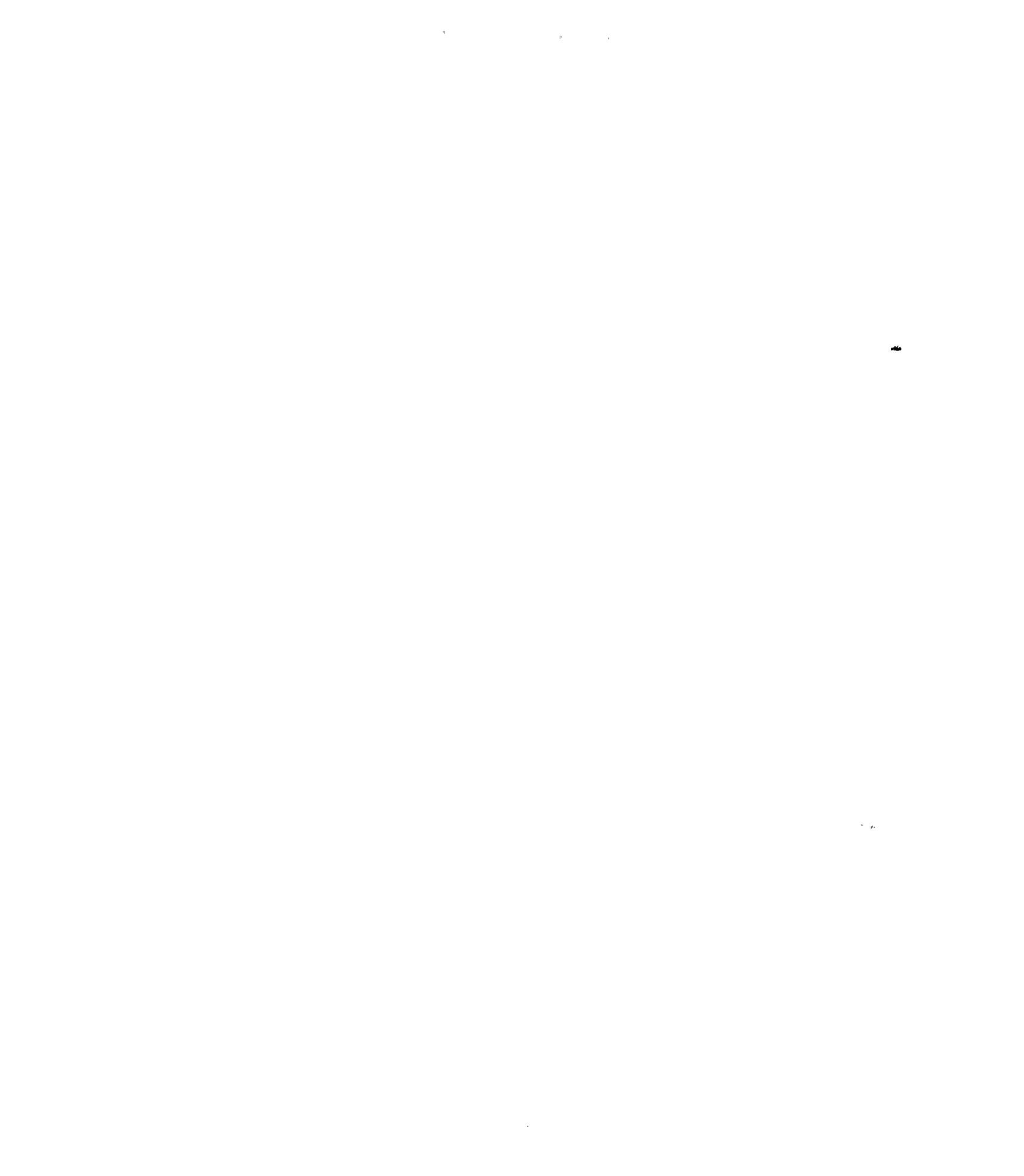


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Decentralized Planning and Poverty Alleviation

*Hiron Kumar Banerjee**

Professor Amartya Sen in his monograph with Jean Dreze entitled “Indian Economic Development and Social Opportunity” writes in the beginning of chapter 2 :

“When the subject of development economics emerged as a distinct field of study shortly after the Second World War, it appeared to be something of a bastard child of growth economics. Some influence other than growth economics was clearly involved in the origin of development economics, but it was not altogether clear what from this influence had taken. In one respect at least, the offspring did not differ from what could be expected from a genuine ‘son of growth economics’, namely an overarching preoccupation with the growth of real income per head.”

One important lesson learnt from the development experience of the 1950s and 1960s is that higher rates of growth do not necessarily generate proportionate increases in employment or reduce income inequality both between DC’s and LDC’s as a whole and among LDC’s themselves. Hence the decade of 1970s was dubbed by UNO as the “Employment and Income Distribution Decade”.

In the early 1960s Pitambar Pant, the great Indian planner, propagated the phrase, ‘the strategy of rapid growth’ sustained by internal savings and supplemented by foreign aid and it was thought to provide the central thrust of the assault on poverty: By providing gainful employment we could provide incomes and pull more people above the poverty line. But this policy needed to be combined with effective and comprehensive land reforms as well as with increasing level of public distribution of social consumption such as clean water, sanitation, health services and education. This is the well known pull-up strategy or trickle-down strategy for attacking poverty. But unfortunately so far as our Country is concerned, Government expenditure in

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the said social sectors fell far short of expectations and the progress of land reforms for the country as a whole was very slow, to say the least, for the first three decades of planning.

From the early days of development economics celebrated economists like Rosenstein-Rodan, Lewis and Nurkse advocated theories that provided the intellectual rationale for centralized planning. These theories identified the problem of development as simply one of failure of investment to materialize. The task of the planner was to identify the constraint that led to this unfortunate outcome and to break it. Rodan's thesis was that decentralised entrepreneurs fail to invest since none of them in isolation had the assurance that others would invest simultaneously and create demand for one's output. Thus came Rodan's celebrated theory of Balanced Growth which advocated or co-ordinated plan of investment by the Government.

Works by Arthur Lewis (1954) and Ragnar Nurkse (1953) and others also advocated a planning mode of thinking although for a different reason. They believed that in the underdeveloped countries there exist hidden resources waiting to be tapped and they saw the hidden resources as tappable via what can only imply a planning approach.

Albert Hirschman's 1958 critique of the Rosenstein-Rodan approach shared the same diagnosis of the basic developmental problem. It viewed the developmental task as one of creating the inducements to invest, but for all practical purpose it advocated an anti-planning mode of thinking. He also shared the optimism concerning hidden resource, but Hirschman's hidden resource would emerge through an uncoordinated 'anti-planning' developmental process generating the necessary creative disequilibria.

India, however, opted for the then Soviet type comprehensive development planning soon after Independence. According to Professor Sukhomoy Chakraborty, dominant ideas of contemporary development economics influenced the logic of Indian plans, and correspondingly development theory was for a while greatly influenced by the Indian case. Chakraborty continues to say "At the time the Fifth

Five Year Plan was formulated, it was widely felt that Indian planning had not paid sufficient attention to problems of poverty, and a strategy was sought that would make perceptible impact on poverty within a specified time frame. That strategy was not implemented for a variety of reasons; so the problem has remained, and requires serious attention.”

According to H. Myint: “One of the most serious gaps in the knowledge required for (centralized) planning is likely to arise not merely from a lack of general ‘technical knowledge’, but from ignorance of the local conditions in the underdeveloped countries themselves, and inefficient feedback of this vital local knowledge from the different parts of the country to the central planning machinery. Nor can this be easily remedied, as is commonly supposed, by improving the standard type of statistical information”. Hence arises the need for decentralised planning.

Chakraborty also thought that the solution to the problem of rural poverty will require that small farmers must also be given access to modern agricultural inputs. Side by side there should be a programme of well-conceived public works. “Both these make considerable demand on available services and organizational capabilities as they cannot be merely directed from above – many of the specific tasks will need to be done on a decentralized basis”. Government of India in a report in 1992 clearly recognized this by pointing out that in the process of development, people must operate and government must cooperate.

The earlier planning regime in India was essential inputs and outputs by means of discretionary controls and rationing. It was believed that the free play of market forces would result in concentration of growth benefits in the hands of a few and swelling the number of people living below the poverty line. Unfortunately since the mid-1960’s this system failed to generate a high rate of growth and alleviate poverty besides spreading corruption at every level... The advocates of New Economic Policy since early 1990’s has advised the government to abandon the system of quantitative rationing and rely more and more on the free play of market forces to shape the pattern of growth. The problem of poverty, they suggested, should be

tackled by adopting separate poverty alleviation programmes.

The debate on market versus plan or, for that matter, on market failure vs government failure is still very much alive. I would like to mention two important researches in this context both published in a recent edited volume entitled “Essay on Public Intervention, Institutional Arrangements and Economic Efficiency”- One by Chandana Das and the other by Ambar Ghosh. Das uses a macrotheoretic framework suitable for an underdeveloped country like India to make a comparative assessment of the two policy options from the point of view of the distribution of income in the short run. Her analysis suggests that even when black market thrives under quantitative rationing, it may be a better alternative than the free market solution for attaining the desired allocation of scarce resource.

Ghosh, on the other hand, has raised grave doubts as to whether an underdeveloped country like India really has the option of moving away from the regime of discretionary controls and still hope to improve the economic conditions of the weaker sections of the population by means of separate poverty alleviation programmes, sustain a high rate of growth and promote competition and technological progress.

Poverty is generally identified with low per capita consumption of cereals which, in turn, is linked with low per capita output of cereals, the latter being treated as exogenous. Ghosh, in tune with Professor Amartya Sen, identifies poverty with low per capita consumption not only of cereals but also of socially necessary consumption goods like clothing, shelter, health care services, transport and communication and education of some desired quality. Achieving a minimum per capita output of the socially necessary consumption goods by developing an indigenous technological base is the necessary condition for removal of poverty while the sufficient condition requires, in addition, adoption of some suitable social security programme to give reliefs to the unemployed, the old and the disabled and also those whose income from employment falls below the desired minimum. Therefore one cannot

hope to make a dent on poverty by leaving the growth process to be shaped entirely poverty alleviation programmes to reduce the incidence of poverty.

Ghosh's paper stresses the need for discretionary controls and direct public investment in essential areas for reducing the incidence of poverty. In the latter context the role of organisations like village panchayats and other local bodies with people's participation in the decision making process is extremely important. The devolution of economic and political powers to the grass root level will increase efficiency and reduce project costs. We have already mentioned that the relevant information available at the local level would be much more reliable than that available at the higher levels. It should also be kept in mind that there is likely to exist diversities between localities and communities in respect of demand for both quality and quantity of public services. Decentralized plans can effectively handle such situations. It has been rightly argued that control rights should be handed over to people who have the necessary information as well as incentives, and at the same time bear the consequences of their decision.

To conclude, decentralization can help mobilize resources, encourage local participation, increase accountability of local officials, and promote growth with justice by involving the poor in the development process. More importantly, decentralized planning ensures concerted efforts to achieve rapid economic growth with social, organizational and infrastructural development in the rural areas.

Poverty Alleviation in India : A Note

*Kamal Nandi**

Concept of Poverty

Poverty is a comprehensive umbrella term. It encompasses many facets of conditions of life. The term has socio-economic connotation. Normally it means 'want of bare necessities of life'; 'ROTI – KAPRA and MAKAN' are the essential needs of a man. Sufficient food, proper amount of clothes to cover the body and a roof over head as a shelter are the essential needs of a man. The list may be lengthened by adding health, sanitation, education, gainful employment etc. etc. but very rarely the term 'mental poverty' is mentioned and/or discussed, though it is not insignificant. The crisis of the day is centred more around the latter than around the earlier facet of poverty.

Context and Issues

Poverty alleviation constitutes the most important problem of Independent India. Since Independence huge amount of fund was allotted and there was no dearth of planning. Though much water has flown through the Ganges nothing appreciable could be achieved. Population has gone almost as high as three fold the figure in 1947. But the number of hungry mouths has increased disproportionately. Now-a-days death due to starvation is an important item in news media and the figure is small, whereas the cases of semi-starvation, though abnormally high, remains unrecorded.

That inspite of various plans and substantial funds allocation the purpose remains unfulfilled raises the question. Why? Exactly there lies the focus of attention of the present paper.

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Pre-requisites of any plan to be successful are the following :

- (1) sincere identification of the problem,
- (2) honest assessment of its dimension,
- (3) objective solutions, i.e., projects and programmes selection,
- (4) plans execution,
- (5) motivation of the executives,
- (6) social commitment of workers at all levels,
- (7) monitoring and supervision,
- (8) introspection and evaluation.

Conceptual Framework

Sincere planners work on 3 H formula. In brief they make an endeavour to bring about perfect harmony and co-ordination between the Head and the Hand , and between the Hand and the Heart. The Head designs the plan, the Hand executes, the problem pains the Heart. Wherever there is a discord between the Head and the Hand, and that between the Hand the Heart, the planner obeys the dictates of his Heart. Heart is here supreme in position, because it is only the Heart that can fill the agony of distress. Head and Hand are just mechanical.

Real difference lies between a mechanical functionary and a sensitive functionary. The latter has a golden Heart to feel. Problem of Independent India exactly lies here. I shall narrate my experiences with a few case histories.

Central and /or State agencies are heartless mechanical devices. Their duty is to allocate the fund and spend it somehow. There is a wide gap between the grass root end beneficiaries and the white collared executive. Sometimes it is a highly absorbing medium. To clarify it, let me quote one statement of our ex-Prime Minister, Rajib Gandhi who sarcastically remarked that for every 100 Rupees spent for the poor, they get only Rs 14. Better not to ask why and how? Side by side, there are

few NGOs where utilisation of fund for the purpose it is allocated is nearly 100%. Though the list will not be too long, mention may be made of (i) Ramakrishna Mission, (2) Bharat Sevashram Sangha, (3) Ramakrishna Vedanta Math, (4) Ramakrishna Sarada Mission, (5) Vivekananda Swasthya O Sangha, (6) Vivekananda Kendra etc etc.

The purpose of this article is to analyse in depth why important and powerful Central and/or State Agencies fail whereas less important NGOs can perform in a far better way.

To start with, I have mentioned eight pre-requisites for successful completion of any social welfare programme.

Discussion of Pre-Requisites

Let us discuss them point by point

(i) Sincere identification of the problem :

Before launching any social welfare project planners and the anticipated beneficiaries should sit together and discuss the problem openly without any caste-colour-religion or political distinction. Many projects fail because of bias on this side or that side. To define a problem, identification of the beneficiaries is the most crucial part of any project. Once it is chalked out impartially without any preferential bias to any factor, the project will be a good starter.

In this context, the great national leader and Herbinger of a new era, Swami Vivekananda raised a few questions to the planners: (1) Does the problem make you deeply absorbed? (2) Does it pain you so much that you can't sleep at night? (3) Do you sincerely believe that whatever you have thought about will be beneficial to the sector of the people you have earmarked. The first two factors are important for identification of the individuals to be involved in planning. The third factor needs experiences, far-sight and wisdom. Screening through these three factors makes an individual fit for the stage of planning.

(2) **Honest assessment of its dimension :**

Once the problem has been identified, the next important is: what is the extent of the geographical area or the population affected by the problem? If it is a problem of location of potable water reserve, then it is surely geological and geographical and hence the area is to be delineated for the purpose. If it is a problem related to poverty, how many persons are affected is to be estimated. There is a need for fund and population match, i.e., to say what is the fund available and how many people can be benefitted out of it.

(3) **Objective solutions :**

Emotional and / or subjective solutions to any problem hardly can hit the target. The project of GR and TR can not even touch the fringe area of the problem of alleviation of poverty. They give only very very temporary relief and the entire fund thus spent goes waste. Swami Vivekananda once commented that even if the entire asset of the wealthiest man in the world is spent to remove poverty from a village, it can do it for a week or a month but never permanently unless the plan is designed to make them self dependent. Any short-term help is an insult to humanity, unless it can generate self-confidence in the man. This is true for a country like India. Many NGOs distribute new clothes to the poor children on religious occasions and make a show of their charity. Every year they go on doing it involving even increasing fund and perpetuating the annual ceremony of cloth distribution. In stead of that, another NGO taught women folk in a village the art of cutting and sewing. Next year it allocated few metres of cloth to every family. On the third year not a single penny had to be spent for that village. They started earning by stitching others' clothes in their locality and adjacent to it. Does it not appear to be a better proposition?

(4) **Plans Execution :**

Plans execution is very delicate. It should not hurt self-respect of any person. To serve mankind is to serve God. Therefore it must be performed with great care, respect and devotion. Executors' hands should touch the heart of the people served.

At this point executors should be selected on the basis of their social commitment and love for the grass root level of people. One NGO in North Calcutta opened a Free Tutorial Class in a slum area. Many students started coming and good teachers also volunteered their service for them. After a couple of months, I observed that the students were not coming any more. It struck me; good teachers were teaching, still students were not coming. On enquiry, it was found that one student has been ridiculed on the way by one of his friends because he is attending a free tutorial class. The word "Free" hurts them. We had to reintroduce the class at a nominal fee of Rs. 20/-per student. The collected sum was spent to provide them exercise books, which are now-a-days very costly. As soon as a nominal fee has been levied students no more feel any hesitation and the parents gladly send their wards there. The society is fast changing, its aspirations are to be realized sympathetically, without any expression of pride or pomp on the face of the volunteer. This type of problem we have never come across in our early lives.

(5) **Motivation of the Executives :**

Unless the workers are properly motivated, the end result will always be far away from the target. The story goes this way - the burden is always imposed from the top. And the executives pass the buck down the line. Therefore if no one in the process is found to be sincerely involved in the implementation the objective reality is never achieved. Number 1 in the process of execution is always a minister. The intensity of realization for the pains suffered by the poor fixes up the scale for motivation. If I am permitted to cite an example, the pace and extent of land reforms policy of the Government of West Bengal as achieved by the then minister Sri Benoy Chaudhury could never be achieved in post-Benoy Choudhury period. For the successful implementation of this policy, West Bengal deserved appreciation, not only in national context but also from international arena. Three questions therefore emerge before the policy makers intending to address a critical problem.

- (a) How to identify the proper person to head and to execute a programme?
- (b) How to imbibe motivation in execution?

(c) How to assess and monitor the objective achievement in real time frame?

The answer to all these queries point to perfection of a man ; how far an individual is humane!

(6) Social Commitment or Social Indebtedness :

The figure cited in this context is almost known to every one, that to make a doctor / medical practitioner, the tax payers of India pay around Rs 4 to 5 lacs, and to produce an enginner or a highly skilled technologist, the taxpayers spend about Rs 3 to 4 lacs. In exchange, the moment a doctor or an engineer appears in the field of service and gets a job, he craves for money and more money. He completely forgets to think about the Indians who have paid for his career to grow. Swami Vivekananda rightly addressed them as the traitors to the country. I strongly feel it is no use to blame in isolation. In our education system, is there any honest attempt to bring home to them this elementary truth? They are trained by a group of careerists however talented they may be, without any value orientation. They must be taught to spend a reasonable length of their service life to pay back this social debt. It will be ideal if throughout their life, they dedicate themselves (i) to repay their social gratitude by restraining their lofty economic aspirations, and (ii) not to try to become a Rockefeller or Ford in one life.

This area needs immediate attention of the planners. Netaji Subhas Chandra Bose in his Preface to "Planning for India" emphatically mentioned that in the first phase of 10 years in Independent India, entire attention had to be focused on 'Character Building' and 'Man-Making'. Thereafter everything will take care of itself; as the man, the most valuable element in the process of development and progress is properly groomed. This aspect of the human problem has lost the vision of the then political leaders. I feel, still it is not too late, let us strive hard to make good the losses and gear up our education policy to imbibe a sincere feeling for social indebtedness and national integration. Down the line after the political leaders comes the role of the civil servants. Unless they can discriminate between 'national

goal' and 'national loss' and prioritise 'service' before 'self', in true sense of the term, no bumper harvest can be expected however good the plan and programme may be. Swami Vivekananda a number of times stressed the need of 'man-making' and 'character-building' in national policy of education.

