presented. The variance-covariance matrix of dummy variables has been presented in the bottom 4 rows of the table 3.7.

The discriminant scores of the samples drawn from Sonari village have remained unaltered due to the fact that the samples from this village have zero code for all the dummy variables. However, the discriminant scores for rest of the 46 samples have changed. These scores have been presented in table 3.8. For first 30 samples, their scores are identical with those presented in table 3.4 before.

However, due to introduction of the dummy variables, the number of outliers has been drastically reduced. As we see in the table 3.4, three outliers are there in the samples from Sonari, and 6 outliers are there from the non-tribals of Bodhakora. Due to introduction of dummy variables, now Sl. No. 6, 7 and 8 are not outliers any more ( $\bar{D}$  is now 12.751). Sl.Nos. 33, 35, 37, 39, cease to be outliers. From among the tribals only Sl.No. 73 was an outlier that has ceased to be so now. However, two new outliers have been introduced among the samples of tribals: Sl. Nos. 74 and 76; both of them are Sonowals.

Table 3.6: Averages of non-tribal, tribal and pooled samples and discriminant weights of 12 discriminant variables (including dummy).

Variables and Dummies	Non-tribal $n_1 = 41$	Tribal $n_2 = 35$	Pooled $n = 76$	Discriminant weights
$\bar{X}_1$	19.610	17.343	18.566	0.0263
$\bar{X}_2$	6.439	9.229	7.724	- 0.3808
$\bar{X}_3$	3.260	1.830	2.601	3.8667
$\bar{X}_4$	0.875	0.444	0.677	5.1808
$\bar{X}_5$	0.073	0.229	0.145	- 0.9132
$\bar{X}_6$	0.201	0.160	0.182	2.6928
$\bar{X}_7$	8.276	7.131	7.749	1.0235
$\bar{X}_8$	0.199	0.011	0.113	34.1778
$\bar{X}_9$	0.000	0.714	0.329	-7.8133
$\bar{X}_{10}$	0.268	0.286	0.276	-0.3387
$\bar{X}_{11}$	0.000	0.914	0.421	-18.2428
$\bar{X}_{12}$	0.000	0.086	0.039	- 3.8652
$\bar{D}_s$	30.860	-8.462	12.751	-

Table 3.7: Covariances of 4 dummy variables with  
8 discriminant variables and variance  
covariance matrix of dummy variables.

	$\underline{X}_9$	$\underline{X}_{10}$	$\underline{X}_{11}$	$\underline{X}_{12}$
$\underline{X}_1$	- 0.0019	- 0.7616	0.3040	- 0.2592
$\underline{X}_2$	0.7751	- 0.2789	0.7348	- 0.0417
$\underline{X}_3$	- 0.2695	- 0.0584	- 0.3240	- 0.0312
$\underline{X}_4$	- 0.0935	- 0.0263	- 0.1000	- 0.0070
$\underline{X}_5$	0.0050	0.0390	0.0048	0.0338
$\underline{X}_6$	- 0.0053	0.0016	- 0.0116	0.0014
$\underline{X}_7$	- 0.2777	- 0.1224	- 0.3281	0.0436
$\underline{X}_8$	- 0.0364	- 0.0138	- 0.0453	- 0.0013
$\underline{X}_9$	0.2207	- 0.0909	0.1904	- 0.0130
$\underline{X}_{10}$	- 0.0909	0.2000	- 0.0242	0.0286
$\underline{X}_{11}$	0.1904	- 0.0242	0.2438	- 0.0166
$\underline{X}_{12}$	- 0.0130	0.0286	- 0.0166	0.0379

Table 3.8: Discriminant Scores of Samples drawn from Mohaijan and Bodhakora villages.

Sl. No.	Score	Sl. No.	Score	Sl. No.	Score
31.	42.08	32.	33.63	33.	14.71
34.	11.56*	35.	13.42	36.	24.70
37.	16.27	38.	28.48	39.	17.17
40.	9.47*	41.	31.36	42.	-11.01
43.	-12.05	44.	-11.62	45.	-12.59
46.	-13.20	47.	-14.08	48.	-14.50
49.	-11.88	50.	-12.10	51.	-11.39
52.	-14.62	53.	-12.48	54.	-11.81
55.	- 8.80	56.	-15.92	57.	-17.82
58.	-16.33	59.	- 7.43	60.	-16.80
61.	-13.00	62.	-14.45	63.	-15.49
64.	- 7.99	65.	-13.21	66.	-15.74
67.	- 7.76	68.	- 6.94	69.	3.29
70.	1.32	71.	- 4.41	72.	- 4.51
73.	5.34	74.	14.78*	75.	12.30
76.	16.73*		-		-

From 31 to 41 are non-tribals of Bodhakora, from 42 to 66 are Mishings from Mohaijan, from 67 to 73 are Mishings from Bodhakora and from 74 to 76 are Sonowals from Bodhakora.

\* = Outliers.

Sl.Nos. 34 and 40 who are outliers from among the non-tribal group have characteristically been identified with very low per capita land available to them at their disposal. Sl. No. 40 is also a scheduled caste household.