(7) Monitoring and Supervision :

Each programme having a time schedule needs monitoring and supervision mainly because of two reasons. Firstly, in course of its implementation, it can change its course at any point of time. Secondly, completion or success to a pre-determined level in a fixed frame of time is to be achieved. Therefore, vigilant supervision and cordial monitoring pave the path of success of any plan and programme. Sometimes, successful completion of a programme is found to be hindered due to either (a) political, or (b) social barriers. As for example in mid-day meal programme social attitude is the main stumbling block. If the meal is cooked by a person belonging to lower caste, then the high caste students will not take it. No one could apprehend of it. It needs careful handling of the situation. Any coercion on the part of the authority may defeat the very purpose of the scheme. Another typical example is the issue of identification of people below the poverty line (BPL) where political attitude of the ruling party sometimes poses a problem. Very cheap and parochial mentality works here. If a person is to be benefitted let him belong to the ruling party in order to broaden their base area. To me it appears on the contrary. If identification of BPL person is irrespective of political-religious and caste bias, then the ruling party can earn long lasting confidence of the villagers. Poverty does not enjoy any political-social or caste preference. In any such preferential treatment, reality is the first casualty.

(9) Introspection and Evaluation :

In general, it is observed that as soon as a programme is fulfilled or its scheduled time is over, the entire group involved in its execution breathes a sigh of relief. Hardly ever a man ponders over the pros and cons of a project after its completion. But to me it appears that analysis of the failures and success of a project enables the planners to design future plans in a full-proof manner and plug many

loopholes.

While we were working in Hazaribagh Drought Relief Camp unexpected donation in kinds was received from all over the globe. Very good quality blankets, horlicks, garments, butter, cereals were supplied for them from different countries. A part of it was pilfered on transit from govt. godown to site camp. After that whatever items are left, they were distributed. Finally we observe that beneficiaries not being in the habit of using such costly items sold out and whatever money they could get, utilized it and came back to initial state of destitution. Since then wherever I have worked I insisted on medium-grade materials so that the beneficiaries do not hesitate to use them. Sometimes muscle power predominates, the physically weaker groups are overpowered by stronger groups and their foodgrains and clothings are looted. In this context, instead of Centralised Distribution System, local distribution points are more beneficial to the victims.

Before I conclude, I am reminded of a word of caution made by the patriot and prophet Swami Vivekananda. He emphatically cautioned that the entire wealth of a country if poured down for the development and welfare of a small village, it can do so for a very short period of time but not permanently. The beneficiaries should realize that the help or assistance is very temporary in nature; ultimately they are to be self-dependent and to generate their own wealth and livelihood. Any type of help or assistance should consist of two distinct components. One component is meant for temporary alleviation of his sufferings; another component, the most significant component, should build up his future and prompt him to be self-reliant. Much emphasis and attention is to be focused on this delicate design of any poverty alleviation scheme.

6. Conclusions :

Poverty is deep-seated and age-old chronic disease of Indian society. In the post-Independence period only fringe area has been touched and superficial patch up project has been taken up, huge fund has been diverted without any permanent

benefit. The malaise needs deep introspection and whole-hearted and sincere analysis of the problem involving grass root level social workers and planners. This problem can not not be tackled from ivory castle by white collared planners; it should involve those who love the country selflessly and the dimension of the problem pains them. It is a tall claim but without this painful feeling nothing meaningful can be achieved.

Swami Vivekananda called the wealthier section of the society 'traitors', because accumulation of wealth more than a man or a family needs has a history of exploitation in the background. This blood-stained wealth needs redistribution amongst the poorest of the poor. When this national feeling will bleed the heart of the planner, emerging new horizons of India will be visible to everyone.

Swarnajayanti Gram Swarozgar Yojana : Is it an improvement over IRDP ?

*Dilip Kumar Ghosh**

Integrated Rural Development Programme (IRDP), essentially a poverty alleviation programme, was launched throughout all blocks of the country during the Sixth Five Year Plan by the Government of India. The programme was not only all pervasive but also comprehensive. It continued for nineteen years (1980-81 to 1998-99) without any jerk. In view of the huge dimension of poverty in the rural areas (according to 1977-78 estimate the percentage of population below poverty line was 50.82 percent in the rural areas) the Sixth Five Year Plan adopted the strategy to put major thrust on strengthening socio-economic infrastructure of development in the rural areas and thereby alleviating rural poverty and reducing regional disparities. Before the beginning of the Sixth Five Year Plan, there was a number of programmes for improving the economic conditions of the rural poor. None of these programmes had coverage throughout the country. On the other hand, at the operational level there were the problems of multiplicity of programmes and different funding patterns. For avoiding all such problems and to initiate concerted efforts towards betterment of socio-economic conditions of the rural poor, the Sixth Five Year Plan proposed introduction of an integrated programme. It is relevant here to present the proposal of the Sixth Five Year Plan in the words of the document :

"It is proposed that such multiplicity of programmes for the rural poor operated through a multiplicity of agencies should be ended and be replaced by one single integrated programme operative throughout the country. The programme will be called the Integrated Rural Development Programme".

IRDP was conceived as a strategy to assist families below the poverty line

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with productive assets provided through coupling of government subsidy and bank credit, technology and skills for making their economic activities viable. With the commencement of IRDP, all agencies were merged into a single agency, known as District Rural Development Agency (DRDA). The Sixth Plan emphatically indicated the importance of the credit institutions for success of this programme. To quote :

“The success of Integrated Rural Development Programme will mainly hinge on the preparation of viable schemes for those identified for assistance and the provision of investment credit on assured basis. While over the years there has undoubtedly been an impressive set-up in credit availability to the weaker sections, its dispersal among various strata of the rural poor has been extremely disparate... .. Experience shows that bracketing those who have some resource (land) with those who have none generally tends to operate to the disadvantage of the latter. It, therefore, appears necessary that the strategy of credit deployment should be so oriented as to equitably serve the needs of each category”.

In course of reviewing the implementation of IRDP, the Seventh Five Year Plan observed that working of the programme was by no means uniform in the country. The performance of the programme was found to be better in the relatively developed regions where the infrastructure was better and the beneficiaries possessed high awareness level. The Seventh Plan document itself mentioned that such a massive programme for poverty alleviation was taken up with very little preparation :

“Many of the shortcomings of the Integrated Rural Development Programme would appear to stem from the fact that a programme of massive dimensions having a multiplicity of critical parameters and functioning in a highly diverse environment, was launched with what can be called very little preparation” (Vol. II).

For remedying the gaps in the programme, the Seventh Plan proposed to put

emphasis on taking up group-oriented activities for the beneficiaries through promotion of cooperatives, registered societies, informal groups etc. It was expected that group activities would be able to realise economies of scale fully and at the same time it would promote group initiative and efforts of the poor. Unitedly they might get strength for bargaining. For better utilization of the programme benefits, the Seventh Plan prescribed assistance under IRDP in the form of more than one scheme/ asset for a family. If necessary the assistance should be extended to different members of the identified household. This change was recommended to create a capacity for productive absorption of credit among the households.

The Eighth Five Year Plan (1992-97) was introduced in a period when the process of liberalization was already rolled in the economy through introduction of major reforms in the economic arena. The changes in the government policies are visible through the following quoted from the Eighth Five Year Plan document :

“... the planning and implementation of the rural development programmes must enable greater self-help by the people and their participation in programmes through panchayati raj institutions, cooperatives and other self-managed institutions. This will mark a reduction in the dependence on the present development administration for delivery” (Vol. II).

However, for removing any confusion in the minds of people in the matter of State withdrawal from the rural development, in the same place, the document continued to say, “this should not be interpreted as a greater move towards privatization or leaving the rural poor to look after themselves“. The Eighth Plan assured that the State intervention should have to continue in the interests of the poor and vulnerable. In reviewing the performance of IRDP, the Eighth Plan noted the limited achievements of the programme; for example, “there is a perception that the achievements have not been commensurate with the resources spent on them”. The Eighth Plan viewed IRDP not as a programme based on subsidy supplemented by bank credit, but as a credit-based self-employment programme with an element

of subsidy. This plan also apprehended that the implementation of IRDP did not give guarantee that once a family crossed the poverty line, this happened for ever : “even those who have generated sufficient additional income to cross the poverty line may relapse into the category of poor, with additions to the family, loss of assets and non-viability of the activity chosen by him” (Vol. II). The Ninth Five Year Plan (1997-2002) also pointed out the weakness of IRDP where it mentioned that “the major constraint in the implementation of IRDP has been sub-critical investments”. Though the programme guidelines stressed on higher per family investment for better incremental capital-output ratio, yet the Ninth Plan document made observations like this :

“Though the average per family investment has been rising steadily in monetary terms, in real terms the increase has been inadequate and in some cases sub-critical due to the inflationary trends and the increase in the cost of assets” (Vol. II).

Inadequate development of infrastructure and insufficient forward and backward linkages and market facilities remained as an area of concern under IRDP. Though the allocation under IRDP programme towards the development of rural infrastructure increased from 10 percent to 20 percent in all the States and to 25 percent in the North Eastern States, yet the expenditure was not in tune with the expectations. The Ninth Plan document noted this in following words :

“..... despite this enhanced provision for programme infrastructure under IRDP and the relaxation in sanctioning norms, the actual expenditure on infrastructural development was a mere 5 percent to 7 percent of the total allocation under the programme at the all India level. There is therefore, a critical need to prepare a infrastructural plan at the district and block level and to ensure that the funds earmarked for infrastructural development under IRDP are closely

monitored and not diverted elsewhere” (Vol. II.)

Considering the major lacunae in the programme implementation, the Ninth Plan recommended a strategic shift under IRDP from an individual beneficiary approach to a group and/ or cluster approach. According to the Ninth Plan document, “as part of the group approach, the focus of IRDP would be on the formation of Self-help Groups”. These Self Help Groups would act as the catalyst for organizing the poor and in turn would empower them to be viable units in the society. The Mid-term Appraisal of the Ninth Five Year Plan indicated many weaknesses of this massive programme. The prominent one was the lack of linkages between allied programmes of IRDP like Training of Rural Youth for Self-Employment (TRYSEM), Development of Women and Children in Rural Areas (DWCRA), Ganga Kalyan Yojana (GKY), Supply of Improved Toolkits to Rural Artisans (SITRA) and Million Wells Scheme (MWS). According to the document of Mid-term Appraisal of the Ninth Five Year Plan, IRDP was simply seen as a scheme distribution programme. For revamping the IRDP and its allied programmes, with effect from 1st April, 1999, the Government of India launched Swarnajayanti Gram Swarozgar Yojana (SGSY) replacing all self-employment programmes of the Ministry of Rural Development.

Strategically, SGSY is different from the earlier programmes of self-employment. This programme is conceived as a holistic programme of self-employment covering all aspects like organization of the rural poor into self help groups, their capacity building, provision of training, planning of activity clusters, building of infrastructure and marketing and technology support. Two key aspects of SGSY are activity clusters and the group approach. Like IRDP, SGSY is also a credit-cum-subsidy programme where credit is marked as the critical component and subsidy is made the minor and enabling element. In IRDP, both subsidy and credit were critical components and there was strong linkage between two, i.e. subsidy could not be disbursed without the release of matching credit from the banks. Accordingly, SGSY envisages greater involvement of the banks for implementation of the programme. Through SGSY attempts are being made to establish a large

number of micro-enterprises in the rural areas. These are to be built upon the potential of the rural poor. In establishing the micro-enterprises, the emphasis under SGSY is on the cluster approach. The guidelines make following provisions regarding the selection of activities for such cluster formation :

“..... about 10 key activities will be identified for each block based on the resources, occupational skills of the people and availability of markets. However, focus should be on 4-5 activities which are identified for training and micro-enterprises development in a cluster approach for a larger number of groups. Selection of key activities will be with the approval of the Panchayat Samitis at the block level and the DRDA/ Zilla Parishad at the district level. The major share of SGSY assistance will be in activity clusters”.

Like IRDP, in SGSY also there is a provision for infrastructure development in the rural areas where 20 percent of annual allocation (25 percent in case of North-eastern States) is kept apart for this purpose. This fund is to be maintained at DRDA level as ‘SGSY-Infrastructure Fund’. Similarly, for skill development also SGSY guidelines make necessary provision. This is like TRYSEM component of IRDP. DRDA is entitled to meet all expenses for both Basic Orientation and Skill Development Training out of SGSY-Training Fund. In SGSY guidelines it has been specially mentioned that in cases where the swarozgaris (beneficiaries of SGSY) possess the required skills they may be put through a basic orientation programme after the loans are sanctioned by the banks. This training is mandatory. Skill Development training is for the identified activities. Under SGSY, individuals also can get the benefits. For safeguarding the interests of the weaker sections, the programme guidelines specify that the scheduled castes/ scheduled tribes will account for a minimum of 50 percent of individual swarozgaris, women will account for a minimum of 40 percent of the total beneficiaries and the disabled should be at least 3 percent of the total beneficiaries. In case of self-help groups, SGSY programme

guidelines reiterate that all out efforts will be made to involve all members in each SHG. In addition, exclusive women groups also have to be formed. The underlying logic for women benefits in this programme is :

“Our experience in the past has shown that Self Help Groups of women have been more successful and sustainable. Further, women are better carriers of development. Therefore, effort should be to organize large number of SHGs exclusively of women” (SGSY Guidelines).

With this background, the present study has been taken up to explore the areas where SGSY brings in improvement over the erstwhile IRDP. SGSY basically is designed by including many features of IRDP and its allied programmes. In IRDP also there was a programme based on group approach – Development of Women and Children in the Rural Areas (DWCRA). DWCRA, however, was solely restricted to women; whereas in SGSY, there may be SHGs with men. It is expected that in SGSY, shortcomings of IRDP will be covered up with better implementation. The indicators adopted in this study for comparing these two programmes are (i) utilization of available funds, (ii) per family investment and (iii) expenditure on training/ skill development, etc.

The present paper is structured in following manner :

Section I provides a scenario of 15 major States of the country in respect of implementation of both the programmes. The States are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. This section will help to get an all-India picture of implementation of IRD programme. Section II presents the case of West Bengal. In West Bengal, all programmes of Ministry of Rural Development are administered by the Department of Panchayats and Rural Development, Govt. of West Bengal and are implemented through active involvement of the panchayat bodies at district, block and village levels. Thus, the onus for any achievement positive or negative, lies on the panchayats at the appropriate tier.

Section III tries to analyse the inherent limitations of SGSY for which its progress is being impeded in most of the districts of West Bengal. For example, low recovery of IRDP itself becomes a problem for credit linkage in SGSY.

Section I

For the present purpose we consider the State-wise details of IRDP and allied programmes for the period 1992-93 to 1998-99. This period comprises the whole of the Eighth Five Year Plan (1992-97) and the first two years of the Ninth Five Year Plan (1997-2002). For SGSY, we consider the period 1999-2000 to 2003-2004 for State details. Integrated Rural Development Programme (IRDP) was designed in such a way that it would promote self-employment ventures in a variety of activities in the rural sector. Evaluation studies indicate its strong bias towards animal husbandry schemes, more particularly milch cattle. The similar bias prevailed during the Seventh Plan period also. The Eighth Five Year Plan document gave a sectoral composition of all the schemes provided under IRDP during the Seventh Plan: "44 percent were in the primary sector, 18.5 percent in the secondary sector and 37.5 percent in the tertiary sector". This indicates the preference of the beneficiaries for such schemes in which they have their own experiences and knowledge. IRDP as such could not bring in any new dimension to the rural occupational structure. In reviewing the progress of IRDP, during the Eighth Five Year Plan, the Ninth Plan pointed out that out of total allocation of Rs. 5048.29 crores during the five years, Rs. 4874.70 crores could be spent – in percentage, 96.56 percent. During the first two years of the Ninth Five Year Plan, out of total allocation of Rs. 2589.79 crores, Rs. 2270.43 crores was the expenditure – in percentage, 87.67 percent of total allocation. In table 1, major State-wise proportions of expenditure vis-à-vis total allocation are given to visualize the extent of expenditure by the States over the total period of the Eighth Five Year Plan and the first two years of the Ninth Plan. There were variations among the States. In all the States, District Rural Development Agency had the responsibility to implement the

programmes. The extent of expenditure reflects the efficiency of these agencies. Regarding the protection of the interests of the marginalized sections, women beneficiaries in the programme were always less than the target. For example, during the first two years of the Ninth Plan, i.e., the last two years of the programme women assistance was to the extent of 35 percent of total assisted when the target coverage was 40 percent.

Table 1(a) : Progress of Expenditure in IRDP

States	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	Average for the period	Rank
Andhra Pradesh	93.50	87.70	94.89	89.05	106.17	90.58	101.08	94.71	6
Assam	87.13	100.45	56.52	73.33	113.62	81.82	25.89	76.96	11
Bihar	70.53	87.24	47.95	62.59	57.78	60.86	62.82	64.25	14
Gujarat	102.58	113.86	102.40	97.75	94.55	81.61	99.89	98.95	2
Haryana	92.33	100.46	76.40	86.49	144.78	75.87	107.99	97.76	3
Karnataka	85.29	72.12	66.93	67.04	80.18	73.79	62.19	72.50	13
Kerala	89.72	84.56	89.39	77.17	110.65	85.50	86.53	89.07	7
Madhya Pradesh	96.09	90.65	94.71	82.39	102.20	115.64	96.56	96.89	5
Maharashtra	96.66	76.66	72.12	88.06	96.95	87.61	90.12	86.88	9
Orissa	82.95	88.94	76.27	80.64	100.00	92.09	99.94	88.69	8
Punjab	88.60	115.44	95.26	157.60	101.51	75.75	105.38	105.65	1
Rajasthan	72.98	73.47	77.90	86.18	71.46	72.23	78.50	76.10	12
Tamil Nadu	97.20	94.80	84.67	103.70	79.13	110.08	108.70	96.90	4
Uttar Pradesh	89.86	82.18	85.54	71.54	81.64	82.16	76.38	81.33	10
West Bengal	93.56	43.87	50.33	54.79	51.54	45.09	44.18	54.76	15
All India	87.46	83.17	75.57	76.70	81.50	80.60	78.20	80.46	-

Source : Basic Rural Statistics.

Note : (i) All figures except Rank are in percentage.

(ii) Erstwhile Bihar, Madhya Pradesh and Uttar Pradesh are taken as the states were not bifurcated then.

From table 1 it can be seen that the progress of expenditure remained low in the States where below poverty line persons were more in number. For example, according to the poverty estimates of 1993-94, the BPL persons were 450.86 lakhs in Bihar, 94.68 lakhs in Rajasthan, 496.17 lakhs in Uttar Pradesh, 209.90 lakhs in West Bengal and 140.90 lakhs in Orissa. Together they were 1392.51 lakhs out of the total of 2440.31 lakhs in the country as a whole – in percentage terms this was 57.06 percent. In the States like Punjab, Gujarat and Haryana where there were less number of poor and better infrastructure facilities, expenditure of the total available funds was quite high. This is a dichotomy of the country's most comprehensive poverty alleviation programme. In West Bengal, implementation of IRDP and its allied programmes was vested on the panchayats at the appropriate tier. The Sabhadhipati of the Zilla Parishad was made the chairperson of the Governing Body of DRDA, the Sabhapati at the block panchayat (Panchayat Samiti) was given the authority to sanction IRDP cases after the identification was done by the gram panchayats. In all stages, from identification of beneficiaries to selection of schemes and disbursement of loans and subsidies, the panchayats were involved in the process of implementation of IRDP. In spite of all these, the expenditure vis-à-vis total available funds remained at a low level.

Like IRDP, implementation of SGSY is also the responsibility of DRDA, where the involvement of the panchayati raj institutions (in particular, the gram panchayats and panchayat samitis), the banks, the line departments and the non-governmental organisations (NGOs) are very specifically mentioned in the guidelines. The involvement of NGOs is a new dimension in SGSY – it was not that much clearly spelt out in IRDP. The guidelines of SGSY published by Ministry of Rural Development delineate the role of different agencies in implementation of the programme :

"The DRDAs are expected to coordinate the implementation of the programme. In particular their role will be critical in organization of the Self Help Groups and their capacity

building as well as in terms of coordination with the technical institutions for technology and training, the banks for planning and credit mobilization, the line departments for infrastructure and technical follow up as well as in coordinating the marketing activities”.

In spite of such elaborate arrangements for implementation of this self-employment programme, the expenditure progress till now does not improve very much in comparison with the trend of IRDP. The Annual Report for the period 2003-2004 of the Ministry of Rural Development, Govt. of India shows that in the first year of implementation of the programme, it became possible to utilize 48.92 percent of the total available funds. In the subsequent years the figures were as follows; it was 69.52 percent in 2000-2001, 74.67 percent in 2001-2002, 78.18 percent in 2002-2003 and 87.95 percent in 2003-2004. Let us now present in table 1(b) the State-wise progress of expenditure in SGSY during 1999-2000 to 2003-2004.