### 8. Elasticities of Discrimination

To obtain an idea about the relative strength of the variables used for discrimination we require elasticities of discrimination. The elasticity of discrimination of particular variable  $X_j$  is given by:

$$e_j = W_j \frac{\bar{X}_j}{\bar{D}}$$

Where  $\bar{X}_j$  is the arithmetic mean of  $X_j$  and  $\bar{D}$  is the overall Average discriminant score.

Table 3.9: Elasticities of Discrimination.

Variable	e	Variable	e	Variable	e
$X_1$	0.0383	$X_2$	-0.2305	$X_3$	0.7888
$X_4$	0.2749	$X_5$	-0.0104	$X_6$	0.0385
$X_7$	0.6220	$X_8$	0.3018	$X_9$	-0.2016
$X_{10}$	-0.0073	$X_{11}$	- 0.6024	$X_{12}$	-0.0120

These elasticities sum up to unity. As it is observed in table 3.9,  $X_3$ ,  $X_7$  and  $X_{11}$  are dominant variables. The elasticity associated with  $X_{11}$  is negative which indicates that the very fact that a sample is Mishing indicates that it will get a low score. The elasticity for  $X_{10}$  is negligible indicating that it matters little whether a sample has been drawn from Bodhakora or from somewhere else. Of course,  $X_9$  has a considerable impact.

We may conclude therefore that variables  $X_3$  (per capita cultivable land),  $X_7$  (Kharif productivity), and  $X_{11}$  (the state of being a Mishing farmer) are very important variables that make a difference. Among other variables,  $X_8$  (percentage of crop retained for next year),  $X_4$  (literacy rate),  $X_2$  (family size) and  $X_9$  (of being from Mohaijan village) are relevant.

Holding size ( $X_1$ ), number of children over age seven not attending school ( $X_5$ ), number of bullocks per bigha of land ( $X_6$ ) status of residing in Bodhakora ( $X_{10}$ ) and the Sonowal ethnicity ( $X_{12}$ ) are of no much consequence.

#### 9. Concluding Remarks

We had occasions to suspect that the status of being a resident of Bodhakora may be itself a reason of being an

outlier. This suspicion was due to our observation that most of the outliers were from Bodhakora. Moreover, Bodhakora is relatively farther from the township and it has a mixed ethnicity. But our analysis has revealed this suspicion quite unfounded. Insignificance of holding size, bullocks per area of land cultivated and disregard to sending grown up children to school have also proved of no avail.

Our stand that the status of being a Mishing farmer may have significant repercussions reflected in low productivity has been corroborated. We have already noted that Mishings practise farming in their particular way and it has to do a lot with the agricultural productivity on their farms. It seems that this stand is corroborated by sample data. Yet, we will not end up our investigation here and further search into the relationship of agricultural practices with productivity till we have enough support in favour of our stand or we reject our stand as the case may be.

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CHAPTER - IV

DETERMINANTS OF AGRICULTURAL PERFORMANCE

### 1. Opening remarks

In the preceding chapter we have noted that the tribal farmers, especially those belonging to the Mishing community, show clearly distinct features and based on the criteria laid down in the preceding chapter, the tribal and the non-tribal farmers can successfully be discriminated from each other. Tribal farmers have shown lower agricultural productivity, lower literacy rate and lesser per capita land cultivated by them.

In this chapter we are mainly concerned with the following:

- 1) How institutional factors determine the agricultural practices adopted by the farmers in our study villages, and
- 2) How agricultural practices affect productivity and utilization of land in our study villages.

### 2. Institutional factors and agricultural practices

In our questionnaires we have had the following questions with regard to the belief and attitude system held by our respondents.

- (i) Do you think that worship of gods before sowing will lead to a better crop? Yes/No.

- (ii) Do you think that your fate determines the return in farming? Yes/No.
- (iii) Do you think that sowing by women will lead to a better crop? Yes/No.
- (iv) Do you think that poverty is due to the anger of gods since you failed in pleasing them? Yes/No.
- (v) Do you think that modern methods of cultivation are not suitable as they will displease gods? Yes/No.
- (vi) Should you spend on festivals even if you are indebted? Yes/No.
- (vii) Do you think that the high rates of interest on the loan taken by you are exorbitant and unjust? Yes/No.
- (viii) Do you cultivate for subsistence? Yes/No.
- (ix) Do you realise that cultivation of cash crops, vegetables, etc. will raise your income? Yes/No, give reasons.

Numerically, we assigned the value unity for "yes" and zero for "no".

We have had the following major questions about the inputs they use:

- (x) Do they use cowdung as manure?
- (xi) Do they use fertilizers/pesticides?

(xii) Do they cultivate Sali/Ahu/Bao or a combination of them? .

(xiii) Do they cultivate Rabi crops?

To the questions xth and xiiith we have obtained information about the quantity - that is, how much cowdung is used as manure and how much area is cultivated under Rabi crop. About xith and xiith question we have preferred to collect information in yes/no terms.

### 3. Interrelationships among institutional factors and agricultural practices

We have found that those farmers who have answered "yes" to question no. (i) have also answered "yes" to question nos. (ii), (iii), (iv) and (v), and those who answered "no" to question no. (i) have also answered "no" to question nos. (ii), (iii), (iv) and (v). Thus, the answers to question no. (i) are the answers to the questions (ii) through (v).