Table 1(b) : Progress of Expenditure in SGSY

States	1999-2000	2000-01	2001-02	2002-03	2003-04	Average for the period	Rank
Andhra Pradesh	91.18	111.17	99.12	101.81	99.98	100.65	2
Assam	58.23	93.77	65.16	64.64	82.05	72.77	12
Bihar	31.65	58.64	63.60	71.42	75.48	60.16	13
Gujarat	54.77	90.71	104.96	96.71	101.61	89.75	7
Haryana	77.95	118.72	98.93	100.46	99.77	99.17	3
Karnataka	49.99	58.62	81.61	90.12	102.83	76.63	11
Kerala	58.09	102.84	92.49	98.06	96.55	89.60	8
Madhya Pradesh	57.75	106.85	97.52	101.78	96.42	92.06	6
Maharashtra	64.84	82.05	90.03	85.94	95.59	83.69	9
Orissa	55.74	94.18	106.10	101.43	110.49	93.56	5

Punjab	76.67	131.99	98.69	98.17	98.88	100.88	1
Rajasthan	69.68	77.25	89.94	75.81	75.74	77.68	10
Tamil Nadu	100.76	118.84	101.56	67.37	97.87	97.28	4
Uttar Pradesh	19.76	57.12	60.23	66.67	78.73	56.50	14
West Bengal	36.01	14.23	27.24	55.70	64.39	39.51	15
All India	50.31	73.40	74.66	78.14	87.95	72.89	-

Source : *Basic Rural Statistics* for the years 1999-2000 and 2000-2001, *Annual Reports* of MORD, Govt. of India for the remaining three years.

- Note* : (i) Erstwhile Bihar, Madhya Pradesh and Uttar Pradesh are presented in the table making adjustment with the respective newly constituted states.
- (ii) All figures, except Rank shows percentage of expenditure vis-à-vis total available funds.

From tables 1(a) and 1(b) it can be easily noticed that the proportion of expenditure in relation to the total available funds was reduced in case of SGSY. The main cause for such decline seems to be the procedures of implementation of SGSY. In IRDP it was quite simple. After sanction of the loans by banks, they immediately disbursed the whole amount debiting the corresponding subsidy from the account of DRDA maintained at the link branch of the concerned banks. In SGSY, thrust is more on group activities and formation of self-help groups. These SHGs have to go through various stages of evolution before establishing links with the banks. The guidelines of SGSY mention four stages, viz. group formation, group stabilization, micro finance and micro enterprise development. From the micro finance stage, involvement of the banks commences. Generally, a SHG consists of 10 to 20 persons where focus is more on women self help groups. The point of departure regarding selection of the beneficiaries for a SHG is that SGSY guidelines incorporate the scope for inclusion of families living marginally above the poverty line. The relevant provision is as follows :

“Generally all members of the group should belong to families below the poverty line. However, if necessary, a maximum of 20% and in exceptional cases, where essentially required, up to a maximum of 30% of the members in a group may be taken from families marginally above the poverty line living contiguously with BPL families and if they are acceptable to the BPL members of the group”.

Self help group formation is a time taking event, because the essentials like social mobilization and community organization involve process-oriented approach where many dichotomies have to be subsumed before group consolidation. Therefore, SHG formation cannot be equated with target-oriented approach. Approximately six months or more times may be required before a group passes the first grading test. All these depend upon the literacy and awareness levels of the group members and their socio-economic background. The grading exercise is normally undertaken by DRDAs with the help of independent agencies. For this it is also necessary to build up capacity of the DRDA personnel for conducting such exercises. This aspect is not properly cared. In most of the cases long time has been taken for completing the process of grading. As a consequence, huge amounts of available funds remain unspent.

Next point of discussion is the per family availability of bank credit under IRDP and SGSY. In both the programmes, investment on the schemes comprises government subsidy and bank credit, where institutional finance bears the major component. In IRDP, the pattern of subsidy was 25 percent of the project cost in case of small farmers, 33 1/3 percent for marginal farmers, agricultural labourers, rural artisans etc., 50 percent for SCs/ STs and physically handicapped persons. There was monetary ceiling in each case. For plain areas it was Rs. 4000/-, for DPAP/DDP areas the limit was Rs. 5000/-, in case of SCs/ STs the limit of subsidy availability was Rs. 6000/- while for the group activities involving at least 5 persons, the ceiling of subsidy admissibility was fixed at Rs. 1.25 lakh or 50 percent of the

project cost, whichever was less. The subsidy pattern in SGSY slightly differs from IRDP. Under SGSY subsidy is uniform at 30 percent of the project cost, subject to a maximum limit of Rs. 7500/- only. In respect of SCs/ STs and disabled persons the subsidy component is 50 percent of the project cost, subject to monetary ceiling of Rs. 10,000/- only. For self-help groups, SGSY guidelines make provisions for subsidy of 50 percent project cost subject to per capita subsidy of Rs. 10,000/- or Rs. 1.25 lakhs whichever is less. However, no monetary limit is prescribed for irrigation sector schemes. The subsidy admissibility and the monetary limit for different categories of beneficiaries clearly explain the major share of the financial institutions in total project cost. For this reason, we calculate separately per family mobilization of credit in both the programmes. This calculation (table 2a) will help us explain whether credit flow is adequate or not.

Table 2(a) : Per Family Credit Availability (in Rupees) in IRDP

States	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	Average for the period	Rank
Andhra Pradesh	4048	3938	6534	10856	8613	9605	10115	7594	11
Assam	4182	4554	5692	7497	7043	7805	8337	6451	15
Bihar	4092	4454	4841	9601	8879	10617	13631	8016	10
Gujarat	3457	4858	5812	8790	9134	11646	12593	8041	9
Haryana	4571	5348	7307	8364	12927	15217	16707	10063	5
Karnataka	4116	4527	5342	7479	8728	9738	10359	7184	12
Kerala	4455	4927	8612	11034	13413	15581	16587	10658	4
Madhya Pradesh	5316	5541	6475	8029	11684	15285	15716	9721	6
Maharashtra	4904	5466	6494	8006	10846	12758	14794	9038	7
Orissa	3732	3887	4944	8968	9586	13560	13512	8313	8
Punjab	6024	6498	8244	19260	15020	14797	15902	12249	2
Rajasthan	4449	4899	6618	9224	18666	21767	24324	12849	1
Tamil Nadu	4185	4681	5837	8005	7343	8023	9921	6856	13
Uttar Pradesh	7475	9568	10120	12622	12894	13441	13645	11395	3
West Bengal	5002	5104	5047	7395	7756	8154	9110	6795	14
All India	5012	5548	6547	9411	10236	11699	13079	8790	-

Source : Basic Rural Statistics.

Note : (i) All figures except rank are in Rupees.

From table 2(a) it can be seen that the per family availability of credit increased gradually. But this increase was in monetary terms. Due to inflationary trends, the real increase of availability of credit would be less. In addition, there was certain increase in cost of the assets. For low mobilization of credit for the IRDP assisted families, banks had genuine reasons for not meeting the full credit requirements of the beneficiaries. The reasons "include poor recovery of IRDP loans, lack of adequate rural banking infrastructure in certain areas and the weak financial performance of Regional Rural Banks and Cooperative Banks" (Ninth Five Year Plan, Vol. II). The observation of the Ninth Plan Mid-term Appraisal regarding low investment is worth quoting here :

"The average investment per family remained at sub-critical levels, inadequate to generate income of Rs. 2000 per family per month as the programmes had set out to do. Such investment at the beginning of the Eighth Plan was Rs. 7889. Even the investment at the beginning of the Ninth Plan of Rs. 16,753 was not much higher in real terms. Such low per family investment in the face of inflationary trends and rising cost of assets cannot finance viable projects to offer adequate incomes on sustained basis".

The irony of the programme was that these inherently unviable projects financed by coupling bank credit and government subsidy were delivered to the persons who had very low educational attainment or no literacy skill and had very little working skill or no skill for managing such assets. As a consequence loss of asset was huge in the programme. Even if a beneficiary who retained the assets, the income generation was not adequate to cross the poverty line on lasting basis. The Expert Committee on IRDP constituted by Reserve Bank of India on the 29th September, 1993 also held under-financing responsible for dismal affairs of the programme :

"... .. large scale under financing of IRDP beneficiaries in the initial years of programme has resulted in sub-optimal

utilization of assets and inadequate income generation which, in turn, had an adverse impact on the quality of lending in general and on recovery in particular”.

Like IRDP, SGSY is also a credit-linked scheme. The size of loan for a project depends on the nature of the projects where loan is always a composite loan involving both the working capital and the fixed capital. The guidelines of SGSY accord certain discretion to the bank branches in respect of selection of the beneficiaries for this programme. It is expected in the guidelines that the bankers should “associate themselves in the entire gamut of activities”. The guidelines urge for adequate flow of bank credit for requisite income generation for the poor families. No ceiling for investment is fixed in the programme guidelines. The purpose is to mobilize credit through proper assessment of the swarozgaris’ needs and viability of the scheme. In table 2(b) we calculate the per family credit mobilisation in SGSY.

Table 2(b) : Per Family Credit Availability in SGSY (in Rupees)

States	1999-2000	2000-01	2001-02	2002-03	2003-04	Average for the period	Rank
Andhra Pradesh	5678	9300	7760	10398	11303	8888	13
Assam	4984	6277	11546	6904	10108	7964	15
Bihar	10187	10532	9846	13279	11370	11043	11
Gujarat	11445	13007	13921	14383	15299	13611	9
Haryana	17294	22481	22201	20162	20833	20594	2
Karnataka	17540	18850	15267	17036	15025	16744	6
Kerala	16980	15854	14467	14714	12545	14912	8
Madhya Pradesh	9685	16181	20212	19641	21163	17376	5
Maharashtra	17505	19747	18560	17092	16425	17866	4
Orissa	12618	14313	13350	14080	13137	13499	10
Punjab	13456	21727	21859	20669	21759	19894	3
Rajasthan	17925	27899	29086	28586	27833	26266	1
Tamil Nadu	11271	9876	7539	5699	6759	8229	14
Uttar Pradesh	16830	13678	14639	15808	14494	15089	7
West Bengal	8068	3595	11742	14281	12913	10120	12
All India	11312	14027	13560	14333	14702	13587	-

Source : *Basic Rural Statistics* for the years 1999-2000 and 2000-2001 and *Annual Reports* of MORD, Govt. of India for the remaining years.

Note : (i) Per family bank credit = $\frac{\text{Total credit mobilisation}}{\text{No. of families assisted}}$

(ii) All figures except rank are in rupees.

Comparing with IRDP, SGSY has better scope for mobilising more money in favour of the poor through higher investment. In this programme major part of the available fund (taking into account both the subsidy and credit) goes to SHGs. A SHG can get maximum subsidy of Rs. 1.25 lakh. Against this, average credit flow should be minimum Rs. 2.50 lakhs. But in 2002-03 and 2003-04, subsidy-credit ratio is well below 2 – it is 1.95 in 2002-03 and 1.84 in 2003-04. This indicates that credit flow is not in proportion to the subsidies released by DRDAs. As a consequence, the investment per beneficiary remains at a low level. The size of loan for a project depends on the nature of project where the loan component comprises both fixed and working capital. The beneficiaries of the programme in general do not opt for any non-traditional project. They have strong preference for primary sector – in 2002-03, of total beneficiaries, 63.83 percent opted for primary sector schemes, 19.60 percent for secondary sector schemes comprising village industries, handicrafts, handlooms etc. and 16.57 percent accepted tertiary sector schemes. In 2003-04, the share of the primary sector schemes increased to 66.11 percent, the share of secondary sector rose to 21.06 percent and that of tertiary sector decline to 12.83 percent. This is mainly due to lack of entrepreneurial ability among the beneficiaries. Poor people need the immediate income generation and prefer those schemes only for which they have before-hand knowledge. They try to avoid further risk in the path to income generation.

The focus of SGSY is on development of activity clusters, with emphasis on key activities as identified at the block level. This is applicable both in the cases of individual swarozgaries and the self-help groups. The activity clusters indicate

geographical clusters covering neighbouring villages within a reasonable radius. Reserve Bank of India's circulars for this programme, however, put a caution on identification of activity clusters. The message runs like this : "care should however be taken that the market is either readily available or there is a potential for market creation for the products". The District SGSY Committee formed in each and every district of the country are mainly responsible for identifying the activity clusters and to select about 10 activities per block where major focus would go to 4-5 key activities. As this identification process is yet to be completed, SGSY cannot take the shape of a full-fledged programme of self-employment generation in the rural areas. Low expenditure for the training and capacity building component is an evidence for this proposition. In IRDP, through the programme of Training of Rural Youth for Self Employment (TRYSEM), the Govt. of India and the State Governments spent a lot of money for upgradation and inculcation of new skills for the rural youths (18-35 years). The objective of the programme was that after receiving the training under different trades (obviously at the government costs), the rural youths would be able to undertake own self-employment ventures or at least could pursue some wage employment activities on sustainable basis. As per official records, the achievement was less than 50 percent. For example, in 1995-96, out of total youths trained numbering 291450, only 141115 were settled in self-and wage employment (*Basic Rural Statistics*, 2001) – in percentage, 48.42 percent. In the year 1997-98, out of 175034 youths trained, 76655 were employed in different self-and wage employment activities – in percentage, 43.79 percent. Overall, the achievements are quite below the expectation. The Mid-term Appraisal of the Ninth Five Year Plan made scathing criticism of this training programme in following words :

"The rural youths so trained were only interested in the stipends, they had not used the knowledge gained under the programme for furthering self-employment prospects. TRYSEM had a weak link with the overall strategy for self-employment in rural areas and with industrial policy. The training was not related to capacity or aptitude of trainees

nor to demand for the respective skill. It was impossible for trained rural youth to run a self employment enterprise, given the poor technological base and uncertainty over availability of credit”.

Like IRDP, this programme for providing training to the rural youths continued for a period of nineteen years and with effect from 1st April, 1999, was merged with SGSY. In spite of all the limitations, the programme was an opportunity for the rural youths to get an exposure to new skills. Failure of the programme was due to the failures of the delivery mechanism of DRDAs. These Agencies were in charge of implementation of the programme in the districts. Even with these failures, DRDAs are again given the responsibility of implementing SGSY where training and capacity building are important components. No revamping of these agencies is made and no restructuring is brought. This training component of SGSY still remains a neglected issue. Very little percentage of total available funds is spent for this purpose. For example, in 2002-03 only 5.44 percent of total expenditure in SGSY was spent for training/ capacity building component. In 2002-03 and 2003-04 respectively Rs. 4116.44 lakhs and 5082.81 lakhs were spent for training and capacity building of swarozgaries against the average spending of Rs. 7236.12 lakhs in TRYSEM during 1992-93 to 1998-99. All these indicate that in SGSY adequate attention is not being given to the skill development aspects. Merging of IRDP and allied programmes with SGSY ultimately led to loss of opportunity for the rural youths in this area. With the analysis of all India situations, let us now present the case of West Bengal where expenditure in SGSY is very less in comparison to the other major States discussed here.

Section II

Along with the rest of the country, in West Bengal also IRDP was launched in all the blocks with the beginning of Sixth Five Year Plan. The State Government devised suitable means to harness all three tiers of the panchayati raj institutions,

district administration and the banking network in implementation of this programme. All funds were channelised through District Rural Development Agencies which were also the nodal agencies for implementing the programme including its monitoring and evaluation. In DRDAs, Sabhadhipati of the Zilla Parishad was made the chairperson of the governing body and the District Magistrate, the Vice Chairperson. The gram panchayats were entrusted with the identification of the beneficiaries and sponsoring of the cases to the panchayat samitis for sanction. At the panchayat samitis there was a committee comprising panchayat representatives, block functionaries and the bankers. This committee was known as Block Level IRDP sub-committee. The Sabhapati of the panchayat samiti was made the chairperson of this committee and Block Development Officer, the Member-Secretary. This Standing Committee was responsible for the selection of the beneficiaries, selection of package of schemes for better per family investment, resolving specific problems at the block level regarding implementation of the programme, monitoring of the programme etc. Even after so much preparation and laying out of well defined strategies for implementation of the programme, a State Government document (1988) recognized that the preparedness was not adequate to tackle a programme of vast magnitude like IRDP :

“..... there were considerable difficulties in the earlier years in the implementation of the programme. The administrative machinery was not prepared to tackle a programme of vast magnitude with credit linkage. There was lack of adequate cooperation and responses from the credit institutions and the idea of carrying forward the community approach was not much favoured by them”.

For assessing the progress of IRDP in West Bengal, we consider the period 1992-93 to 1998-99 as we did for the major states in Section 1. First, we calculate the proportion of expenditure in each year for every district and then compare it with that in SGSY for the period 1999-2000 to 2003-2004. This is done for viewing

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whether rate of spending of available funds improves in course of SGSY implementation. Next, we calculate per family bank credit mobilisation both in IRDP and SGSY and training expenditure in SGSY. This will help us understand whether SGSY is an improvement over IRDP. In table 3(a), proportions of expenditure vis-à-vis total available funds are given for the period 1992-93 to 1998-99.

Table 3(a) : Progress of Expenditure in IRDP : District wise

Districts	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	Average for the period	Rank
Burdwan	104.89	19.13	25.26	37.71	36.44	49.30	26.94	42.81	16
Bankura	80.11	45.90	44.63	42.89	63.37	45.12	45.63	52.52	12
Birbhum	94.63	112.71	75.25	60.20	61.72	53.94	40.10	71.22	1
Midnapur	85.75	33.48	51.68	68.30	78.77	49.10	49.04	59.44	7
Howrah	106.03	26.66	32.44	35.11	50.45	61.08	32.78	49.22	13
Hooghly	107.08	58.50	59.06	50.23	41.11	43.80	32.30	56.01	10
North 24 Parganas	107.30	107.04	48.90	74.39	49.27	30.20	36.81	64.84	4
South 24 Parganas	106.79	14.59	26.29	30.94	34.54	43.26	28.77	40.74	17
Nadia	93.75	26.79	48.79	60.25	39.57	37.55	61.28	52.57	11
Murshidabad	88.01	70.34	43.49	38.09	50.88	69.22	51.80	58.83	8
Uttar Dinajpur	70.86	69.60	47.99	50.63	56.33	72.98	50.24	59.80	6
Dakshin Dinajpur	74.93	35.46	72.48	68.18	79.92	85.50	40.16	65.23	3
Malda	89.07	37.08	71.68	44.25	11.36	27.73	30.63	44.54	15
Jaipalguri	99.05	38.26	65.07	41.05	64.32	43.51	74.37	60.80	5
Darjeeling	95.14	80.58	80.13	61.37	67.08	65.76	36.64	69.53	2
Cooch Behar	92.10	27.57	43.52	60.46	66.03	53.66	65.20	58.36	9
Purulia	63.14	21.90	39.63	47.00	42.34	38.34	61.91	44.89	14
West Bengal	92.58	46.50	45.93	49.18	49.37	46.85	41.72	53.16	-

Source : Department of Panchayats and Rural Development, Govt. of West Bengal.

Note : All figures except rank are in percentage.

From table 3(a) it can be visualized that the rate of expenditure of the available funds in IRDP was consistently low since 1993-94. This might be due to the change in mode of releasing subsidy – from front-end subsidy to back-end subsidy. This switch over was suggested by the Expert Committee on IRDP formed by RBI in 1993 :

“With a view to preventing the misuse of capital subsidy, the committee recommends switch over to a back-end subsidy system. Although, the full project cost including subsidy would be disbursed to borrowers as loan right at the beginning by the banks, the real benefit of subsidy under this system would be made available to the beneficiaries only at the end.”

Due to introduction of this new system of releasing subsidy, the sponsoring agencies and the identified families might not feel any encouragement to get involved in bank loan. In the earlier front-end system of releasing subsidy, loan and subsidy were disbursed separately but simultaneously.

In the back end subsidy, however, loan and subsidy were disbursed at a time, which means no scope for grabbing the subsidies only. The expert committee underlined the weakness of the front-end subsidy by saying that : “.... the present front-end subsidy system has caused leakages and malpractices besides encouraging beneficiaries to clandestinely dispose of assets.” The introduction of back-end subsidy became able to check the leakages and misuse of subsidy and better utilisation of the assets / schemes delivered to the beneficiaries. This became possible as the subsidy amount could only be adjusted with last few loan instalments and there would be a lock in period for subsidy. In the case of front-end subsidy, the repayment of bank loan immediately after the disbursement was rampant - the beneficiaries simply grabbed the government subsidy without pursuing any self employment ventures provided under the programme. These tendencies frustrated the objectives of IRDP. The back-end system of adjusting subsidy is also adopted in SGSY. Let us see the extent of expenditure in SGSY (table 3 b) in different districts of the state.