Answers to questions (vi) and (vii) are again identical. Answers to questions (viii) and (ix) are having the identical information content.

Answers to question no. (xi) have been, to the best of our judgement, very inaccurate. We will not include it in our analysis.



A perusal of the table 4.1 reveals that the seven variables can easily be grouped into two groups that have positive correlations within the group and negative correlations with inter-group variables. Thus arranged, the correlation matrix is presented in table 4.2.

Table 4.2: Correlation matrix of grouped variables of attitudes and agricultural practices.

Variables	Z <sub>1</sub>	Z <sub>2</sub>	Z <sub>3</sub>	Z <sub>6</sub>	Z <sub>4</sub>	Z <sub>5</sub>	Z <sub>7</sub>
Z <sub>1</sub>	1.000	0.923	0.756	0.689	-0.767	-0.899	-0.309
Z <sub>2</sub>		1.000	0.683	0.746	-0.725	-0.974	-0.357
Z <sub>3</sub>			1.000	0.505	-0.747	-0.714	-0.353
Z <sub>6</sub>				1.000	-0.627	-0.766	-0.553
Z <sub>4</sub>					1.000	0.854	0.476
Z <sub>5</sub>						1.000	0.373
Z <sub>7</sub>							1.000

In this arrangement we note that belief in unearthly causes of good and bad crop, belief in necessities of festivities, subsistence cultivation and Bao cultivation go together. Use of cowdung, Sali cultivation and Habi cultivation go together.

#### 4. Some Interesting Relationships

Here we have carried out regression analysis of  $Z_4$ ,  $Z_5$ ,  $Z_6$  and  $Z_7$  on  $Z_1$ ,  $Z_2$  and  $Z_3$ . These regression equations are given below.

$$Z_4 = -0.3253 Z_1 - 0.1547 Z_2 - 0.3954 Z_3 ; R^2 = 0.6570$$

(0.19)            (0.10)            (0.44)

$$Z_5 = 0.0904 Z_1 - 0.9786 Z_2 - 0.11396 Z_3 ; R^2 = 0.9523$$

(0.14)            (1.72)            (0.20)

$$Z_6 = 0.0127 Z_1 + 0.7421 Z_2 - 0.01146 Z_3 ; R^2 = 0.5566$$

(0.01)            (0.43)            (0.01)

$$Z_7 = 0.38994 Z_1 - 0.5145 Z_2 - 0.2964 Z_3 ; R^2 = 0.1678$$

(0.15)            (0.22)            (0.26)

Except in case of  $Z_7$ , the explanatory capabilities of  $Z_1$ ,  $Z_2$  and  $Z_3$  together are quite high as reflected by  $R^2$ . However, we note that correlation between  $Z_1$  and  $Z_2$  is very high (0.923). Due to this the problem of multicollinearity is quite serious and the estimated regression coefficients have very large variances. That is why the  $t$  values associated with the coefficients (written beneath the coefficients in parentheses) are in general very poor and show that the coefficients are not different from zero, though such a conclusion may be illusive.

## 5. Two Principal Components

Now we want to derive two principal components, say U and V. The first principal component is derived from the weighted aggregation of  $Z_1$ ,  $Z_2$ ,  $Z_3$  and  $Z_6$ . These variables characteristically represent the tribal beliefs and bac cultivation. Hence, the principal component derived from these variables will represent tribal institution and practices of cultivation. The higher the value of U, the greater is the intensity of tribal institutions and practices of cultivation while lower values of U will represent the lesser intensities (and in turn, stronger intensity of non-tribal belief and practices).

$Z_4$ ,  $Z_5$  and  $Z_7$  have characteristically higher values for non-tribals and hence V, derived from  $Z_4$ ,  $Z_5$  and  $Z_7$  will represent non-tribal agricultural practices.

A principal component is a derived variable such that<sup>1</sup>

$$U_i = \sum r_j Z_{ij}^* ; \left. \begin{array}{l} i = 1, 2, \dots, 76 \\ j = 1, 2, 3, 6. \end{array} \right\}$$

$$V_i = \sum r_j Z_{ij}^* ; \left. \begin{array}{l} i = 1, 2, \dots, 76 \\ j = 4, 5, 7. \end{array} \right\}$$

Where  $r_j$  is the coefficient of correlation between U and  $Z_j$  in case of U and between V and  $Z_j$  in case of V.

The computation of the  $r$  values is carried out as follows. First, the Intercorrelation matrix of relevant  $Z$  variables is used for extracting eigen value (largest) and the associated eigen vector. Then, the eigen vector is normalised such that the sum of the squares of the elements of the vector is equal to the eigen value. These normalised elements of eigen vector are the  $r$  values. For computing the principal component, standardised variables ( $Z^*$ ) are used. The standardisation is done by the procedure:

$$Z_{ij}^* = (Z_{ij} - \bar{Z}_j) / \sigma_{Z_j}$$

Where  $\bar{Z}_j$  is the arithmetic mean of  $Z_j$  and  $\sigma_{Z_j}$  is the standard deviation of  $Z_j$ .