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Table 3 (b) : Progress of Expenditure in SGSY: District-wise

District	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	Average for the period	Rank
Burdwan	57.33	6.11	17.76	33.27	45.39	31.97	14
Bankura	41.38	8.16	16.92	58.43	77.49	40.47	8
Birbhum	43.32	3.92	19.17	48.14	62.36	35.38	12
Midnapore	40.43	20.05	48.78	79.33	67.23	51.16	5
Howrah	40.31	38.13	61.49	93.04	85.22	63.64	3
Hooghly	23.43	6.59	28.62	59.71	65.04	36.68	9
North 24 Pgs.	39.01	3.70	23.92	69.08	77.82	42.71	7
South 24 Pgs.	43.74	23.09	15.51	80.54	83.67	49.31	6
Nadia	22.83	3.20	24.21	60.24	63.86	34.87	13
Murshidabad	46.88	17.29	19.32	43.50	55.28	36.45	11
Uttar Dinajpur	43.30	23.62	78.53	95.85	45.41	57.34	4
Dakshin Dinajpur	71.56	25.03	86.92	79.66	56.39	63.91	2
Malda	26.99	19.07	19.76	45.62	47.39	31.77	15
Jalpaiguri	24.21	4.53	7.07	16.49	51.20	20.70	16
Darjeeling	19.32	28.63	32.47	36.37	65.49	36.46	10
Cooch Behar	79.72	60.59	66.66	71.26	90.70	73.78	1
Purulia	30.58	0.20	7.59	7.83	46.20	18.48	17
West Bengal	34.74	14.42	27.24	55.12	63.85	39.07	-

Source : Department of Panchayats and Rural Development, Govt. of West Bengal

Note : All figures except rank are in percentage

The percentages show proportion of expenditure vis-à-vis total available funds.

According to the guidelines of SGSY, expenditure in the programme in a year should be at least 60 percent of the available funds. Though there is no dearth of funds expenditure remains at a low level. This tendency persists since the days of the

IRDP and it becomes further low in SGSY era. The result is that the availability of funds from the Government of India gets reduced. To quote the relevant instruction from Govt. of India for realizing the loss :

“The opening balance in the district, i.e., aggregate of balance with DRDA should not exceed 15% of the district allocation of the previous year. In case, the opening balance exceeds this limit, the central share of the amount by which it exceeds this limit will be deducted at the time of release of second instalment.”

Most of the districts suffered from this cut in allocation of fund due to their low expenditure. This is again a failure of delivery mechanism of the programme. The main reason as may be ascertained through field reality is that the panchayat members are not showing much interest in this programme because of its new approach to generate self-employment through group formation. In IRDP a beneficiary got the assistance immediately after completion of the formalities. Receiving of cash or an asset was an immediate phenomenon where the panchayat members normally took initiatives with or without any interest. While in SGSY there is a grading system of categorizing the SHGs, which usually takes long time before a group can be linked with bank credit.

Adequate assistance for the families below poverty line was a sine qua non for the success of IRDP. The general impression is that the assistance under the programme was not adequate. The mid-term appraisal of Ninth Five Year Plan elaborated this:

“The average investment per family remained at sub critical levels, too inadequate to generate income of Rs. 2000 per family per month as the programmes had set out to do. Such investment at the beginning of the Eighth Plan was Rs. 7,889. Even the investment at the beginning of the Ninth Plan of Rs. 16,753 was not much higher in the real terms. Such low per family investment in the face of inflationary trends and

rising cost of assets can not finance viable projects to offer adequate incomes on a sustained basis.”

The consequence of low investment was inadequate incremental income generated from the schemes endowed, which in fact did not enable the poor beneficiaries to cross the poverty line on a sustained basis. This frustrated the major objective of the IRD Programme. IRDP, assisted families mostly had no other sources of occupation whether main or subsidiary. The indication of the Ministry of Rural Development, Govt. of India in the year 1986-87 was that for being a viable unit per capita investment should be in the range of Rs. 13000 to Rs. 14000. Only then it would be possible to generate such additional income that would enable the assisted families to cross the poverty line in one go and on sustainable basis. The expert committee on IRDP set up by RBI in 1993 also was of the view that ‘there is a strong case for enlarging significantly the per family / enterprise investment under the IRDP.’ In table 4(a), we calculate per family investment in IRDP since 1992-93 till the merger of the programme with SGSY. This calculation will also help us get an idea about the subsidy-credit ratio which also indicates adequacy of credit availability.

Table 4(a) : Adequacy of investment in IRDP: West Bengal

Year	No. of families assisted	Bank credit mobilised	Subsidy released	Per family investment (in Rupees)	Loan-subsidy ratio
1992-93	171695	8588.35	5141.20	7996	1.67 : 1
1993-94	73818	3767.86	2326.00	8255	1.62 : 1
1994-95	15972	8061.07	5016.65	8187	1.61 : 1
1995-96	161724	9472.64	5817.71	9454	1.63 : 1
1996-97	110280	8552.94	4485.75	11823	1.91 : 1
1997-98	91733	7480.25	3755.94	12248	1.99 : 1
1998-99	71134	6480.70	3141.78	13527	2.06 : 1

Source : Department of Panchayats and Rural Development, Govt. of West Bengal.

Note : Figures of bank credit mobilized, subsidy released are rupees in lakhs.

From the table 4(a) it can be easily realized that the quantum of investment is not adequate for the poor families to cross the poverty barrier. This is reflected in the BPL survey conducted by the Department of Panchayats and Rural Development, Govt. of West Bengal. According to 1997-98 survey, 44.75 percent rural families below poverty line as against 45.37 percent in 1993-94; in absolute number, 4918296 families were reeling under poverty in 1997-98. The districts in the western region of the State, viz. Bankura, Birbhum and Purulia and the districts in the northern part of the State viz. Cooch Behar, Jalpaiguri, Malda, Uttar Dinajpur and Dakshin Dinajpur accounts for 35.34 percent of total BPL families in 1997-98. A question often comes in the mind, what then happened to such a colossal programme which continued for slightly less than two decades. Failures of the delivery mechanism, which included government officials, bankers and panchayat representatives in different tiers are very much glaring (the case of low expenditure and low investment). In spite of repeated instructions from the Government of India for providing at least two schemes for a family, in West Bengal it was never complied. For example, in 1992-93, family-scheme ratio was 1:1.45, in 1993-94, 1:1.43; in 1994-95, 1:1.13; in 1995-96, 1:1.26; in 1996-97, 1:1.28; in 1997-98, 1:1.26 and in 1998-99, 1:1.31. Low per family scheme also is a pointer towards low per family investment. The vicious cycle of low per family scheme ratio, low investment per family and low income generation was very strong in IRDP. The programme interventions failed to break this cycle for better prospects in favour of the rural poor. Let us see, how far the situation improves in case of SGSY during its implementation period from 1999-2000 to 2003-2004. In table 4(b), flow of bank credit and subsidy in SGSY are shown to reflect their adequacy as to the income generation.

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Table 4(b) : Financial Assistance in SGSY

Year	No. of Swarozgarles assisted	Total amount of credit (Rs. in lakh)	Amount of subsidy (Rs. in lakh)	Investment per Swarozgary (in Rupees)	Loan-Subsidy ratio	Change in investment per Swarozgary over the previous year
1999-2000	75977	7162.84	3463.74	13986	2.07:1	
2000-2001	6723	676.65	321.44	14846	2.10:1	6.15 %
2001-2002	13472	1887.24	904.00	20718	2.08:1	39.55 %
2002-2003	28748	4105.58	2108.46	21615	1.95:1	4.33 %
2003-2004	27008	3487.58	2104.23	20704	1.65:1	- 4.21 %

Source : Department of Panchayats and Rural Development, Govt. of West Bengal

Note : (i) Loan-Subsidy Ratio = Total Bank Credit disbursed / Total amount of Subsidy given

Comparing the tables 4(a) and 4(b) it can be seen that practically there occurs no substantial improvement under SGSY in respect of the qualitative indicators like per family investment or loan-subsidy ratio. Another weak area of SGSY is the organization of skill development programmes for the assisted individuals and self-help groups. With the abolition of TRYSEM, the rural youths of BPL families more or less lost the opportunities for getting training at the government expenses for acquisition of new skills or upgradation of their existing skills. The progress of expenditure on training is very much low in SGSY. The guidelines of SGSY makes elaborate provisions for skill upgradation of the swarozgarles. In reality, the achievements touch only fringe of them. In table 5, let us provide some relevant data from which it will be clear that implementing agencies pay very little attention to this training aspect. SGSY guidelines provide for earmarking of 10 percent of the total allocation for training purposes and give this earmarked fund the name 'SGSY – training fund'. Again, it is also specified that the total expenditure on basic orientation and skill development training will not exceed Rs. 5000 per trainee. This means

there exists permissible limit for spending Rs. 5000 per person identified for training. An excerpt from the guidelines of SGSY can help to understand the elaborate arrangements made for providing training :

"While developing the project profiles for the identified key activities, the District SGSY committee should in consultation with concerned technical personnel determine the Minimum Skill Requirement (MSR), in terms of both the technical and managerial skills. Once the person or group of persons has been identified for assistance, their training needs also should be ascertained with reference to MSR. The assessment regarding technical skills may be made by the line departments while that of the managerial skills may be made by the banker while scrutinizing the loan application. Such an exercise along with the swarozgaries will help in identifying those who have the MSR and therefore need only a basic orientation and those who need skill training. Keeping this in mind two types of training are contemplated under SGSY."

Basic orientation programme has the objective to familiarize the beneficiaries of SGSY with the programme objectives and purposes. These programmes are of very short duration and should not normally be more than two days. Skill development trainings are longer duration trainings where their all expenditures are borne out of SGSY fund. The fixation of duration of training programmes is left to the State Government. This has been done for maintaining uniformity in all the districts and to make training duration activity specific.

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Table 5 : Progress of Skill Development in SGSY

Year	No. of Swarozgaries trained	Total training fund (Rs. in lakhs)	Expenditure in training fund (Rs. in lakhs)	Percentage of expenditure	Per trainee expenditure (in rupees)
1999-2000	8569	1015.58	184.38	18.15	2151.70
2000-2001	3843	579.59	19.92	3.44	518.34
2001-2002	109364	520.01	158.79	30.53	145.19
2002-2003	182355	520.01	176.50	33.94	96.80
2003-2004	99690	718.40	479.66	66.77	481.15

Source : Department of Panchayats & Rural Development, Govt. of West Bengal

Note : (i) Percentage trained = $\frac{\text{Total no. of Swarozgaries trained}}{\text{Total no. of Swarozgaries}} \times 100$

(ii) Percentage of expenditure = $\frac{\text{Total expenditure incurred for training}}{\text{Total training fund in SGSY}} \times 100$

From table 5 it can be seen that the proportion of expenditure in training vis-à-vis total training fund in SGSY is began to take off from the year 2003-2004 when it was above 50 percent. The expenditure per trainee is also low; because emphasis was placed on basic orientation programme only where duration of training would be maximum two days. An observation (Banerjee and Sen, 2003) from the field can express the reality :

“ Almost all the members are involved in small activities, which are mostly home-based. They are mostly continuation of what they had been doing in the past before joining the group. The additional resources had helped them to expand their scale to some extent. But in spite of the talk about SGSY’s training component, we saw no indication of new skills being introduced or old skills being upgraded.”

This state of affairs simply indicates that Swarozgaries assisted under SGSY including self help groups are boasting upon low productivity work where both capital and technological inputs are predominantly absent ; even when there is a little of them, they are in rudimentary form. With this type of support to SHGs in particular, it is very difficult for them to withstand the competition of the markets in and outside their districts. In SGSY expenditure major share goes to subsidy and revolving fund (around 60 percent). The share of training expenditure in total expenditure of SGSY in different years continues to be low throughout the period - it was 3.26 percent in 1999-2000, 1.19 percent in 2000-2001, 5.54 percent in 2001-2002, 3.30 percent in 2002-2003 and 9.05 percent in 2003-2004. From the discussions in this section it becomes clear that even if it is prophesied that SGSY is an improved version of IRDP, in reality it is not felt so far. Before concluding the paper, in the next section some inherent complexities and inherited problems of SGSY can be discussed.

Section III

The focus of SGSY is on self help groups. Many stages are there before a group can take up economic activities and become a micro enterprise. This itself is a time consuming process. In brief the stages are (i) social mobilisation and formation of groups, (ii) group stabilisation through thrift and credit activity amongst the members and beginning of internal lending, (iii) the stage of micro finance where the group corpus formed through own contribution of the SHG members are supplemented by the revolving fund and linkage with the banks and (iv) the final stage of being a micro enterprise. The guidelines of SGSY clearly delineated that the SHGs having more members from assetless families or possessing little skill may take more time to pass the micro finance stage and to enter micro-enterprise stage. In the words of the guidelines, “ such groups may continue to remain in the micro finance stage for a longer period of time and may require intensive training and capacity building inputs to enable them to reach higher levels of income generation.” DRDAs are responsible for extending these inputs in time and in proper way. If these are lacking then the progress of the programme is bound to suffer. Development of Women and Child in

Rural Areas (DWCRA) also adopted this group approach for the development of women. In strict sense there was no demarcation of different stages like SGSY before a group earns eligibility to get bank loan. It is true that the area of DWCRA was limited in comparison to SGSY; but it is also true that the guidelines of DWCRA were bit simpler than those of the current SGSY. The ground reality is that even DRDA personnel in general have not gained the expertise of grading the groups in course of their transition from one stage to the next stage, not to talk of the block agencies or the panchayat functionaries. The group formation and its evolution through different stages is not a spontaneous approach. It requires proper caring, support and constant monitoring. Any process approach requires long time before consolidation; therefore low expenditure in SGSY is a natural outcome of the programme strategy. In IRDP, due to its simple implementation procedures, the poor families had the privilege to get assets in fairly easier way than the present SGSY. There were cases of misutilisation of assets, grabbing of government subsidy through immediate repayment of bank loan etc. All these were due to inadequate monitoring arrangements and lack of vigilance on the part of administrative agencies. From the point of view of immediate assistance to the poor for their amelioration from the poverty menaces, IRDP was far better than the current SGSY. It is expected that in any poverty alleviation programme immediate assistance to the poor should get the priority over all other issues. In SGSY less attention is given on this aspect.

Apart from SGSY, there is a number of programmes catered to generate self-employment opportunities for women through self help group approach. Some of them are initiated by NABARD, Rashtriya Mahila Kosh (RMK), Women and Child Development Department under the name of Swa-Shakti and Swayamsidha etc. All these programmes are implemented in isolation. As a consequence it may happen that the same group or same person can enjoy multiple benefits from different programmes of the same nature. Only consolation is that these programmes do not cover all districts of the State; while SGSY is all pervasive. Building of a data base incorporating information of self help groups in the districts formed under different

programmes can provide some solution to the problem of overlapping activities and multiple benefits. The DRDA may act as the nodal agency for developing such database. Convergence of different programmes having more or less the same objectives is necessary for consolidating the benefits.

Huge defaulters in IRDP create problem in identification of prospective beneficiaries in SGSY. A defaulter in the eyes of the bank is no longer eligible for further assistance, even if he or she fails to cross the poverty barrier. The bankers are concerned more with repayment of the dues, instead of considering the socio-economic situations under which the BPL families are reeling. It is desirable that repayment of bank dues will be made out of the incremental income generated from the asset/ scheme delivered under IRD programmes. When the scheme failed or the asset being sold out, a poor family lost the ability to repay the loan taken from the bank. For redressing the miseries, banks need to consider a case by its merit. It is not that a willful defaulter be assisted through a further dose of assistance. Again it also needs to be seen that otherwise eligible members of a BPL family must not be debarred from getting the benefits of SGSY (either through individual assistance or by being a member of SHG) on the ground that a member of that family is a defaulter in the records of a bank. SGSY requires to incorporate this type of flexibility.

Regarding monitoring system also, SGSY is not at all an improvement over IRDP. In IRDP Manual published in 1988, it was advised to initiate qualitative monitoring at Block/ DRDA level through field visits and physical verification of assets. The Manual suggested a schedule of inspection of families by the various levels of officers in a district. Exactly similar suggestions are also given in the guidelines of SGSY published in the year June 2003. These two are given below :

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Levels of officers	-	IRDP	-	SGSY
(i) District Magistrate/ Chairman DRDA	-	10 per month	-	10 per month
(ii) District Development Officer/ Project Officer DRDA (Project Director, DRDA)	-	20 per month	-	20 per month
(iii) APO (Monitoring) (Project Officer/ Project economist)	-	40 per month	-	40 per month
(iv) SDMs	-	20 per month	-	20 per month
(v) BDOs	-	20 per month	-	20 per month
(vi) ADOs	-	20 per month	-	20 per month

In reality these instructions are rarely followed. Whatever was done in IRDP was through statutory meetings and through the proforma reports submitted. Field visits were few and far between. Till now, no new dimension is added by SGSY in this area.

Conclusion

Ideologically, Integrated Rural Development Programme was based on the premise that the families living below poverty line should be assisted adequately for crossing the poverty barrier on permanent basis. In our country where more than 50 per cent of the population in the rural areas was living below poverty line, IRDP was the most appropriate intervention by the State for alleviation of rural poverty. Many experimentations were made with IRDP; its weaknesses were brought to the fore and ultimately the programme was discontinued after nineteen years of its continuation. The whole approach to the problem of alleviation of poverty was changed. In the

present SGSY approach, immediate assistance cannot be extended to the needy as the whole process involves many stages and it passes through a long time frame. Self help group approach may be adopted for organizing the rural poor, but for their assistance focus should be placed on more individual assistance. This can expedite the expenditure in the programme. The same delivery mechanism of IRDP is there for implementing SGSY – it will be natural that they carry the vices of the earlier programme. For correction, alternative mechanism through more involvement of non-government organizations (NGOs) may be explored. NGOs are more accountable and flexible than the governmental structure. They are more sensitive to the causes of the poor. It is expected that NGO-DRDA collaboration with greater involvement of the panchayats can give some clue towards better implementation of the programme. At the end of the year 2003-04 in West Bengal, out of total self help groups of 58752 formed since 1st April, 1999, only 2885 reached micro finance stage and 1005 have taken up economic activities, i.e., they have reached the stage of micro-enterprise – in percentage, 4.91 percent and 1.71 percent respectively. Until and unless, a group reached micro-enterprise stage and started economic activities the achievements of SGSY remain limited. For changing the current scenario of slow growth of the programme, it is desirable that there should exist strong interrelationship among the panchayats – NGO and rural development officials associated with the programme implementation. Initially, the panchayats may be shy of NGO involvement, but that should be alleviated through mutual respect and understanding. In absence of any synergic effect, the rural poor will suffer.

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**Finance for SME Sector and State Financial Corporation :
A Study with Special Reference to Western Part of the State
of West Bengal**

*Trinath Krishna Sinha**

In the fifties of the last century, the financial managers of the country paved the way for setting up State Financial Corporations with certain special objectives, which include (a) Promoting Economic Growth, (b) Reducing regional imbalances and (c) Widening entrepreneurial base. To achieve such objectives, the SFCs were designed to promote, aid and finance tiny, small and medium scale industries to start with at the grass root level and play a crucial role in bringing decentralized economic development.

The State Financial Corporations including the West Bengal Finance Corporation (WBFC) had their untiring and persistent service to extend long term loans to tiny and SSI units and allied activities during the last 50 years of their existence and no doubt played the most significant role in the promotion and development of the SSI sector. Today, nobody can deny the role and status of Small Scale Sector; in terms of number of industrial units (being 90%), output and turnover (around 40%) and export contribution (more than 35%) this sector runs ahead of all other sectors. In terms of employment too, small scale sector is the second largest contributor next to agriculture. Potentiality of further employment through agricultural activities is almost exhausted and here lies the importance of SSI sector. As on 31st December 2003, there were 15.54 lakh registered SSI units and 98.41 lakh unregistered units making a total of 113.95 lakh units showing 5.86, 3.79 and 4.07 percentage growth respectively over the previous year. Fixed investment was Rs. 170726 crore as against Rs. 162533 crore in the financial year 2002-03 resulting

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in production of Rs.351427 crore at current prices and registering growth of 12.64%. Employment in the corresponding period was 271.36 lakh persons while the same was 260.13 lakh in the previous year implying an increase by 4.32%. At the end of 2002-03, exports were of Rs.860.13 crore achieving 20.73% growth over the previous year. Further, as against the 6.3% growth in the Industrial Sector as a whole, the SSI Sector has achieved a growth of 8.02% during the year 2000-01. During 2003-04, the rates were 6.6% and 11.6% respectively. Had there not been consistent and ceaseless effort on the part of SFCs in the past, the Spectacular Performance of SSI sector could not have been achieved.

The Process of Economic Liberalization and Financial Sectoral reforms were initiated in 1991. Prior to such reforms, the SFCs enjoyed almost monopoly status in the term lending activity but with easy flow of fund at cheap rate of interest, the Commercial Banks and Small Industries Development Bank of India (SIDBI) with its direct lending activity have posed a serious problem for the SFCs to carry on their lending at a competitive rate in favour of the SSI units. Even then, the SFCs played their role very faithfully during the very beginning of the current century (Table 1).

Table 1 Loan Sanctioned and Disbursed by SFCs

Financial Year	Loan Sanctioned (Rs. in crore)	Loan Disbursed (Rs. in crore)
2001-2002	2078.6	1770.9
2002-2003	1808.4	1488.7
2003-2004	1545.4	1291.4

Because of changes in attitude and Industrial Policy, West Bengal has emerged as an important destination of investment. Investors consider the State, now a days, as one of the foci of industrial investment. This has opened up tremendous opportunity for industrial finance.

WBFC being the pivotal state agency to aid and further the industrial progress of the state responded positively to the need of the hour. The Corporation during its existence through the last 50 years had always been instrumental to pave the way for development of entrepreneurship and of the underprivileged segment of the industrial economy in the state and sanctioned Rs. 133612 lakh in support of 23001 industrial units.

The Corporation has been striving to register better performance year after year and over the last couple of years, it posted an encouraging trend (Table 2).

Table 2 Amount Sanctioned, Disbursed and Employment Potial of WBFC

Financial Year	Sanction Amount	Disbursement	Employment
	(Rs. in lakh)	Amount	Potential
		(Rs. in lakh)	(Nos.)
1999-2000	7996	5522	5574
2000-2001	9492	6879	7068
2001-2002	14400	9586	6702
2002-2003	14170	10600	5490
2003-2004	11778	10136	6038
2004-2005	18148	11098	6763

Over all the years, the thrust area of financing of the Corporation changed from one group of industries to another group as suited the industrial scenario of the state. Once it was cold storage, rice mills, hotels and similar enterprise. As the area appeared to be almost saturated for further financing, the Corporation had to move into new areas of financing like mini steel plant, restaurants, tea processing, entertainment complex, health care, pharmaceuticals, jute-based products, Haldia downstream projects and other emerging areas like I.T., food processing industries viz., biscuits, bread and confectionary items flour mills, printing and allied activities,

bio-tech-based projects and activities etc. etc.

With a view to encouraging enterprise building by the unemployed youth, the Govt. of West Bengal had launched an employment-oriented scheme – ‘Bangla Swanirbhar Karmasansthan Prakalpa (BSKP)’. Under this Prakalpa, a sum of Rs.956 lakh was disbursed upto March 31, 2005 and State Government’s matching grant was to the tune of Rs. 249 lakh as against Rs. 116 lakh disbursement upto 2003-04 with State Government’s matching grant of Rs. 47 lakh.

To facilitate the units which had undertaken upgradation of technology under the ‘Technology Upgradation Fund Scheme (TUFS)’ for textiles, the Corporation drew and reimbursed @ 5% p.a. interest subsidy for Rs. 3.50 lakh released by the Ministry of Textiles, Government of India during the F.Y. 2004-05 as against Rs. 10.31 lakh during the F.Y. 2003-04.

The Corporation sanctioned assistance of Rs. 197 lakh to 40 units as soft loan bearing service charge @ upto 5% p.a. and the corresponding Term Loan sanction was of Rs.404 lakh at the range of interest rate of 9 – 9.5% p.a. under the National Equity Fund Scheme (NEFS) during 2004-05 as against Rs. 157 lakh to 67 units as soft loan and term loan for Rs.263 lakh under the said scheme during the previous Financial Year.

As a measure to promote the entrepreneurs of small means, the artisans and the skilled ones, the State Financial Corporation contributed to extend assistance under composite loan scheme. So far Rs.3308 lakh had been sanctioned in favour of 13402 units.

To provide better medical facilities, WBFC sanctioned financial assistance to the tune of Rs.660 lakh for setting up 31 Nursing Homes, Diagnostic Centres with modern medical equipments during the F.Y. 2004-05 as against Rs. 285 lakh to 14 units during the F.Y. 2003-04.

Sectoral sanctions and portfolio-wise disbursement over all the years during the last decade except the F.Y. 2002-03, 2003-04 & 2004-05 will reveal that the

SSI sector has received the larger share of the lending disbursed by West Bengal Financial Corporation and indeed in some of the years the percentage shares exceeded 80%. Out of the total fund disbursement of Rs. 1200 crore, SSI sector drew Rs. 665 crore, which is more than 50% (Table 3).

F.Y.	Total Amount disbursed (Rs. in lakh)	Total Number of Units	Amount disbursed to the SSI sector (Rs. in lakh)	Number of Units in SSI Sector	(4) as % of (2)	(5) as % of (3)
1	2	3	4	5	6	7
1993-94	2292	352	1916	348	84%	98%
1994-95	3074	443	2604	434	85%	97%
1995-96	4787	428	2393	404	50%	94%
1996-97	5067	533	3515	490	69%	91%
1997-98	7272	605	4224	579	58%	95%
1998-99	6058	525	5925	524	98%	99%
1999-2000	5522	525	4915	524	89%	99%
2000-2001	6879	494	5009	477	73%	96%
2001-2002	9586	571	6097	539	67%	94%
2002-2003	10600	681	3215	624	30%	91%
2003-2004	10137	513	3612	462	36%	90%
2004-2005	11098	458	4538	404	41%	88%

Here we are to note that the definition of small industries has changed in the recent past and units having plant and machineries exceeding Rs. 1 crore cease to be small industrial units.

With the onset of globalisation and WTO regime, the objective conditions for scale of operation and type of operation of an industrial unit have assumed much importance. SSI is not the sufficient ground to continue as SSI and the time is ripe for Indian SSIs to graduate to the SME level. “Small is beautiful” but it is not always effective. Size and scale certainly add to efficiency and competitiveness. It’s time for us to reorient our attitude towards the SSIs and encourage them to grow to the status of SMEs.

Keeping this switch-over in mind as a policy prescription, the West Bengal Financial Corporation sanctioned Rs.24281 lakh upto 31st March 2005 and disbursed Rs. 18256 lakh upto 31st March 2005 towards the units engaged in manufacture of secondary steel products like sponge iron, MS Ingot, ferro alloy, rerolled items etc. in and around Durgapur (Burdwan), Barjora (Bankura) and Purulia. The investment made by the Corporation in this sector has yielded satisfactory results in terms of employment and output.

Location of industry is highly conditioned by availability of raw materials which are mostly agricultural produce or natural resources, skilled as well as semi-skilled human resource, good communication facility leading to larger and wider market, adequate infrastructural support including power, presence of entrepreneurs who are ready to assume risk and accept challenge and finally the flow of credit. Obviously, so far as the conditions are concerned, certain areas are placed in more advantageous position relative to other areas and in the process of industrialization other sectoral development takes place in such areas. Benefits in the form of employment and advancement are reaped by the inhabitants of such localities. As a result, social infrastructure is also built up and consequently, the concept of developed and underdeveloped or less developed area or region crops in. Continuance of regional disparity causes social unrest and agitation, which ultimately tells upon speed of development. Here comes in the logic of balanced and rational development and as a footstep, social scientists and economists advocate adoption of a policy, be it agricultural or industrial so that regional disparities are removed and social discontentment is arrested.

Keeping in view the above issues, SFCs were asked to design their credit policy taking sufficient care of the need of the less developed areas. The WBFC has assumed the responsibility sincerely in the past and credit requirements of the less developed areas of the state have been looked into positively and due attention has been provided to the northern part of the state as well as western and south western part of the State.

There are 20 blocks and 3 municipalities in the district of Purulia. 83 Commercial Bank Branches, 29 Rural Bank Branches, 3 Co-operative Bank Branches, 4 Land Development Bank Branches and 1 Branch of WBFC cater to the credit requirements of the district having a population of 22, 24, 577.

Resources of the districts are -

Agricultural :	Paddy,
Minerals :	Stone,
Forestry :	Lac.

Santhaldihi Thermal Power Station is located in the district and it is connected with the outside world by Road and Railway.

Existing Industrial activities of the district include Cement, Oil Seed Crushing, Small Tool, Bakery, Structural Metal Products, Bellmetal Utensils and Sponge Iron. Mask is one of the prestigious handicraft products of the district. The potential places for industries of the district are Hura, Adra, Manbazar, Jhalda, Raghunathpur and Purulia.

During its operational years in Purulia, WBFC has granted financial assistance of Rs.50.36 crore in support of 1553 units. In 2004-05 and during previous 4 financial years credit disbursement of the WBFC and related features are shown in Table 4.

Table 4 Credit Disbursement and Related Features of WBFC in Purulia District.

F.Y.	Amount sanctioned (Rs. in lakh)	Amount disbursed (Rs. in lakh)	Activity in General	No of Employ- ment (No)	Total Salary per annum approx. (Rs. in lakh)
2000-01	142.84	156.21*	Cement, Rice Mill, Atta Mill, Biscuit, Hotel, Transport, Diagnostic Centre.	164	35.69
2001-02	686.75	516.69	Sponge Iron, Cement, Rice Mill, Atta Mill, Biscuit, Hotel, Transport, Diagnostic Centre	385	76.04
2002-03	1356.00	1081.00	Sponge Iron, Plastic, Xerox Copying, Nursing Home	282	54.35
2003-04	764.52	423.40	Sponge Iron, Hotel, Market Complex, Ice-cream, Dal/chira Mill, Computer Centre, Transport, Nursing Home	279	68.88
2004-05	1028.90	176.34	Sponge Iron, Rice Mill, Hotel, Godown, Lodge, Electronics	89	16.63

* includes last year's sanction.

In the last financial year, as against 8462 registered SSI units in the state as a whole, 198 SSI units were registered in the district of Purulia and the same could provide employment to 1461 persons while 54,241 persons got employment benefit in the State.

District of Bankura consists of 22 Blocks, 3 Municipalities. District population is 28,05,065. To provide banking service, Commercial Banks, Rural Banks, Co-operative Banks and WBFC have 97 branches, 69 branches, 16 branches and 1 branch respectively. Agricultural activities of Bankura are confined to cultivation of Paddy, Potato, vegetables and animal resources consisting of Cow, Buffalo, Sheep, Goat and Pig. Lac is also available in the forestry, while mineral resources are china clay, quartz and stone.

Mejia Thermal Power Station is a new dimension in respect of infrastructure of Bankura. Industrial Estate at Barjora and Growth Centre at Bishnupur can provide necessary support to the entrepreneurs. Rice mill, oil seed crushing, stone crushing, bakery, wheat grinding, engineering workshop, cold storage, bellmetal, handloom etc. are the prominent industrial activities of the district. The district does possess a good treasure of handicrafts of the state, viz. dokra, baluchari saree, stone curving, wood curving, teracotta, conchshell crafts, bamboo products, dasabatar tas, lac products etc. and there exists the scope of activities under food processing, jute diversified products, plastic based products. Potential places for setting up of industries in the district are Beliatare, Barjora, Bishnupur, Sonamukhi, Kotulpur, Chatna, Saltora, Taldangra and Bankura.

So far, the WBFC sanctioned loan of Rs. 56.90 crore in favour of 1127 units. Since 2000-01 till the end of the last financial year, the WBFC's role in the district may be studied from Table 5.

Table 5 : Credit Disbursement and Related Features of WBFC in Bankura District

F.Y.	Amount sanctioned (Rs. in lakh)	Amount disbursed (Rs. in lakh)	Activity in General	Employment (No)
2000-01	200.43	175.92	Cold Storage, Dyeing and bleaching, Rice mill, Hotel, Bakery, Bell metal	56
2001-02	344.17	401.41*	Cold Storage, Flour mill, Diagonistic Centre, Chira mill, Transport, Biri, Stone crushing, Rice mill, Cyber café.	95
2002-03	353.00	163.00	Cold Storage, Offset printing, T.V. Repairing, Video Photography, Diagnostic centre, Rice mill	66
2003-04	743.58	832.27	Cold storage, Dyeing, Bleaching, Rice mill, Nursing Home, Transport, Brick field, Sponge iron, Hotel, Flour mill	372
2004-05	1107.35	747.49	Newspaper, Rice mill, Brick field, Sponge iron, Transport, Printing, Cold Storage, Baluchari saree	269

* includes previous sanction.

In Bankura, in the last financial year, 322 SSI units have been registered having employment scope for 2162 persons.

Midnapore (East and West) comprises vast area spreading through 54 blocks and 13 municipalities. Population of the area is 83,31,912.

Agriculture is the principal activity of the populace of Midnapore in general while we notice prominent industrial activities in Haldia, Kharagapur and Kolaghat area. Paddy, pulses, oilseeds, jute, potato, cashew and mulberry are the major crops of Midnapore. Railways and well-spread roadways do provide linkage to the outside world. One thermal power plant is located at Kolaghat. At present there are some major industrial installations like Haldia Petro Chemicals, Indian Oil Corporation, Haldia Port, Tata Metaliks, Mint and also traditional industrial activities like rice mill, oil mill, cold storage, cashew processing, engineering, bamboo, jute, paper and printing, metal products, non-metallic mineral products, rubber etc. etc.

The area is blessed with one IIT and Digha. The latter has got immense tourism potentiality. If that can be exploited in a planned manner, employment opportunity can be opened up for the local people. Scope also exists over food and fruit processing, jute diversified products, plastic and polymer products, engineering and handicrafts.

In owning its responsibility, the WBFC during the last 50 years responded positively to 2243 units and the financial support was to the tune of Rs. 141.98 crore.

During the last five financial years, lot of care has been taken in sanctioning projects which are traditional as well as sophisticated ones. We may consider the following for our analysis :

Table 6 : Credit Disbursement and Related Features of WBFC in Midnapore District

F.Y.	Amount sanctioned (Rs. in lakh)	Amount disbursed (Rs. in lakh)	Activity in General	No of Employ- ment (No.)	Total Salary per annum approx. (Rs. in lakh)
2000-01	1555.66	901.41	Hotel, Cold Storage, Rice Bran Refinery, Biscuit, Rice Mill, Diagnostic Centre, Chemical, Computer Software	347	84.38
2001-02	1365.78	1128.63	Cold Storage, Rice Bran, Refinery, Rice Mill, Diagnostic Centre, Brick Field, Plastic, Engineering, Hotel	518	124.47
2002-03	1110.00	953.00	Cold Storage, Rice Mill, Diagnostic Centre, Engineering, Hotel, Transport & Brick Field	391	95.75
2003-04	936.13	955.69*	Cold Storage, Rice Mill, Diagnostic Centre, Engineering, Hotel, Transport, Automobiles Service Centre	419	99.60

2004-05	1742.85	1744.37*	Cold Storage, Hotel, Rice Mill, Edible Oil Mill, Cement	575	139.20
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* includes previous sanctions.

During 2004-05, in Midnapore 1298 SSI units have been registered with employment opportunity for 6889 persons.

During its operational years in Burdwan, WBFC has had sanctioned 1519 cases with financial support to the tune of Rs.302.44 crore. In 2004-05 and previous four financial years credit disbursement of the WBFC and related features are shown in Table 7.

Table 7 Credit Disbursement of WBFC and Related Features in Burdwan District

FY.	Amount sanctioned (Rs. in lakh)	Amount disbursed (Rs. in lakh)	Activity in General	No of Employ-ment (No)	Total Salary per annum approx. (Rs. in lakh)
2000-01	2145.43	1291.33	Cement, Rice Mill, Chira Mill, Biscuit, Hotel, Detergent, Iron & Steel, Oil Mill, Engg. Cold storage.	855	239.80
2001-02	6369.01	3619.03	Cement, Rice Mill, Chira Mill, Hotel, Iron & Steel, Oil Mill, Cold storage, Weighbridge, Xerox Market Complex, Flour Mill, Chemical	1052	296.10

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2002-03	5501.00	5489.00	Cement, Rice Mill, 1176 Market Complex, Hatchery, Transport, Iron & Steel, Oil Mill	395.39
2003-04	4411.84	3957.57	Cement, Flour Mill, 795 Iron & Steel, Transport, Nursing Home	349.59
2004-05	6433.04	3514.59	Rice Mill, 315 Automobile Servicing, Iron & Steel, Cold storage	136.77

If we consider the cumulative lending by the SFC in West Bengal during the last 50 years and the same in the districts of Purulia, Bankura & Midnapore during the corresponding period, the districts' respective share comes to 2.03%, 3.54% and 9.08%. Whereas, share of the developed district Burdwan is 19.50%, i.e. 1/5th – total lending in the district being Rs. 234.222 crore in support of 1755 units. In percentage and absolute terms the share of the 3 districts is less than those of Burdwan. Here it will be pertinent to consider and draw a comparison of the four districts already referred to in terms of existing infrastructural facilities & some major resources vis-à-vis WBFC's contribution to the industrial development of the four districts in terms of investment during last five years (Table 8).

Table 8 : Resource and Infrastructure in Four Districts

Sl.No.	Infrastructure/Resource	Midnapore	Purulia	Bankura	Burdwan
I	Area (in square km.)	14081	6259	6822	7024
II	Area under Forest in %	9.25	12.00	21.46	3.19
III	Net area sown in %	67.92	54.22	50.59	66.78
IV	Net area sown per agricultural worker in hectare	0.38	0.45	0.37	0.43
V	Index No. of Agricultural Production (Base crop year 1981-82=100)	294.30	259.04	213.01	226.47
VI	No. of Registered Factories (In 2004)	298	79	162	863
VII	No. of workers employed daily (In 2004)	33753	5494	5707	92654
VIII	Number of Villages electrified upto Nov. .2004	6848/ 11736	1802/ 2653	2811/ 3830	2433/ 2529
IX	Registration on the Live Register of Emp. Exchange in '000 (upto May, 2004)	812.1	199.2	287.7	724.4
X	No. of Bank offices at the end of June, 2004	483	113	166	380
XI	Population per Bank office in '000 at the end of June, 2004	21	23	20	19
XII	Per Capita Bank Deposits (Rs.) at the end of June, 2004	4410	3944	3874	9169

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XIII	Per Capita Bank Advances (Rs.) at the end of June, 2004	898	706	892	2022
XIV	No. of PACCS (As on 31.03.2003)	1656	177	391	611
XV	Number of Members of PACCS (As on 31.03.2003) in '000	634	128	167	380
XVI	Working capital (As on 31.03.2003) (Rs. in Lakh)	52503	3361	8019	24773
XVII	Roadlength-Surfaced at the end of March 2004, in km.	2033	847	1164	1939
XVIII	Roadlength-unsurfaced at the end of March 2004, in km.	56	2	22	3
XIX	Loan Sanctioned by WBFC (Rs. in lakh)	6710	3979	2749	24860
XX	Loan Disbursed by WBFC (Rs. in lakh)	5683	2354	2320	17872
XXI	Loan Outstanding at WBFC (Rs. in lakh)	3915	1801	2219	11715

Hence, it may not be out of logic to infer that it is not policy directive or resolution but existing industrial environment and resultant infrastructure which are the driving force behind fresh investment proposal and approval.

It has been worked out that in respect of the projects funded by the WBFC in the entire state, for each employment, fund requirement is to the tune of Rs. 1.45 lakh, whereas the same in respect of Midnapore comes out to be Rs. 2.13 lakh, for Purulia it is Rs. 1.85 lakh and for Bankura it is 2.55 lakh.

For Midnapore, the average salary per employment varies from Rs.1980 p.m. to Rs. 2147 p.m. and the same for Purulia is from Rs. 1154 p.m. to Rs.1914 p.m, whereas in the same district employees of sponge iron units and cement units draw on an average Rs. 2748 to Rs. 4952. Hence, we find average worker gets around Rs. 2000. Such workers generally have a family of 1 plus 3 and dwell in the world of tremendous uncertainty so far as continuance in employment is concerned. Now time has come for the economists and sociologists to ponder how well off the workers in SME Sector are specially where and when the social security net is almost zero.