Principal components have some very remarkable characteristics. First, that the sum of squares of the correlation of the principal components with the original variables is the maximum, and thus, the principal component is the best representative variable of the original ones. Second, the principal component minimises the sum of the squares of errors in all directions. That is to say, as in regression analysis, the sum of squares of errors is minimised in the  $Y$  direction, the direction of the dependent variable; analogously, in principal component analysis, the sum of squares of errors is minimised in the directions

of every variable. Viewed as such, the principal component is the ideal vector.

We have seen that  $Z_1$  through  $Z_7$  are measured in 1/0 units. We have reasons to believe that all farmers must not be having the strong belief or disbelief such that they should ideally have given 0 or 1 values. We may think that zero and one are the limiting values and in fact, farmers might well have responded in numerical values (like 0.3, 0.7, 0.5 etc.) could they feel and measure the strength of their belief and so on. Thus we may visualise that all the variables,  $Z_1$  through  $Z_7$  are measured with error. If we want to know the true index then we must minimise errors in all directions. Thus, principal component analysis is a suitable method for constructing such an index.

The intercorrelation matrix of  $Z_1$ ,  $Z_2$ ,  $Z_3$  and  $Z_6$ , extracted from table 4.2 is given below.

Variables	$Z_1$	$Z_2$	$Z_3$	$Z_6$
$Z_1$	1.000	0.923	0.756	0.689
$Z_2$	0.923	1.000	0.683	0.746
$Z_3$	0.756	0.683	1.000	0.505
$Z_6$	0.689	0.746	0.505	1.000

The largest eigen value of this matrix is equal to 3.1663.

The eigen vector associated with this eigen value is:

$$[1.0000, 0.9956, 0.8641, 0.8622]$$

The normalised vector is:

$$[0.9537, 0.9495, 0.8241, 0.8222]$$

$$\text{Thus } U_i = \sum_j r_j Z_{ij}^* \quad (j = 1, 2, 3, 6)$$

will have correlations with  $Z_1$ ,  $Z_2$ ,  $Z_3$  and  $Z_4$  of the order of 0.954, 0.950, 0.824 and 0.822 respectively. The overall representative power of  $U$  will be 79.16% of the total variance of  $Z^*$ .

The intercorrelation matrix of  $Z_4$ ,  $Z_5$ ,  $Z_7$ , extracted from table 4.2 is given below.

Variables	$Z_4$	$Z_5$	$Z_7$
$Z_4$	1.000	0.854	0.476
$Z_5$	0.854	1.000	0.373
$Z_7$	0.476	0.373	1.000

The largest eigen value of this matrix is equal to 2.1632. The associated eigen vector is:

$$[1.000, 0.9625, 0.7180]$$

The normalized eigen vector is:

$$[0.9412, 0.9059, 0.6758]$$

Thus  $V_i = \sum_j r_j Z_{ij}^*$  ( $j = 4, 5, 7$ ) will have correlation with  $Z_4$ ,  $Z_5$  and  $Z_7$  of the order of 0.941, 0.906 and 0.676 respectively. The overall representative power of  $V$  will be 72.11% of the total variance of  $Z^*$ .

#### 6. Determinants of Kharif Productivity

We visualise that Kharif productivity ( $P$ ) may be explained by the following five variables.

- (i) Family size of the farmer =  $X_2^*$
- (ii) Per capita land in the farmer household =  $X_3^*$
- (iii) Literacy rate of the adults in the farmer's family =  $X_4^*$
- (iv) The principal component  $U^*$
- (v) The principal component  $V^*$ .

We specify our model as:

$$P^* = b_2 X_2^* + b_3 X_3^* + b_4 X_4^* + b_5 U^* + b_6 V^* + e$$

and run regression of  $P^*$  on the said five variables. The asterisk on the variables remind us that the variables have been standardised.

We have purposefully standardised the variables (such that their respective means are zero and respective standard deviations are unity). In this form of regression analysis we are directly in a position to compare the relative strength of individual variables. In the statistical literature these regression coefficients ( $b_s$ ) are called Beta coefficients. It has another advantage in the sense that the sum of the product of the beta coefficients and the correlation coefficients of dependent variable with independent variables is equal to the coefficient of multiple correlation. Thus

$$R^2 = b_2 r_{PX_2} + b_3 r_{PX_3} + b_4 r_{PX_4} + b_5 r_{PU} + b_6 r_{PV}.$$

Since  $R^2$  is the linear aggregation of the products of  $b_j r_{PX_j}$  etc., each term is a measure of the contribution of the independent variable to explanation of the dependent variable.

The regression equation estimated by us is:

$$\begin{aligned} \hat{P}^* &= - 0.1632 X_2^* + 0.1811 X_3^* + 0.5168 X_4^* - 0.6819 U^* \\ &\quad (0.98) \quad (1.37) \quad (1.21) \quad (2.16) \\ &+ 0.2579 V^* ; R^2 = 0.9437 \\ &\quad (1.81) \end{aligned}$$

The figures in the parentheses are student's t values. The explanatory contribution of  $X_2^*$ ,  $X_3^*$ ,  $X_4^*$ ,  $U^*$  and  $V^*$  are 3.7%, 5.6%, 29.9%, 43.2% and 17.4% respectively.

At 5% level and 70 degrees of freedom the table value of students' t is about 1.99. This value at 10% level is about 1.66 (we have referred to the table given by H. Theil<sup>2</sup> who tabulates values at 60 and 120 degrees of freedom). Thus while the coefficient associated with  $U^*$  is significant at 5% level, the coefficient associated with  $V^*$  is significant at 10% only. The coefficient associated with  $X_3^*$  is significant at 20% level of confidence. (The table value at 20% level is about 1.29).

The significance we have noted above refers to two tail test. Now, we resolve to hold the following.

- (a) Higher the value of U, lower the productivity since the higher value of U refers to the stronger belief in unearthly causes of good and bad harvest, belief in necessities of festivities, subsistence farming and bao cultivation, and these may have depressing effects on raising more crops. The coefficient associated with U should thus be negative.

- (b) Lower the value of  $V$ , lower the productivity as lower value of  $V$  refers to not utilising cowdung, not cultivating sali, not adopting seedling transplantation method of raising paddy and single cropping. Thus the coefficient associated with  $V$  should have positive sign.
- (c) Larger the per capita land available, more is the possibility of savings over and above consumption and thus greater the chances the farmer gets to purchase better inputs. Thus the coefficient associated with  $X_3$  should be positive.
- (d) Higher the literacy rate, greater are the chances that the farmer will allocate resources more rationally. Thus the coefficient associated with  $X_4$  should be positive.
- (e) Larger family size may affect productivity either way: positive, if larger family size leads to intensive labour utilization; negative, if it reduces farmer's saving that could be used for purchase of better inputs, etc.

Thus, we will use one tail test for testing the coefficients associated with  $U$ ,  $V$ ,  $X_3$  and  $X_4$ . But we will use two tailed test for testing the coefficient associated with  $X_2$ .

So viewed, the coefficient associated with  $V$  is significant at 5% level.  $\hat{b}_3$  is significant at 10%.

Poor reliability of  $\hat{b}_4$  and  $\hat{b}_2$  led us to analyse the residual vector,  $\hat{e}$ . We suspected heteroskedasticity. Heteroskedasticity has an adverse effect of the efficiency of the regression coefficient.

We detected very strong degree of heteroskedasticity in the residual vector. The major source of heteroskedasticity has been the scatter of productivity,  $P$ , around relatively more localised values of  $X_4$  (literacy rate),  $U$  and  $V$ . The fact is that in the sample observations  $X_4$ ,  $U$ , and  $V$  have some fixed values which frequently occur. Since  $U$  and  $V$  have been constructed by weighted aggregation of variables that take on only two values, 0 and 1, the computed values of  $U$  and  $V$  also take on some fixed values frequently.  $X_4$  also takes on some values like 1, .8, .75, .5, .667, .4, .333, .25, .2 etc. Of course, the values of  $X_4$  are much less localised.

To treat the problem of heteroskedasticity we have estimated the following regression by weighted least squares method.<sup>3</sup> The weights have been inversely proportional to the square of the estimated values of  $P^*$ , that is:

$$W_i = 1/(\hat{P}_i^*)^2$$

Thus, the weighted regression model (in terms of standardised weighted variables) is given as:

$$(P^*W)^* = C_2(X_2^*W)^* + C_3(X_3^*W)^* + C_4(X_4^*W)^* + C_5(U^*W)^* \\ + C_6(V^*W)^* + E$$

Designating the standardised weighted variable by double asterisk,

$$P^{**} = C_2X_2^{**} + C_3X_3^{**} + C_4X_4^{**} + C_5U^{**} + C_6V^{**} + E$$

The estimated regression equation is:

$$\hat{P}^{**} = - 0.1911 X_2^{**} + 0.1622X_3^{**} + 0.4339 X_4^{**} \\ (1.01) \quad (1.59) \quad (1.42) \\ - 0.6652 U^{**} + 0.2855 V^{**}; R^2 = 0.9318 \\ (2.32) \quad (2.06)$$

It may be observed that the t values associated with all coefficients have improved. However, the coefficient associated with  $X_2^{**}$  remains insignificant.  $U^{**}$  and  $V^{**}$  have shown highly significant values of coefficients. The relative contribution of  $X_2^{**}$ ,  $X_3^{**}$ ,  $X_4^{**}$ ,  $U^{**}$  and  $V^{**}$  in explaining  $P^{**}$  are, 4.6%, 5.1%, 31.5%, 44.1%, and 14.7% respectively.

We conclude from this analysis that  $U$  and  $X_4$  are the most important variables in explaining  $P$ . The third important variable that explains  $P$  is  $V$ . The rest of the variables,  $X_2$  and  $X_3$  are relatively less important.