To come out of such a critical situation, at least to a reasonable extent and to create a favourable atmosphere for balanced economic development through industrialization cutting across geographical boundary, we are to consider and suggest certain remedial measures specially on the part of WBFC, which include interalia :

(a) Opening or conducting entrepreneurship development centres in the potential areas/districts

At present, Small Industries Service Institute(SISI), Govt. of India, West Bengal Consultancy (WEBCON) and Directorate of Cottage and Small Scale Industries, Govt. of West Bengal, conduct Entrepreneurship Development Camps on selective trades. Such organizations do not have the exposure in the fields of credit lending, implementation of projects and revival of sick units directly, where lies the cutting edge in favour of WBFC.

Accordingly, if WBFC takes up conducting entrepreneurship development centre we will march forward positively at least to some extent towards setting up of enterprises by a group of selective entrepreneurs.

(b) Interacting with District Chambers of Commerce and association of different traders

Such interactions will help in identifying the missing links and desired action on identified areas which need special and specific treatment. Members of such organizations are the right persons in pointing out credit requirement and requirements in the areas of updated technology, availability of skilled work force and marketing linkage.

WBFC has already started dialogue at the State level and the process will continue and spread over the districts.

It may not be out of place to mention here that for skill formation the ITIs may conduct specific orientation courses and educational institutions may initiate the process by way of introducing different vocational courses. Sophisticated Technical Institutions like IIT may take up the task of upgradation of existing and obsolete technology. Similarly, universities may design specific course on Entrepreneurship Development and in such enterprise, lending institution may be associated.

(c) Interacting with the District Level Panchayat

Inadequacy in infrastructural facilities poses serious problem for taking up new venture and sometimes becomes responsible for uneconomic operation leading to closure of running unit(s). Intervention on the part of zilla panchayat may be of immense help for the prospective as well as existing entrepreneur in the areas of availability of land, road linkage, power supply, market linkage etc. WBFC is ready to play the role of catalyst in this regard in future as being done at present.

(d) Interacting with the District Administration

In the district, for all practical purposes, District Administration - is the nodal agency in executing different programmes and schemes introduced by central and/ or State Govt. In any complex situation, the pivotal role of District Magistrate cannot be denied, rather most sought for in easing out such problems. We are to keep in mind that District Magistrate is the Chairman of the District Level Credit Consultative Committee.

WBFC acts as facilitator in this regard.

(e) Studying the flow of institutional assistance to the districts

In respect of credit requirement and flow of institutional lending, all the districts are not placed on the same platform. Geographical location, climatic condition, availability of work force, quality of work force, industrial environment, availability of natural resources and agricultural produce, infrastructural support; transport, communication and access to market influence flow of fund . Obviously-- an depth study of the objective conditions is essentially required in arriving at decision on sanctioning of fund and releasing the same.

It is admitted that sometimes decisions are not backed by proper study. It is also admitted that flow of assistance to a particular area is not always studied and taken into consideration before making fresh release. The result is obvious, for some area there remains critical gap while some areas are over-funded.

WBFC is aware of this lapse and is attempting to act in this regard in a righteous manner.

Before drawing any conclusion regarding the role played by SFCs including WBFC vis-à-vis the same envisaged for them, we must consider the constraints under which SFCs/WBFCs are to operate.

To have refinance, the SFC is to depend upon SIDBI and abide by the laid down stipulations. For operating on a wider scale, besides refinance, the SFC must ensure fund from alternative source including market borrowing. Previously, RBI used to allow the SFCs to raise fund through SLR Bonds which has since been discontinued. SFCs can't also raise fund from and amongst members of public due to restriction imposed by RBI. The only source that remains open is to float non-SLR bonds guaranteed by State Govt. SFCs are also guided by policy directives issued by Govt. of India and State Govt. from time to time and WBFC is no exception.

For WBFC, the major problem is its high cost of borrowing as huge amounts of fund were raised in the past during high interest regime whereas, the Corporation is to charge only competitive interest rate at the time of fresh & new investment,

which is definitely lower than the cost of capital available at its disposal.

In the entire state, WBFC operates through its 14 branches mostly located in the district head quarters and some of the districts are looked after by a branch located in the adjacent district. Naturally the interested borrower and the employees of the Corporation are required to travel a long distance for service. This is a genuine problem and still then WBFC is determined to extend its best out of existing infrastructure and on cost consideration; it is not in a position to open more branches, whereas; the competitive banks operate through good number of branches.

Being a public undertaking, the WBFC can not bypass and ignore the social obligations bestowed on it. Accordingly, at the time of project appraisal it is ascertained if measures towards workers' welfare and safety have been provided in the project or not and suitable steps are taken at the time of sanction.

But it is observed that in respect of some potentially hazardous industries, the prescribed safety measures and devices are not strictly adhered to by the employer and thereby workers are open to imminent danger.

To check such threats to safety and security, there are Regulatory Authorities and as a lending institution, WBFC has nothing to do with such violation. In this regard, Educational Institutions, Panchayat Raj Institutions and Municipalities can undertake Awakening Campaign.

Industrial development and environmental pollution are often considered as cause and effect. Social implication of environmental pollution is an issue which deserves attention from almost all corners. For potentially hazardous industries, WBFC ensures at the time of sanctioning of project that necessary clearances are obtained from the Regulatory Forum. It is also ensured before final disbursement of fund that anti pollutant devices are installed. Even then it happens and is revealed that industrialists with an aim to minimize cost of production do not strictly comply with the stipulations and though installed, anti-pollutant devices are not put into operation fully.

To cope with such a situation and ensure a pollution free environment social consciousness is to be raised. In leading to that direction, public awakening campaign may be taken up by educational bodies and institutions of public representatives.

Globalization has opened up many vistas -- improved quality of life and aspiration levels. Its impact may be seen amongst new strata of rural and semi-urban population ready to buy products of varied ranges and styles. Necessary outcome is enhancement in demand. On the other hand, globalisation has opened up the boundary and necessiated withdrawal of quota regime. Naturally more and more suppliers have started entering the market. Herein lies the threat of extinct of local competitors who are still unable to equip themselves with quality product at a competitive price. Such a miracle is possible only when local operators transform themselves as to the need of the changed scenario by way of improving their technology of production, upgradation in skill and change in mindset.

This battle of existence on the part of SME Sector cannot be fought unless helping hands are extended by Policy makers, Technicians, Engineers, Scientists and Bankers etc. It is a proven and established fact that as the principal lending institution for SSIs in the State, the SFC, i.e., WBFC has been playing a key role with deepest faith and resolution to work for those who deserve the most.

Saving Investment Behaviour of Rural Craft Households

A Study of Four Districts in West Bengal

Sachinandan Sau & Debasish Mondal***

Introduction

For centuries, the crafts in India held prominent place in the rural area. They provide the artisans with an opportunity to express their creativity, a respectable place in the society, and viable and self-employment avenues. In recent years following economic reforms, the craft economy has undergone substantial changes. Today the crafts have both subsistence and developmental roles to play. Countries like South Korea, China, and Japan evolved very comprehensive policy and institutional support for handicrafts, enabling the sector to rebuild its viability so as to survive the new challenges coming from the globalisation. In India also the government of India have taken measures for their development through technology upgradation, infrastructure development and innovative enterprise skills development.

For accelerating economic growth and development, saving and investment play an important role, which is recognised as an engine of growth. It helps to attain the social objectives like poverty alleviation, increase of employment rate, reduction of economic inequalities etc. Particularly, economic development of a developing country like India is largely dependent on the rate of saving and investment. In an era of economic liberalisation, the study on saving and investment behaviour of rural crafts is highly significant while their both subsistence and developmental roles are recognised. It is relevant to the study of problems like poverty, unemployment and also to the study of rural development in relation to the dynamics of rural industrialisation.

Srivastava and Tripathi (1999) observe that the small-scale industries sector has the potential of becoming a dynamic sub-sector of India's integrated industrial

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economy. While subsistence role of the rural crafts is emphasised in the existing literature their developmental and dynamic role, particularly of the flourishing crafts is hardly recognised and studied. Rural crafts like brasswares, jewellery, hornware, mat etc do no longer remain in traditional forms. They are being organised, reorganised and modernised in response to internal and external impulses of development like institutional, technological and cultural changes. Rural craftsmen practise their crafts under differential conditions, i.e., various types of production organisations, markets, technology, etc. and their growth and development depend upon the pace of capital accumulation. Capital accumulation depends upon the propensity to save and invest. The questions that naturally arise are: What is the saving-income ratio of the craft households? What is the nature of their investment behaviour? How are they related to internal production organisation and to external institutional factors like credit, market, liberalisation and globalisation, and also to changing technological conditions and the level of development of the regions under study? The present chapter examines the saving and investment of rural craft households in relation to the production organisations and the dynamic institutional arrangements of credit, market and changing technologies, particularly in the context of liberalisation and globalisation of the Indian economy and with reference to the relatively developed and relatively backward regions.

The study covers four districts of West Bengal. This state has been purposely selected due to its high population density and work participation in non-agricultural activities. Four districts have been selected on the basis of proportion of rural industrial workers to total main workers and categorised into relatively advanced and relatively backward districts. Nadia and Midnapore are selected from among relatively advanced districts, and Bankura and Purulia are selected from among relatively backward districts. From these sample districts, most important rural industries have been considered for the study. One block has been selected for the study of a particular industry according to the information available at the office of the District Industries Centre and District Planning Cell, Zilla Parishad. Primary data have been collected from artisans selected on the basis of stratified random sampling of rural

craft households — strata include production organisations, namely independent and tied and also cooperatives. At least 20 crafts households have been surveyed in a block under the categories of one particular industry where it is available. In case more than one type of production organisation, 15 craft households have been selected from each type of organisation.

In total the study covers 13 types of crafts from the four sample districts. Mostly, these are traditional and labour-intensive. In West Bengal, undivided Midnapore and Bankura districts have good heritage of rural crafts from Mughal regime. Due to existence of diverse types of rural crafts in these two districts, greater number of sample crafts have been included in the present study. Handloom and Brass & Bell metal works are common in every sample district. The important industries are: Clay works in Nadia; Hornware, Zari, Mat, Chadni, Conchshell, Dhup making in Midnapur; Conchshell, Docra, Teracota in Bankura; Lac and Mukhosh in Purulia districts.

In a sample Block all villages are not equally important for the specific crafts. As a result, a village or cluster of villages has been selected depending upon the availability of number of samples.

The study has examined the saving and investment behaviour of rural craft households in relation to the production organisations of rural crafts catering to both indigenous and overseas markets. Though rural artisans work under three different types of production organisation (independent, tied and cooperative organisations) rural crafts are seen mostly to be household industries that members of households mainly run. During the boom seasons craft households concentrate on craft production and are not involved in other types of works.

It has used both secondary data and primary data. The former have been obtained from the demographic Census. The secondary data from the Census are not adequate. Therefore, for an in-depth study primary data have been collected and used. The study is in fact in the nature of survey and is mainly on primary data collected on the basis of questionnaire and personal interview methods. For survey

of sample craft households, a questionnaire has been used. Direct response of members of craft households is considered for the actual value of a question. The primary data for the study include types of products produced, types of production organisation, nature of technology used, institutional factors, wages, profit, family size, income, consumption pattern, saving and investment. The data collected from sample craft households have been analysed by the use of simple statistical techniques like frequency distribution, average, standard deviation, coefficient of variation, correlation and regression.

Major findings from analysis of secondary and primary data are discussed under different heads, namely number of workers, capital intensity, labour and capital productivity, income, saving, investment. Capital intensity is measured by fixed capital-labour ratio, productivity of labour by the ratio of value of output and value added to number of mandays of work, capital productivity by value of output and value added per unit of fixed capital.

Employment, Capital Intensity and Productivity

Number of workers per craft unit is small and that varies significantly across production organisations, crafts and relatively developed and backward regions. Other parameters vary significantly across different production organisations of the crafts under study.

Number of workers: Frequency distribution of craft units by number of workers shows that the craft units located in the relatively advanced districts and having independent organisation of production have larger number of workers than those in the relatively backward districts and operating under tied conditions and cooperatives. Cent per cent of handloom, hornware and conchshell units in the backward districts are tied to *mahajans* / large industrial units and these are tiny units having workers below 5. Percentage of independent units having below 5 workers varies from 80.0 per cent in handloom (backward region) to 46.7 per cent in conchshell. Only 4.0 per cent of tied brassware units belong to the size class of 1-4 workers. In the relatively advanced districts the size of the handloom and brassware units is larger

than that in the relatively backward districts. For instance, in the former districts about 8 per cent of handloom units and 11 per cent of brassware units belong to the size class of 10 workers and above but in the latter districts there is no such unit. The sample lac units are relatively large - 70 per cent of 30 sample units belong to the size class of 10 -19 workers, 26.7 per cent to the size class of 20-49 workers and 3.3 per cent to the size class of 50 workers and above. Of the total 149 independent units 57.7 per cent belongs to the size class of 1-4 workers, while 19.5 per cent, 18.1 per cent, 10 per cent and 0.7 per cent to the size classes of 5-9, 10-19, 20-29, and 50 and above respectively. 65.4 per cent of the 162 tied units belong to the size class of 1-4 workers while the rest to the size class of 5-9 workers. Similar is the feature in case of cooperative organisation of production, more than 85 per cent belonging to the size class of 1-4 workers. In aggregate, 62.4 per cent of total 356 units belong to the size class of 1-4 workers, while 25.3 per cent to the size class of 5-9 workers and the rest, i.e., only 12.3 per cent to the size class of 10 workers and above.

Capital Intensity: It is observed that in the sample relatively advanced districts the capital intensity is higher than that in the relatively backward districts and for the independent units it is higher than that for the tied units of each sample craft. For the cooperative units the capital intensity lies in between independent units and tied units - it is higher in cooperative units than in the tied units but lower than in the independent units. Variation in capital intensity across the production organisations is statistically significant for brass and bell metal units of Nadia and Midnapore districts, for hornware, and conchshell units of Bankura district, the F values being above 12. Coefficient of variation in capital intensity across independent units is significant for chadni, mat, teracota and docra, the values being above 50 per cent. There is no significant variation across tied units excepting in case of zari and dhup making. Capital intensity is highest for conchshell in Midnapore district, followed by lac in Purulia district, handloom in Purulia district and brass and bell metal in Nadia district. It is highest in tied units of handloom in Purulia district, followed by brass and bell metal units in Nadia district. Capital intensity in cooperative units is similar to that in tied units.

Labour productivity: Indices of labour productivity measured in terms of (i) value of output (V_o) per unit of manday (md) and (ii) value added (V_a) per unit of manday, i.e., V_o / md and V_a / md , respectively, are in general higher in independent craft units than those in tied units and cooperatives, the exception being handloom industry in Purulia district where labour productivity in tied units is higher than that in independent units. So far as labour productivity in tied units and cooperative units is concerned we observe that it is higher in the former in most cases, the single exception being handloom in Nadia district.

The variation in V_o / md across independent and tied units is statistically significant for handloom in Midnapore district, brass and bell in Nadia district, hornware and conchshell in Bankura district, the F values being above 12. Coefficient of variation in V_o / md across independent units is significant for handloom (Nadia, Midnapore and Purulia), chadni, and mukhosh, the values being above 50 per cent. There is no significant variation in V_o / md across tied units excepting in case of zari and dhup making. V_o/md is highest for independent chadni units, followed by conchshell in Midnapore district and lac in Purulia district, and brass and bell metal in Nadia district. It is highest in tied units of dhupbati, followed by brass and bell metal units in Purulia district. In cooperative units it is similar to that in tied units.

Situations in respect of labour productivity measured in terms of value added per unit of manday, i.e., V_a / md are similar to those in respect of V_o / md . The variation in V_a / md across independent and tied units is statistically significant for handloom in all the sample four districts, namely Nadia, Midnapore, Bankura and Purulia, for brass and bell in Nadia district, hornware and conchshell in Bankura district, the F values being above 5. Coefficient of variation in V_a / md across independent units is significant for handloom in Nadia, Midnapore and Purulia districts, brass and bell metal in Nadia, hornware, chadni, lac and mukhosh, the values being above 50 per cent. There is no significant variation in V_a / md across tied units excepting in case of zari. V_a / md is highest for independent chadni units, followed by lac in Purulia district, and conchshell in Bankura district. It is highest in tied units

of brass and bell metal in Midnapore district, followed by handloom units in Nadia district. In cooperative units it is similar to that in tied units.

Capital Productivity : Measured in terms of value of output (V_o) or value added (V_a) per unit of fixed capital (F_c) it is seen to be always higher in independent craft units than in tied units and cooperatives. Between tied units and units under cooperatives capital productivity in the latter is higher in most cases.

The variation in V_o / F_c across independent and tied units is statistically significant for conchshell in Bankura, the F values being above 5. Coefficient of variation in V_o / F_c across independent units is significant for handloom (Purulia), teracota, lac and mukhosh, the values being above 50 per cent. There is no significant variation in V_o / F_c across tied units excepting in case of zari and dhupbati. V_o / F_c is highest for independent chadni units, followed by conchshell in Midnapore district. It is highest in tied units of dhupbati, followed by zari. In cooperative units it is similar to that in tied units.

It is observed that in the sample relatively advanced districts the capital productivity measured in terms of value added per unit of fixed capital (V_a / F_c) is higher than that in the relatively backward districts and for the independent units it is higher than that for the tied units of each sample craft. For the cooperative units the capital productivity lies in between independent units and tied units - it is higher in cooperative units than that in the tied units but lower than that in the independent units. Variation in V_a / F_c across the production organisations is not statistically significant for any of the sample industries, the F values being less than 5. Coefficient of variation in capital productivity across independent units is significant for teracota and mukhosh, the values being above 50 per cent. There is no significant variation across tied units excepting in case of zari and dhupbati making. V_o / F_c is highest for chadni, followed by clay works and mukhosh. It is highest in tied units of zari, followed by dhupbati.

Profitability and Income

Profitability : Profitability of sample craft units is measured in two ways – (i) profit per unit of manday and (ii) profit per unit of fixed capital. Of all the three production organisations independent units represent the highest values in terms of both the indices, followed in most cases by the cooperative units.

Profitability measured in terms of profit per unit of manday (i.e., profit / md) is higher in relatively advanced districts of Nadia and Midnapore than that in the relatively backward districts of Bankura and Purulia and for the independent units it is higher than that for the tied units of each sample craft. For the cooperative units the profit /md lies in between independent units and tied units - it is higher in cooperative units than that in the tied units in most cases but lower than that in the independent units. Variation in profitability across the production organisations is statistically significant for handloom units of all sample districts and also for conchshell in Bankura district, the F values being above 6. Coefficient of variation in profit / md across independent units is significant for brass and bell in Nadia district, chadni, lac and mukhosh, the values being above 50 per cent. There is no significant variation across tied units excepting in case of zari. Profitability is highest for conchshell in Bankura district, followed by lac in Purulia district, conchshell in Midnapore district and clay works. It is highest in tied units of brass and bell in Midnapore district, followed by brass and bell metal units in Bankura district. Profit / md in cooperative units is similar to that in tied units.

Profitability measured by profit per unit of fixed capital, i.e., Profit / Fc also varies substantially across production organisations and across industries. It is higher for handlooms in relatively advanced districts of Nadia and Midnapore than that in the relatively backward districts of Bankura and Purulia and for the independent units it is higher than that for the tied units of each sample craft. For the cooperative units the profit / Fc lies in between independent units and tied units - it is higher in cooperative units than that in the tied units in most cases but lower than that in the independent units. Variation in profitability across the production organisations is

statistically significant for only conchshell in Bankura district, the F values being 31. Coefficient of variation in profit / Fc across independent units is significant for mat, teracota and mukhosh, the values being above 50 per cent. There is no significant variation across tied units excepting in case of zari and dhupbati. Profitability of independent units is highest for chadni, followed by teracota and mukhosh. It is highest in tied units of zari, followed by dhupbati units. Profit / Fc in cooperative units is similar to that in tied units.

Income : Income of craft households comprises (1) income from craft works, (2) income from agriculture and allied activities, (3) income from trade and business, and (4) income from services. It is significant to note that of the sample crafts across the sample four districts in terms of income generation conchshell of Bankura district leads other crafts and districts, followed by lac of Purulia district, handloom of Nadia district, conchshell of Midnapore district, brassware of Nadia district and hornware of Midnapore district.

The percentage share of income from industry in total income of craft households varies across sample crafts. It is above 90 per cent for handloom, brassware, clay works, conchshell, docra and lac, but less than 60 per cent for mat and dhupbati. It is highest for docra (97.98 per cent), followed by brassware (96.44 per cent) in Midnapore district, handloom (96.02 per cent) in Nadia district and brassware (95.70) in Bankura district and is least (23.75 per cent) for dhupbati. For the craft households agricultural income and allied income account for 65.36 per cent for dhupbati making households and hardly 1 per cent for handloom in Nadia district. The percentage of income from trade and business varies from 27.01 per cent for mukhosh making households to 0 per cent for brassware, chadni and teracota manufacturers. Income from services constitutes an insignificant proportion of total income of the craft households. In general, percentage share of industrial income is higher for independent units than that for tied units.

Per capita income from different sources by industry and organisation shows that it is highest for hornware, followed by brassware in advanced districts and

conchshell, and that is higher in independent units than in tied units. Variation in per capita industrial income across independent units of different units is, however, statistically significant, the coefficient of variation being above 50 per cent and that across tied units is not significant barring brassware in advanced districts.

Saving Behaviour of Crafts Households

Saving is nothing but the difference between the income and the consumption expenditure. Consumption items include food and non-food. Food expenditure includes that on rice, wheat, cereal, pulse, milk & allied, vegetables, non-vegetables, tea & coffee, sugar & ghees, tobacco, pan (betel leaf) and other soft & hot drink etc. On the other hand, expenditure on non-food items includes expenditure on fuel, gas, light, electricity, phone, internet, transport & conveyances, clothing & footwear, cosmetics & toilets articles, ritual expense, medicines, entertainments, payment to washermen & house servant, remittances, gifts, donation, subscriptions and other expenditure on maintenance of social relations.

Saving per independent and DME craft unit is highest for lac, followed by brassware and handloom in advanced districts, namely Nadia and Midnapore. Per tied handloom unit it is, however, negative in those districts. Handloom per unit registers higher saving in cooperative than that in independent units. It declines as we move from larger units to smaller units, i.e., from DME to NDME and OAME.

Saving is related to income. Saving-income ratio (S/Y) for sample craft households is analysed with reference to both total income and industrial income. Both saving-income ratio and saving-industrial income ratio vary substantially across crafts. These are always positive for independent artisan households but not so for all tied artisans. S/Y also varies substantially across the independent crafts units. It is higher for the independent units than that for the tied units of each sample craft. Variation in saving-income ratio across the production organisations is statistically significant for handloom in Midnapore and Bankura districts, hornware and conchshell, the F values being above 6. Coefficient of variation in S/Y across independent units is significant for all sample crafts excepting conchshell in Midnapore

district, and lac. There is also significant variation across tied and cooperative units for most of the sample crafts. Saving ratio of independent units is highest for lac, followed by conchshell in Bankura district and clay works. It is highest in tied units of zari, followed by conchshell in Bankura district. The saving-income ratio is highest for lac (68 per cent), followed by teracota (53 per cent), clay works (38 per cent), conchshell (35 per cent), brass and bell metal (26 per cent) and handloom (15 per cent). It is lowest for mat craft households, only 3 per cent. For handloom tied artisans saving ratio is negative and for other tied craft households it is positive but less than that of independent craft households. For handloom artisan households working under cooperative in Bankura district also the saving-income ratio is negative (Table 1).

Table 1 Saving of Sample Craft Households per Unit of Total Income (S/Y)

Industry	Independent	Tied	Cooperative	F	N
Handloom (Nadia)	0.19 (209.66)	-0.001 (-10060)	0.09 (346.60)	1.34	42
Handloom (Midnapore)	0.09 (442.52)	-0.05 (-265.48)		17.25	30
Handloom (Bankura)	0.18 (52.99)	-0.16 (-179.75)	-0.21 (-179.60)	6.67	45
Handloom (Purulia)	0.17 (181.15)	0.13 (158.25)		3.21	30
Brass & Bell (Nadia)	0.26 (157.45)	0.23 (74.53)	-		27
Brass & Bell (Midnapore)		0.25 (59.24)	0.29 (59.88)	0.68	30
Brass & Bell (Bankura)		0.22 (195.75)			30
Brass & Bell (Purulia)		0.19 (228.20)	-	-	20

Hornware	0.36 (82.47)	0.09 (277.29)	0.01 (5463)	8	34
Conchshell (Midnapore)	0.34 (42.59)	-	-	-	30
Conchshell (Bankura)	0.42 (25.70)	0.26 (64.56)	-	9.2	30
Zari	-	0.32 (128.94)	-	-	20
Mat	0.03 (1195)				50
Teracota	0.43 (70.26)	-	-	-	20
Docra	0.04 (502.38)	-	-	-	20
Lac	0.68 (34.65)	-	-	-	30
Mukhosh	0.27 (108.04)				20
Clay works	0.38 (69.47)	-	-	-	20

Source : Field Survey;

Note : Parentheses represent coefficient of variation (CV%)

Similar are findings for saving-industrial income ratio (S/YI) across three production organisations and sample crafts and districts. Among the independent units it is highest for teracota (50 per cent), followed by chadni (50 per cent), mukhosh (47 per cent) , brass and bell metal (37 per cent) and conchshell (36 per cent). S/YI is negative for handlooms located in Nadia, Midnapore and Bankura districts and is positive for other tied crafts. It is highest for dhupbati making

(205 per cent) followed by zari (50 per cent). Handlooms under cooperative also suffer from negative saving in Bankura district. Saving-industrial income ratio here is highest for brass and bell metal (Midnapore) followed by handloom (Nadia). Variation in S/YI across production organisations is significant for handloom in Midnapore, Purulia and Bankura districts and that across independent units and tied units it is also significant for almost all crafts under study, the coefficient of variation being higher than 50 per cent.

Distribution of saving ratio across production organisations and sample crafts shows that it is negative for 48 per cent of independent handloom units in advanced districts, namely Nadia and Midnapore, and for 53 per cent of tied handloom units in these two districts. It is also negative for 54 per cent of hornware tied units. S/Y varies between 1 and 25 per cent for 33 per cent of sample handloom units located in relatively backward districts, namely Bankura and Purulia. Brassware located in both advanced and backward districts and for both independent and tied units registers saving-income ratio varying between 26 and 75 per cent. Clayware and hornware also present the above-mentioned scenario. Most of the lac units running independently record saving-income ratio above 50 per cent and none of them registers negative S/Y.

While analysing saving as a function of industry income, other income, wealth and number of family members it is observed that for all craft households industry income as a determinant is statistically significant at 1 per cent level. The coefficient of other income as a determinant is positive in all cases and is significant for most of the craft households but for some households it is not significant. Wealth and family member are negatively correlated with saving. For most of the craft households the coefficient of correlation between saving and family member is statistically significant but that between saving and wealth is insignificant in most cases (Table 2).

Table 2 Determinants of Saving of Sample Craft Households

Industry	Constant	YI	YO	W	FM	R ²	F	N
Handloom (Nadia)	-1183 (-0.31)	0.71 (58.32)	1.05	-0.01 (6.25)	3190 (-1.57)	0.99 (-4.58)	1398	42
Handloom (Midnapore)	-15519	0.91 (-413)	0.83 (71.13)	-0.11 (4.03)	372.65 (-7.15)	0.99 (0.52)	8090	30
Handloom (Bankura)	-4984 (-0.92)	0.73 (4.69)	0.69 (4.45)	-0.05 (0.72)	-706 (-1.14)	0.88	76.00	45
Handloom (Purulia)	208.09 (0.25)	0.77 (24.93)	1.04	-0.04 (47.19)	-2089 (-7.28)	0.99 (-9.28)	2676	30 27
Brass & Bell (Nadia)								
Brassware (Midnapore)	-60.36	0.66 (-0.02)	1.88 (14.27)	-0.04 (5.54)	-2404 (-0.80)	0.96 (-4.31)	162	30
Brassware (Bankura)	-15017 (-2.76)	0.99 (13.97)	0.59	-0.02 (0.71)	-1449 (0.29)	0.90 (-4.00)	54.16	30
Brassware (Purulia)	-5731 (-1.92)	1.06 (25.51)	1.02	-0.02 (44.42)	-3792 (-0.77)	0.99 (-9.88)	700	20
Hornware	-5256 (-2.50)	0.79 (16.30)	0.87	-0.01 (9.50)	-1956 (-1.04)	0.98 (-5.09)	539	34
Conchshell (Midnapore)	-14286	0.67 (-2.68)	-0.26 (4.74)	-0.01 (-1.07)	439 (-0.66)	0.84 (0.30)	32.11	30
Conchshell (Bankura)	-2571 (-0.56)	0.62 (15.28)	0.97	-0.05 (3.97)	-1555 (-1.95)	0.95 (-2.55)	125	30
Chadni	-5925 (-0.87)	0.80 (5.44)	1.13 (6.40)	0.01 (0.19)	-1582 (-2.07)	0.85	20.56	20
Dhupbati	-1968 (-0.79)	0.69 (3.71)	1.01 (12.17)	0.02 (1.67)	-3322 (-7.44)	0.97	141.53	20

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Mat	1745 (1.07)	0.75 (6.78)	1.02 (26.66)	-0.02 (-3.61)	-2887 (-9.71)	0.96	241	50
Teracota	-7122 (-4.92)	1.06 (19.79)	0.98	-0.01 (38.66)	3375 (-0.86)	0.99	1242	20
Docra	-2337 (-0.65)	1.08 (5.05)	1.38 (3.57)	-0.19 (-1.01)	-728 (-2.57)	0.74	11.08	20
Lac	-4884 (-0.34)	0.98 (183.6)	0.18	-0.03 (0.09)	-6216 (-1.74)	0.87	48.89	30
Mukhosh	-16674 (-1.97)	1.13 (6.84)	0.74 (8.61)	0.01 (0.54)	-2962 (-3.93)	0.94	56.18	20
Clay works	709 (0.02)	1.01 (25.16)	0.80	-0.06 (2.16)	-4561 (-2.96)	0.98	238.29	20

Source : Field Survey

Note : Parentheses represent t-value

Investment Behaviour of Craft Households

Investment is the most important aspect to assess the growth potentialities of the craft households. Investment can be categorised into 7 items broadly, viz. (1) Capital formation for crafts works, (2) Investment in agriculture, (3) Investment in trade and other business activities, (4) Investment in durables, (5) Purchase of ornamental assets, (6) Investment in financial assets, (7) Investment on human resource development.

Capital formation of craft works includes new purchase of machine, tools, transport equipments, land & building for manufacturing works and repair and maintenance expense of plant and machinery of the industry. Investment in agriculture involves purchase of agricultural land, equipments etc. Investment in agri-allied activities include farm poultry, fishing etc. Investment in trade and other business activities involves investment on shop and other trading activities. Investment on durables includes the purchase and repair of television, radio, refrigerator, four &

two wheelers, cycle, wristwatch, furniture, housing and other household equipments. Purchase of other ornamental assets comprises the purchase of ornaments and other jewelry articles of gold, silver, diamond etc., which have precious value. Investment on financial assets includes current, fixed and term deposit on bank, post office or other financial institutions including savings on LIC, KVP, IVP etc. Investment on human resource development includes all types of expenditure on education and cultural activities.

Proportion of investment made on craft works is highest for brass and bell metal followed by docra, mukhosh, conchshell and hornware. Financial assets account for the highest proportion for brass and bell metal, teracotta, docra, zari and handloom.

Investment per unit of total income (I/Y) of craft households across three production organisations and sample crafts and districts varies substantially. Among the independent units it is highest for teracota (22 per cent), followed by hornware (14 per cent), brass and bell metal (10 per cent) in Nadia district and handloom (7 per cent) in Purulia district. For tied units it is highest in conchshell (24 per cent) followed by handloom (6 per cent) in Purulia district. Handlooms under cooperative in Nadia district record the highest I/Y ratio among the cooperative units. Variation in I/Y across production organisations is not significant for most of the crafts and that within independent units and tied units is, however, significant for almost all crafts under study, the coefficient of variation being higher than 50 per cent (Table 3).

Table 3 Investment of Sample Craft Households per Unit of Total Income (I/Y)

Industry	Independent	Tied	Cooperative	F	N
Handloom (Nadia)	0.06(66.92) 42	0.03(20.79)	0.05(42.10)	1.27	
Handloom (Midnapore)	0.06(91.86) 30	0.04(20.72)		3.42	
Handloom (Bankura)	0.047(73.61) 45	0.033(52.94)	0.037(47.82)	1.26	
Handloom (Purulia)	0.07(60.33) 30	0.06(28.75)		0.65	
Brass & Bell (Nadia)	0.10(107.15) 27	0.03(62.34)	-		
Brass & Bell (Midnapore)		0.04(108.39) 30	0.03(62.43)	0.35	
Brass & Bell (Bankura)	- 30	0.02(53.53)	-	-	
Brass & Bell (Purulia)		0.03(44.22) 20			
Hornware	0.14(17.30) 34	0.016(31.80)	0.015(28.64)	1.8	
Conchshell (Midnapore)	0.02(39.11) 30	-	-	-	
Conchshell (Bankura)	0.036(63.33) 30	0.24(54.53)	-	2.11	
Chadni	0.03(75.67) 20				
Zari		0.04(272.53) 20			
Dhupbati		0.01(200.80) 20			
Mat	0.01(59.76) 50				
Teracota	0.04(39.51) 20	-	-	-	

Docra	0.08(56.47)			
	20			
Lac	0.06(53.35)	-	-	-
	30			
Mukhosh	0.22(135.19)			
	20			
Clay works	0.04(45.19)	-	-	-
	20			

Source : Field Survey

Note : Parentheses represent coefficient of variation (CV%).

Investment per unit of industrial income (I/YI) of craft households across three production organisations and sample crafts and districts also varies substantially. Among the independent units it is highest for mukhosh (30 per cent), followed by brass and bell metal (13 per cent) in Nadia district and handloom (9 per cent) in Purulia district. For tied units it is highest in handloom (6 per cent) in Purulia district followed by chadni (6 per cent) and handloom (5 per cent) in Nadia district. Handlooms under cooperatives in Nadia district record the highest I/YI ratio among the cooperative units. Variation in I/Y across production organisations is significant only for handloom (Nadia) and that within independent units and tied units is significant for almost all crafts, the coefficient of variation being higher than 50 per cent.

Pattern of investment of sample craft households is shown in Table 8.24. Most of the relatively large size handloom units belonging to DME and NDME invest in trade and business and financial assets in relatively developed districts while most of them invest in craft works in relatively backward districts, namely Bankura and Purulia. Most of the brassware, conchshell, clay and lac units of all sizes invest in crafts. Hornware making households mostly invest in agriculture and durables. Brassware and clay works making households also invest substantially in financial assets (Table 4).

Table 4 Investment Pattern of Sample Craft households by Strata of Independent Units (Rs thousand)

Industry	Strata	Craft Works	Agri-culture	Agri-allied activities	Trade & business	Financial assets	Ornaments	Durables	Human Resource Development	Total
Handloom (AR)	DME	425.0 (26)	0 (0)	45.0 (3)	550.0 (34)	150.0 (9)	100.0 (6)	225.0 (14)	118.0 (7)	1613.0 (100)
	NDME	224.5 (23)	25.0 (3)	51.5 (5)	45.0 (5)	360.0 (37)	80.0 (8)	30.0 (3)	154.6 (16)	970.6 (100)
	OAME	41.3 (41)	15.0 (15)	1.5 (1)	0	18.5 (18)	0 (0)	8.8 (9)	15.0 (15)	100.1 (100)
Handloom (BR)	NDME	110.0 (32)	64.0 (19)	7.5 (2)	0 (0)	50.5 (15)	18.5 (5)	75.0 (22)	14.2 (4)	339.7 (100)
	OAME	42.5 (47)	5.0 (6)	3.9 (4)	5.0 (6)	2.5 (3)	9.4 (10)	8.5 (9)	14.0 (15)	90.8 (100)
Brassware (AR)	DME	675.0 (32)	190.0 (100)	23.0 (1)	450.0 (21)	325.0 (15)	79.5 (4)	179.0 (9)	184.0 (9)	2105.5 (100)
	NDME	32.5 (28)	9.0 (8)	3.5 (3)	0 (0)	42.0 (36)	11.0 (9)	12.5 (11)	7.5 (6)	118.0 (100)
	OAME	23.5 (34)	14.0 (20)	1.5 (2)	0 (0)	2.5 (4)	6.5 (9)	10.5 (15)	10.3 (15)	68.8 (100)
Clay Works	NDME	139.5 (27)	7.5 (1)	20.5 (4)	47.5 (9)	172.5 (34)	37.0 (7)	35.5 (7)	47.5 (9)	507.5 (100)
	OAME	33.4 (26)	9.0 (7)	7.1 (5)	15.0 (12)	30.0 (23)	7.5 (6)	10.0 (8)	17.6 (14)	129.6 (100)
Hornware	NDME	90.0 (15)	122.0 (21)	12.5 (2)	0 (0)	35.0 (6)	31.5 (5)	283.0 (48)	18.8 (3)	592.8 (100)
	OAME	20.1 (19)	12.5 (12)	3.4 (3)	0 (0)	17.5 (16)	15.3 (14)	26.5 (25)	11.6 (11)	106.9 (100)
Conchshell	NDME	350.0 (30)	260.0 (22)	0 (0)	55.0 (5)	55.0 (5)	65.0 (6)	332.5 (0)	44.0 (4)	1161.5 (100)
	OAME	107.5 (28)	135.0 (35)	0 (0)	20.0 (5)	0 (0)	17.0 (4)	80.5 (21)	20.7 (5)	380.7 (100)
Lac Works	DME	5217.4 (40)	28.0 (0.2)	0 (0)	450.0 (3)	3612.0 (27)	814.0 (6)	2662.5 (20)	410.2 (6.8)	13248.1 (100)
	NDME	57.5 (18)	16.0 (5)	0 (0)	0 (0)	93.0 (28)	43.5 (13)	75.7 (23)	41.8 (23/100)	327.5

Source: Field Survey

Note: Figures within parentheses indicate percentage share to total

Distribution of craft units by amount of investment across organisations shows that most of the sample handloom units, irrespective of whether these are independent, tied or cooperative or located in the relatively advanced or backward districts invest to the tune of Rs 1001 to 2500. Most of the brassware, clay works, hornware units invest to the amount varying between Rs 2501 and Rs 10,000. Most of the lac units invest above Rs 100,000.

While analysing determinants of investment we observe that the coefficient of industrial income as a determinant is positive and statistically significant for most of the craft households. The coefficient of other income is insignificant in most cases. All the models are statistically significant as indicated by their respective F values (Table 5).

Table 5 Determinants of Investment of Sample Craft Households

Industry	Constant F	YI N	YO	BOW	R ²
Handloom (Nadia)	-1585(-3.54) 573	0.10(32.32) 42	-0.09(-2.67)		0.97
Handloom (Midnapore)	-2983(-3.95) 1698	0.18(57.13) 30	0.08(0.62)		0.99
Handloom (Bankura)	367(3.02) 6.23	0.021(3.46) 45	-0.02(-1.09)		0.24
Handloom (Purulia)	-1483(-4.83) 222	0.15(8.66) 30	0.13(6.88)		0.94
Brass & Bell (Nadia)	785.21(1.00) 78.21	0.04(9.49) 27	0.03(0.88)		0.87
Brass & Bell (Midnapore)	241.60(0.63) 5.05	0.03(2.48) 30	0.01(0.08)		0.31
Brass & Bell (Bankura)	691(4.10) 0.72	0.03(0.63) 30	-0.03(-1.07)		0.05
Brass & Bell (Purulia)	889(11.50) 0.34	0.001(0.33) 20	-0.001(-0.76)		0.05
Hornware	-4.1(-0.22) 1659	0.02(29.83) 34	0.01(6.53)		0.98

Conchshell (Midnapore)	-43.62(-0.15)	0.01(0.96)	0.03(5.30)	0.74
	39.05	30		
Conchshell (Bankura)	-145.90(-0.27)	0.62(3.21)	0.09(3.04)	0.61
	21	30		

Estimated coefficients of investment functions concerning crafts are shown in Table 6. The coefficients of industrial income are seen to be positive and statistically significant for all the sample crafts irrespective of whether these are located in the relatively advanced or backward districts. All the models are statistically significant as indicated by their respective F values (Table 6).