### 7. Determinants of Intensity of Cropping

Analogous to the determinants of productivity, we have specified the cropping intensity model as:

$$I^* = b_2 X_2^* + b_3 X_3^* + b_4 X_4^* + b_5 U^* + b_6 V^* + e.$$

The OLS estimate of this model is:

$$\begin{aligned} \hat{I}^* = & 0.0219 X_2^* + 0.2317 X_3^* + 0.3310 X_4^* \\ & (.26) \quad (0.86) \quad (1.46) \\ & - 0.4332 U^* + 0.1814 V^*; \quad R^2 = 0.6361 \\ & (1.77) \quad (1.62) \end{aligned}$$

Once again we have found the residual vector heteroskedastic. The weighted regression equation is found out to be:

$$\begin{aligned} \hat{I}^{**} = & 0.0826 X_2^{**} + 0.1813 X_3^{**} + 0.4133 X_4^{**} - 0.346 U^{**} \\ & (0.35) \quad (1.42) \quad (1.47) \quad (1.89) \\ & + 0.2537 V^{**}; \quad R^2 = 0.6224 \\ & (1.68) \end{aligned}$$

The relative contributions of  $X_2^{**}$ ,  $X_3^{**}$ ,  $X_4^{**}$ ,  $U^{**}$ ,  $V^{**}$  in explaining  $I^{**}$  are, 0.96%, 7.52%, 21.33%, 51.36%, and 18.84% respectively.

Once again, we find that U, V and  $X_{44}$  are very important variables that explain intensity of cropping also.

### 8. A Summary

We opened this chapter with objectives to assess the impacts of institutional factors on agricultural practices and in turn, on the overall agricultural development of our study villages. In the process of this assessment we found that institutional factors exert significant influence on the type of agricultural practices carried out by the farmers. We found that certain beliefs and mores of a certain section or community of farmers lead to carrying out of certain agricultural practices which characterise lower yield rate and lesser utilisation of agricultural resources. We found that education (literacy) has a significant role in inducing farmers to adopt more remunerative agricultural practices.

In this chapter we could obtain enough empirical evidences to corroborate the thesis that institutional factors have a great role to play in determining the utilisation of land resources and, thus, the level of agricultural development of a region is evidently determined by the settled habits of the communities in thinking and doing accordingly; conversely, we have gathered;

enough evidences to disagree with Dr. Schultz and his followers who hold that economic factors alone can explain the performance of the agricultural sector of a region; and that "cultural" factors are irrelevant. We do not, however, suggest that economic and technological factors are less important; only thing that we suggest is that we should not disregard the institutional factors.

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CHAPTER - V  
POLICY IMPLICATIONS  
AND  
CONCLUDING REMARKS

## 1. Opening Remarks on Social Planning

We have had enough evidences in the preceding chapters that suggest a need of social planning or an exercise of social engineering methods to change the present institutional structure of the society in general and tribal farmers in particular. Social planning aiming at changes in the attitudinal and belief system of a community largely uses educational methods, formal and informal, directly by contact and indirectly by mass media and many other programmes planned for accomplishing its ends.

Notwithstanding the need for social planning there have been conflicting opinions about its desirability on one hand and its feasibility on the other. As token arguments we quote J.W. Ivy who writes:

The belief that education can lead in social reform is a form of wish fulfillment thinking based upon the assumption that social life can be rationalised and that the social process can be rid of its irrational elements and brought under the control of a previously established plan. Such a belief is not a product of scientific observation, but of the "faith" as naive as any inherited by man.<sup>1</sup>

W.G. Sumner, a great social Anthropologist, writes:

The great stream of time and earthly things will sweep on just the same in spite of us ... Every one of us is a child of his

age and cannot get out of it. He is in the stream and is swept along with it. All his science and philosophy came to him out of it. Therefore the tide will not be changed by us. It will swallow up with us and our experiments... That is why it is a great folly of which a man can be capable to sit down with a slate and pencil to plan out a new social world.<sup>2</sup>

R.E. Park visualises changes in mores, folkways and institutions by "crisis". These changes are rapid and radical.<sup>3</sup> The crisis theory maintains that under certain circumstances, habits, mores and folkways are recognised by people to be no longer useful as ways of meeting situations and needs, and after a brief period of amoral disorganisation, people come together to build up a new type of socially acceptable behaviour or such a new folkway develops naturally without discussion and organisation. The political process can only proceed in a relatively orderly way in so far as it generates an environment capable of providing a certain degree of order and discipline until a new equilibrium has been achieved and the changes which the new programmes initiated have been assimilated, digested and incorporated with the folkways of the original and historic society. To Park, therefore, it seems that planned methods to change the folkways, mores and institutions are more or less futile. William Ogburn also holds similar views.<sup>4</sup> To Ogburn, the tremendous flow of the society cannot be changed by man's intentional efforts.

Ivy, Ogburn, Park and Sumner write the same what, translated into a more familiar terminology, economists mean by "Laissez faire". Now, as it is known to all of us that "Laissez faire" amounts to suggest two things simultaneously: First, that what is natural is inevitable; and second, that what is natural is also desirable. Thus what these sociologists and anthropologists hold is the belief in the inevitability and desirability of the mores, folkways and institutions prevailing in different communities. If it is so, naturally, there is no need for planning — nor planning can turn a single stone.

Nevertheless, economists have abandoned the idea and ideal of "Laissez faire" long back. Hence, the practice of economic planning for development. However, economic planning has been much more conservative in its approach than it should have been. Models of growth and strategies of development have grossly been formulated in terms of economic variable and economists, like Schultz, have tried to interpret every social fact as an economic phenomenon. Even educational planning, a major component of manpower planning, has been geared to be viewed as a tool for estimating the requirements of trained personnels of different categories to be felt by the growing industrial sector and programming to meet these needs such that

the demand can be met by the supply. Educational planning has never been considered by economists as a tool for moulding institutions and making attitudes of the society more conformal to development.

Some sociologists and anthropologists vehemently oppose the idea of deliberate attempts to mould the institutions of any community. They are afraid that existing institutions changed by superimposition of "foreign" institutions will render the system dysfunctional and disturb the social equilibrium.

However, there are sociologists and economists who entertain the feasibility of social planning. To quote Myrdal:

Recognising the folkways and mores ... and having a desire to change some of them in one direction or another, we should be interested in studying the range and degree of inertia; all the exceptions to the folkways; the specialisation of groups; the conflicts (between persons and within persons); the changes, the flexibilities, and the manageability of some factors in the social system; instead of stressing and exemplifying the great overall inertia. On the practical plane we should make not only the negative inference that a plan for social change should expect to be time-consuming and to meet strong resistance, but also the positive inference that it has to direct its attack on certain points where the mores are weakest and where people are already

beginning to question them (or have divided conscience with respect to them). We should also infer that it should not attack them directly but should create situations where the people themselves will strain the mores.<sup>5</sup>

The above quotation from Myrdal evidently offers a number of suggestions for social planning for modifying the belief and attitude system of farmers in conformity with the requirements for agricultural development.

## 2. Some Guidelines for Agricultural Planning

An outline of Institutional planning may be developed on the suggestions given by G. Myrdal. First, we have to look into the range and degree of inertia of institutions in our study village and also in the study region. A closer scrutiny of the data collected by us reveals that degree and range of inertia in sending their children to schools is the least among the tribal households. Those who do not send their children to school or those whose children drop-out may fall into three categories: first, those who are not very aware of the possible advantages of education; second, those who are too poor to afford the expenses, may be very little, in educating their children; and third, those who employ their children in farming and other productive activities. By providing sufficient and suitable facilities and motivation, these farmers can

certainly send their children to schools. Rise in the literacy rate will automatically alter their institutions. Our analysis has suggested us that literacy is a very important factor in promoting productivity and intensive utilisation of agricultural resources. Hence the first line of attack should be based on universalisation of education.

The next variables in which we have found lesser degree and range of inertia are subsistence cultivation and Rabi cropping. Now, cultivation of crops to sell in the market will not go far if farmers cultivate cereals. Cultivation of cereals will cause a stronger inertia. Then the way-out is to promote the cultivation of vegetables, potatoes, etc. It suggests that suitable policies for motivating them to cultivate vegetables, potatoes, etc. may be formulated and by means of extension activities these policies can be effectuated. Rabi cultivation cannot be promoted unless there is irrigation facility available to the farmers. Cultivation of vegetables and potato also is not possible without irrigation facilities. It is to be noted that the irrigation facilities are not at all developed in the study region. Almost the whole area depends on rainfall to raise crops. Such a state of cultivation as permitted by rainfall is conformal to subsistence cropping,

dependency on the mercy of nature, fatalism and other-worldliness. Development of irrigation facilities may be a suitable policy to fight out these obstacles to agricultural development.

On the face of it, development of irrigation facilities and promotion policies for popularisation of the cultivation of vegetables and potato, etc, do not look like a measure of institutional planning. But it should be borne in mind that institutional planning comprises of anything and everything that is programmed for changing the attitudes of the people — they work directly or indirectly is no matter of importance to the Institutional planner.

So far the inertia of the belief in unearthly causes of good and bad harvest and belief in necessities of festivities are concerned, they are quite strong and pervasive. It will be difficult to attack them directly. But we hold that cultivation for market, Rabi cropping, irrigation facilities, and educational development together will weaken the belief in the unearthly causes of productivity and in the long run, it will weaken the belief in necessity of festivities also. Of course, festivities have nothing to do with productivity as such. If they can use better seeds, adopt better agricultural practices and apply

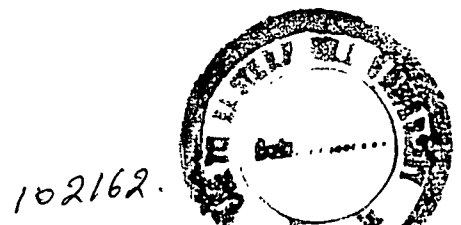
better inputs, there is nothing against festivities. But they may ultimately be aware of the fact that festivities that lead to indebtedness are harmful. We hold that policies suggested here will, in the long run, be effective in making the institutions more conformal to agricultural development.

It is to be noted that Ahu and Bao cultivations are done by the broadcast method, while sali is cultivated by the transplantation method. The broadcast method is correlated with the tribal belief that women's broadcasting the seeds in the field fetches richer harvest. Thus, Ahu and Bao cultivations go with the festivities, rituals and associated belief of the tribal farmers. As a matter of fact, broadcasting is an inoptimal agricultural practice. To change this practice the farmers may be suggested to cultivate paddy by the transplantation method. If the elderly persons of the village can be convinced, it would be very easy to change the broadcasting method to the transplantation method. Nevertheless we understand that it will not be very easy to convince the elderly people of the tribal villages.

In case of the non-tribal farmers, we have found that they transplant the paddy seedlings when they are

almost five weeks old. Agricultural scientists suggest, however, that the transplantation of seedlings should be done when they are about 3 to  $3\frac{1}{2}$  weeks old. Seedlings older than 4 weeks transplanted in the field yield lower. It seems that most of the farmers are not aware of this scientific fact. There is another difficulty in this regard. Transplantation is possible only if the field is ready for transplantation. The field can be made ready only if there is enough water available in the field. On account of untimely rainfall, it is not always possible to make the field ready for transplantation while the seedlings are 3 to  $3\frac{1}{2}$  weeks old. The farmers have to wait for rains and in this process, sometimes they transplant the seedlings early and at other times quite late. This problem can be solved only if the irrigation facilities are guaranteed. Thus there is a need for the development of irrigation facilities.

Our sample data reveal that in Mohaijan Missing Village there are 102 cattle (bulls, cows and buffaloes). In Sonari there are 137 cattle, and in Bodhakora there are 82 cattle. Farmers of Mohaijan village do not use dung manure. Thus the dung in the village is wasted. This waste can be stopped by convincing the farmers the possibilities of higher yield if they use the dung as manure. In the



traditions of Mishing tribals, there is nothing against using dung manure in the field. They can easily be convinced to use dung manure. What is required is to suggest them how to accumulate dung, make compost and carry them to the field. It is expected that they will not take time to adopt this practice. Among the non-tribals also, the use of dung and organic wastes as manure is not very universal. They can, however, be promoted to adopt this practice. If dung and organic wastes can be used for making compost at a universal level and used as manures, agricultural productivity in the study area can be greatly enhanced.

### 3. Concluding Remarks

Now before we close our study, we want to present a summary of the work done. We recollect that in Chapter I we introduced the problem taken up by us for investigation. It has been: to study the differences in agricultural practices carried out by tribal and non-tribal farmers and impact of these practices on the performance of the agriculture sector of the Block of Lakhimpur. We did discuss why we want to study our problem by a particular methodology. We made an elaboration with regard to the possible odds against our methodology and pointing out the weakness of the alternative methodology we justified our own methodology and stand to approach the study.

For our study we selected three villages from Lakhimpur Block. One of these villages is solely inhabited by tribals, the other is solely inhabited by non-tribals and the third village is inhabited by tribals and non-tribals both.

In Chapter II we presented an expository introduction to the villages (selected by us), together with a general introduction to the area of our study. The characteristic feature of our study area is that about 96% of the people are engaged in cultivation. Farming is traditional, mainly subsistence oriented. The major crop grown is paddy. The intensity of cultivation is very low. Irrigation facilities are not developed. The region is prone to frequent floods on account of several rivers and rivulets criss-crossing the whole stretch of the area.

The study of our sample villages revealed that there are two different kinds of agricultural practices in vogue. One type of practices - characterised by broadcasting method of sowing seeds of Ahu and Bao variety - is popular among the tribal farmers. Tribal farmers have their own system of attitudes and beliefs regarding method of cultivation, use of inputs, the causes of good or bad harvest etc. The other type of practices - characterised by trans-

planting method of growing sali variety of paddy — is popular among non-tribals. The non-tribals often use organic manures. Among the tribal farmers and non-tribal farmers there are marked differences with regard to family size, literacy rate, land per capita owned by the farmers and their attitude towards use of inputs and the whole practice of cultivation.

In Chapter III, we made an investigation to know whether the tribal farmers can be discriminated with the non-tribal farmers with regard to a number of variables. We found that indeed they can be discriminated. The status of being a Mishing tribe, literacy rate and per capita cultivable land at the disposal of the household were found to be the most important discriminant variables.

In Chapter IV, our main concern was to assess the impact of a number of variables on productivity and intensive utilisation of land. In the process of investigation we constructed two indices of attitudes and agricultural practices. We found that certain attitudes are highly correlated with the type of agricultural practices adopted by the farmers. We also found that literacy rate, the index of attitude system and the practice of cultivation can significantly explain agricultural productivity and intensity of utilisation of land. This analysis corroborated

our stand on the relevance of institutional variables in determining agricultural performance in the study villages.

The implications of our findings in Chapters III and IV are suggestive of certain policy guidelines for agricultural development. Our main suggestions are to develop irrigation facilities in the area, to provide more facilities to universalise education, to promote the interest and readiness of the farmers to cultivate non-cereal crops, to motivate use of organic manures and to adopt the practice of transplantation in place of broadcasting of paddy seeds.

In view of the scope and limitations of our study we could not go into the details of institutional planning in particular and overall planning for agricultural development in general. Since the scope of study is limited to the assessment of the effects of different agricultural practices on agricultural performance, we may not be expected to go into details to formulate an elaborate policy for agricultural development of the study region. Nevertheless, we have made some observations on a suitable agricultural policy. We hold that a detailed study for formulating agricultural policy of development of our study region is needed and this need calls for further research work on this line.

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