Table 6 Estimated Coefficients of Investment Functions Concerning Crafts

Variable	Handloom (AR)	Handloom (BR)	Brassware (AR)	Brassware (BR)	Clay Works	Horn- ware	Conch- shell	Lac Works
Constant	-4476 (-6.48)	-2563 (-3.88)	-9934 (-1.73)	-4835 (-3.90)	-10827 (-3.13)	-22.94 (-0.47)	-9964 (-2.76)	-81942 (-3.11)
Y1	0.17 (17.6)	0.29 (15.78)	0.23 (12.1)	0.14 (1.83)	0.17 (6.17)	0.15 (6.91)	0.22 (9.38)	0.14 (5.14)
Yo	-0.11 (-1.70)	-0.03 (-1.13)	0.01 (0.04)	0.11 (6.24)	0.18 (1.04)	0.03 (0.30)	0.03 (0.82)	0.69 (0.27)
B	0.41 (6.70)	0.09 (1.08)	0.65 (5.44)	-0.02 (-0.33)	0.04 (0.94)	-0.15 (-1.59)	0.07 (2.37)	-3.06 (-0.46)
N	72	75	45	50	20	34	30	30
R ²	0.98	0.83	0.96	0.72	0.89	0.78	0.93	0.96
F	95	3.6	79.6	205.0	29.2	24.3	25.7	80.1

Notes : Figures within parentheses indicate t-ratios

Conclusions

Rural crafts have a subsistence as well as developmental role to play for rural households. Rural crafts like brasswares, jewellery and mat having flourishing internal markets do no longer remain in traditional forms. Their growth and development depend upon the pace of capital accumulation. Capital accumulation depends upon the propensity to save and invest.

In the sample relatively advanced districts the capital intensity is higher than that in the relatively backward districts and for the independent units it is higher than

that for the tied units of each sample craft. For the cooperative units the capital intensity lies in between independent units and tied units - it is higher than that in the tied units but lower than that in the independent units. Similar are the findings in respect of labour and capital productivity and profitability.

The percentage share of income from industry in total income of craft households varies across sample crafts. Saving-income ratio for sample craft households varies substantially across crafts. It is always positive for independent artisan households but not so for all tied artisans. It also varies substantially across the independent crafts units. For all crafts households industry income as a determinant is statistically significant at 1 per cent level. The coefficient of other income as a determinant is positive in all cases and is significant for most of the crafts households but for some households it is not significant. Wealth and family member are negatively correlated with saving. For most of the craft households the coefficient of correlation between saving and family member is statistically significant but that between saving and wealth is insignificant in most cases.

Capital formation of crafts works includes new purchase of machine, tools, transport equipments, land & building for manufacturing works and repair and maintenance expenses of plant and machinery of the industry. Investment in agriculture involves purchase of agricultural land, equipments etc. Investment in agri-allied activities includes that in poultry, fishing etc. Investment in trade and other business activities comprise that on shop and other trading activities. Investment on durables includes the purchase and repair of television, radio, refrigerator, four & two wheelers, cycle, wristwatch, furniture, housing and other household equipments. Other ornamental assets comprise ornaments and other jewellery articles of gold, silver, diamond etc. Investment on financial assets includes current, fixed and term deposits and savings on LIC, KVP, IVP etc. Investment on human resource development includes all types of expenditure on education and cultural activities. Proportion of investment made on craft works is highest for brass and bell metal followed by docra, mukhosh, conchshell and hornware. Financial assets account for the highest proportion for brass and bell metal, terracotta, docra, zari and handloom. The

coefficient of industrial income as a determinant is positive and statistically significant for most of the crafts households. The coefficient of other income is insignificant in most cases.

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Reforms and Growth of Indian Agriculture: A Review

*Pulak Mishra**

Introduction

Role of agriculture in the process of economic development of a developing country like India is well recognized. The sector provides food to the nation and, thereby, helps in reducing hunger and poverty. It also enlarges export capability, contributes to capital formation, and secures market for industrialization¹. Besides, growth of agriculture can make an important contribution in reducing regional disparities and thereby the socio-political instability in the economy. It can also absorb the incremental portion of population and labour force till the time the non-agriculture sectors start generating sufficient employment opportunities.

In India too, though declined over years, the agricultural sector still accounts for about 28 per cent of the country's GDP and it is the source of livelihood for nearly two-third of the total population. It contributes about 13 to 18 per cent of total annual exports of the country. Besides, due to its large production base, the agricultural sector in India has an enormous impact on global food situation. As the Global Commodity Market, World Bank (1999) reports, India along with China contributed 55.7 per cent of the global production of rice in 1998-99.

Initiation of the process of economic reforms in 1991, which focused mainly on fiscal adjustment, foreign trade and investment, industry and financial sectors, was expected to have significant impact on the agricultural sector through reduction of subsidies and tariff and trade liberalization. While reduction in power, seed and fertilizer subsidies was likely to raise production costs, tariff reduction and import liberalization were expected to reduce cost of imported materials and make them easily available to the Indian farmers.

¹It is widely accepted that in a large country like India, agriculture provides the demand stimulus for industrialization even with less social and economic costs.

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A number of studies (e.g., Dev 2003; Landes and Gulati 2004; Sharma and Gulati 2005) attempted to explore the impact of these policy changes on various facets of the sector. But, while there is a consensus that growth of agricultural sector retarded in the post-reform period, most of these studies were confined to the aggregate sector level and crop level experiences remained largely unexplored. Further, very little effort has been made so far in examining this growth performance in a systematic manner.

Besides, the policy prescriptions made by the existing studies centers around public investment for R&D and infrastructure, removal of restrictions, delivery of credit, etc. For example, Desai (2002) is of the view that the sector requires integrated farming approach with a paradigm shift in public and private expenditure on agriculture R&D. Rao (2003) also emphasized on strengthening agricultural research and extension along with removal of restrictions on agricultural trade and processing, reinforcement of infrastructure and delivery of credit. Sharma and Gulati (2005) too suggested increase in public expenditure for agricultural R&D and rural infrastructure. These policy proposals can address the issue in general. But, considering that growth performance of the sector may differ across crops, formulation of crop-specific policy resolutions, especially in respect of R&D is imperative. Besides, the suggested policy framework ignores two other important aspects, viz. crop diversification and agriculture-industry linkages.

The present paper attempts to deal with some of these issues. The rationale for such effort lies not only in examining the growth phenomena with a systematic econometric approach, but also in having a clear understanding of the effectiveness of the present policy framework across various crops. It also aims at suggesting a comprehensive policy framework to enhance growth performance of the sector.

The rest of the paper is divided into four sections. While Section II gives the methodology applied for assessing growth performance, Section III examines growth performance of the sector. Section IV provides an explanatory note on observed growth performance. Section V gives the concluding remarks and suggests some important policy imperatives.

Methodologies

The present paper examines growth performance of the agricultural sector in terms of area, production and yield. This growth performance is examined in three stages. First, we estimate trend growth rate of the sector as a whole and of major crops in the post-reform era. Next we examine if there is any acceleration or deceleration in the growth process, i.e., whether the absolute rate of growth was increasing or decreasing over time. Finally, we test if there is any statistically significant difference between growth rate of the post-reform period and that of the pre-reform period. In order to estimate trend growth rate we estimate the following linear trend equation :

$$Y_t = a + bt + u_t$$

Here, Y_t , t and u_t stand for the dependent variable (i.e. index of area, index of production and index of yield in the present context), time and the random disturbance term respectively. Trend growth rate of Y_t is calculated by dividing estimated b with arithmetic average of Y_t .

On the other hand, whether there is any statistically significant acceleration or deceleration in the growth process is tested² by estimating the following quadratic trend equation:

$$Y_t = \gamma + \delta_1 t + \delta_2 t^2 + u_t$$

There is statistically significant acceleration or deceleration in the process depending on whether δ_2 is statistically significant and $\delta_2 > 0$ or $\delta_2 < 0$ ¹. On the other hand, if δ_2 is not statistically significant it is hypothesized that there is no acceleration or deceleration in the growth process, i.e., the rate of growth is constant over time. In this connection it should, however, be mentioned that since t^2 is a nonlinear function of t , the quadratic trend equation does not violate the assumption of no multi-collinearity (Gujarati 2003).

Finally, in order to test whether the trend growth rate of the post-reform era is significantly different from that of the pre-reform era (i.e., if the 'trend-break' between the two sub-periods is statistically significant), we estimate the 'kinked exponential model' of Boyce (1986). The advantage of using this model is that,

unlike the usual technique of fitting separate trend lines to each segment of the series, it eliminates the discontinuities between the segments of the piece-wise regression by imposing linear restrictions³. In general, if there are m segments and, thereby, $(m-1)$ in the trend line of any characteristic, say, Y , the 'kinked exponential model' is of the form,

$$\begin{aligned} \ln(Y_t) = & a + b_1(D_t + \sum_{j=2}^m D_j k_{j1}) + b_2(D_t - \sum_{j=2}^m D_j k_{j1} + \sum_{j=3}^m D_j k_{j2}) \\ & + \dots + b_i(D_t - \sum_{j=1}^m D_j k_{i-1} + \sum_{j=i+1}^m D_j k_{ji}) \\ & + \dots + b_m(D_t - D_m k_{m-1}) + u_t \end{aligned}$$

Here, k_i ($i = 1, \dots, m-1$) is the kink point for the i^{th} sub-period, and D_j is the dummy variable for the j^{th} sub-period taking value 1 in the j^{th} sub-period and 0 otherwise. The OLS estimates of β s give the exponential growth rates for the respective sub-periods.

In the present context, considering initiation of the reform process in 1991, the trend lines are partitioned into two sub-periods, viz., 1980-81 to 1990-91 and 1991-92 to 2003-04⁴. Therefore, the model is reduced to

$$\ln(Y_t) = a + b_1(D_t + D_2 k) + b_2(D_t - D_2 k) + u_t$$

As mentioned above, $D_1 = 1$ during 1980-81 to 1990-91 and $D_1 = 0$ otherwise, whereas $D_2 = 1$ during 1991-92 to 2003-04 and $D_2 = 0$ otherwise.

² As said earlier, in the present context, acceleration or deceleration is tested in terms of whether the absolute rate of growth was increasing or decreasing, i.e., irrespective of whether the growth rate is positive or negative.

³ The elimination of discontinuities is important particularly because with discontinuities the sub-period growth rates may be higher and/or lower than the growth rate for the period as a whole. Not only that, in these cases the estimated sub-period growth rates may be negative while the estimated growth rate for the period as a whole may be positive and vice versa.

⁴ The number of sub-periods into which a given time series can be meaningfully segmented, however, varies from case to case depending on the amount of instability, the presence of cyclical fluctuations, and the a priori ground for expecting growth rates to change.

Growth Performance of the Sector

Table 1 depicts the state of Indian agriculture during 1980-2004. No significant change in area under the sector in general and under food crops in particular could be found. Area under non-food crops, on the other hand, increased during 1980-92, but showed declining tendency thereafter. Production and yield of the sector as a whole and also of different crops, however, increased considerably during 1980-2004.

Table 1: Index of Area, Production and Yield in Indian Agriculture (Base Triennium Ending 1981-82 = 100), 1980-81 to 2002-03

Year	Area			Production			Yield		
	Food	Non-Food	All Crops	Food	Non-Food	All Crops	Food	Non-Food	All Crops
1980-81	99.8	99.4	99.7	104.9	97.4	102.1	105.1	99.2	102.9
1985-86	100.9	104.2	101.6	123.4	113.0	119.5	120.6	108.3	116.0
1991-92	96.0	124.8	102.7	137.6	158.8	145.5	136.5	123.7	131.1
1995-96	95.3	131.7	103.8	146.1	185.4	160.7	143.1	135.7	139.8
1999-00	97.0	103.7	104.8	169.7	189.0	176.9	159.8	136.4	149.6
2003-04	97.9	119.1	102.8	171.0	193.8	179.5	163.9	146.3	156.4

Source: Ministry of Agriculture, Government of India.

Table 2: Trend Growth Rate of Area, Production and Yield, 1991-2004

Variable	Crop	Index Average	Trend Growth Rate (%)
Area	Food Crops	96.2	-0.2
	Non-Food Crops	125.1	-0.5
	All Crops	103.3	-0.2
Production	Food Crops	156.0	1.1
	Non-Food Crops	181.4	0.9
	All Crops	165.3	1.1
Yield	Food Crops	150.7	1.1
	Non-Food Crops	135.1	0.6
	All Crops	143.7	0.9

Source: Ministry of Agriculture, Government of India.

Growth performance of the sector was, nevertheless, dismal in the post-reform era. While the trend growth rate of area was negative, though marginally, that of production and yield was positive but insignificant (Table 2)⁵. Importantly, the growth performance varied across crops during 1995-2004 (Table 3). Area under wheat, jute, sugarcane, potato and the plantation crops recorded a positive rate of growth, whereas it was negative for the rest. For some crops like gram, groundnut & mustard, rapeseed and tobacco the decline was at a considerably high rate.

The experience is mixed in respect of production. The trend growth rate was negative for the crops like gram, oilseeds, cotton, mesta (and also fibres as a whole), sugarcane and tobacco but positive for the rest. Notably, except coffee, for all the crops the rate of growth was less than even 5 per cent. Interestingly, yield in the sector recorded a positive rate of growth for all the crops except cotton fibres (and also fibres as a whole), tea and sugarcane, though the rate of increase was marginal except for coffee.

Table 3: Trend Growth Rate for Major Crops, 1995-2004

Name of the Crop	Area	Production	Yield			
	Index	Growth	Index	Growth	Index	Growth
	Average	Rate (%)	Average	Rate (%)	Average	Rate (%)
Cereals	95.6	-0.5	164.3	0.7	157.2	1.0
Rice	108.7	-0.3	168.6	0.6	155.0	1.0
Wheat	118.3	0.1	197.3	0.9	167.9	1.3
Coarse Cereals	71.0	-1.2	108.2	0.7	143.1	0.3
Pulses	97.0	-0.3	129.6	Neg.	130.7	0.5
Gram	94.4	-2.1	129.3	-1.7	136.9	0.5
Oilseeds	131.1	-1.5	200.8	-2.0	141.8	Neg.
Groundnut & Mustard	95.5	-3.3	118.5	-3.1	123.7	0.2
Rapeseed	143.1	-5.2	260.5	-3.0	181.8	1.6
Fibres	104.3	-1.7	149.7	-2.0	140.3	-1.0
Cotton	108.3	-2.0	153.3	-2.5	139.3	-1.4
Jute	98.0	0.5	148.5	2.3	151.5	1.9
Mesta	53.2	-0.6	63.5	-1.3	121.6	0.3

⁵ As regards agricultural employment, the rate of growth not only declined it was even negative in the 1990s. Annual rate of growth declined from 1.51 percent during 1983-94 to -0.34 percent during 1994-2000 with the absolute number of persons employed in the sector declining from 242.46lakhs in 1993-94 to 237.56lakhs in 1999-2000. As agriculture has a significant contribution to total employment of the nation, this deceleration in agricultural employment reduced the rate of growth of total employment in the economy from 2.04 percent in 1983-94 to 0.98 percent in 1994-2000.

Plantation Crops	154.7	1.9	197.2	2.3	136.2	0.1
Tea	124.5	2.7	147.4	1.0	118.8	-1.8
Coffee	158.3	2.1	186.8	5.6	120.3	3.1
Rubber	209.4	0.7	395.5	2.4	191.0	1.5
Sugarcane	148.8	0.8	181.0	-0.6	122.5	-1.0
Tobacco	88.1	-4.5	114.0	-3.4	129.7	1.2
Potato	173.0	1.4	240.8	1.9	139.1	0.6

Note : Neg. – Negligible (< 0.05)

Source : Ministry of Agriculture, Government of India.

As regards acceleration or deceleration in the growth process, Table 4 shows that, except production of non-food crops, δ_2 is not statistically significant in any of the quadratic trend equations. Even for production of non-food crops, though δ_2 is statistically significant at 5 per cent level, value of R^2 is not reasonably high and the D-W Statistic does not rule out the possibility of positive or negative auto-correlation in the random disturbance term. In other words, there was no statistically significant acceleration or deceleration in Indian agriculture during 1995-2004.

Like growth rate, the experience differs across crops in respect of acceleration or deceleration also. δ_2 is not statistically significant in respect of area under any of the crops considered. This means that though δ_2 is negative or positive in sign for different crops, there was no statistically significant acceleration or deceleration in the growth of area (Table 5).

Table 4: Regression Results of Quadratic Trend Equation, 1991-2004

Variable	Crop	Coefficient			Adj-R ²	F-Stat	DW
		Constant	t	t ²			
Area	Food Crops	95.7050	0.6084	-0.0602	0.03	1.20	2.60
			(36.495)*	(0.706)	(-1.006)		
	Non-Food Crops	120.6653	2.9415	-0.2561	0.07	1.45	2.43
		(14.581)*	(1.082)	(-1.355)			
	All Crops	100.3612	1.6441	-0.1357	0.30	3.55	2.60
		(39.094)*	(1.949)	(-2.316)			
Production	Food Crops	133.1786	5.9128	-0.2946	0.35	4.28	3.15
		(14.478)*	(1.957)	(-1.403)			
	Non-Food Crops	149.1896	9.7762	-0.5757	0.47	6.33	2.66
		(15.665)*	(3.125)*	(-2.647)*			
	All Crops	138.8072	7.3605	-0.3977	0.45	5.82	3.19
		(16.122)*	(2.602)*	(-2.023)			

Yield	Food Crops	134.9261 (24.236)*	3.3049 (1.807)	-0.1166 (-0.918)	0.55	8.28	3.36
	Non-Food Crops	124.0694 (21.642)*	3.0198 (1.603)	-0.1600 (-1.222)	0.18	2.36	2.66
	All Crops	129.8905 (24.477)*	3.1247 (1.792)	-0.1280 (-1.056)	0.46	6.06	3.25

Note : *Significant at 5 percent level.

Source : Ministry of Agriculture, Government of India.

For production, on the other hand, δ_2 is statistically significant only for rubber and sugarcane. But, while R^2 is significantly high for rubber, it is not reasonably high for sugarcane. On the other hand, F-Stat is significant only for sugarcane. Since δ_2 is negative for these crops it can, therefore, be said that production of sugarcane decelerated in the post-reform era, but there was no statistically significant acceleration or deceleration for other crops (Table 6).

Similarly, in respect of yield also, δ_2 is statistically significant and negative in sign only for sugarcane. Value of R^2 is also quite high for this crop. But, the F-Stat is not significant and the D-W Stat does not rule out the possibility of auto-correlation in the random disturbance term. This means that deceleration in yield of sugarcane was not statistically significant. Hence, none of the crops did experience statistically significant acceleration or deceleration in yield during 1995-2004 (Table 7).

Table 5: Regression Results of Quadratic Trend Equation for Area, 1995-2004

Name of the Crop	Variable-t		Variable-t ²		Adj-R ²	F-Stat	D-W Stat
	Coeff.	t-Stat	Coeff.	t-Stat			
Cereals	1.365	0.787	-0.183	-1.083	0.08	1.33	2.60
Rice	3.958	2.138	-0.431	-2.385	0.36	3.21	2.88
Wheat	3.903	1.602	-0.383	-1.614	0.07	1.31	2.11
Coarse Cereals	-2.443	-1.159	0.159	0.772	0.20	1.98	2.30
Pulses	-4.167	-1.076	0.389	1.031	-0.12	0.58	2.08
Gram	-5.788	-0.676	0.384	0.460	-0.10	0.63	1.82
Oilseeds	-4.074	-1.266	0.209	0.665	0.44	4.13	1.80
Groundnut & Mustard	-2.088	-1.242	-0.107	-0.650	0.90	36.24*	2.56
Rapeseed	-6.956	-0.780	-0.049	-0.057	0.61	7.15*	1.74
Fibres	2.840	1.208	-0.464	-2.025	0.64	8.07*	3.21
Cotton	3.004	1.079	-0.513	-1.888	0.63	7.73*	3.17
Jute	4.257	1.257	-0.378	-1.143	-0.04	0.86	1.73
Mesta	-2.153	-1.110	0.182	0.962	-0.06	0.76	2.14

<i>Plantation Crops</i>	9.710	2.4998*	-0.679	-1.793	0.61	7.39*	2.83
Tea	4.842	1.781	-0.144	-0.543	0.79	16.17*	1.33
Coffee	6.664	3.2420*	-0.336	-1.675	0.87	27.90*	1.47
Rubber	22.531	1.257	-2.101	-1.202	-0.05	0.80	2.59
Sugarcane	2.624	0.572	-0.150	-0.335	-0.09	0.67	1.80
Tobacco	2.773	0.308	-0.676	-0.770	0.25	2.30	1.67
Potato	6.569	1.161	-0.409	-0.741	0.24	2.24	1.94

Note : * Statistically significant at 5 percent level of significance

Source : *Economic Survey*, Various Issues.

Table 8 shows regression results of kinked exponential fit. It is observed that for area under food crops and also all crops the t-Statistics corresponding to the individual coefficients are not statistically significant. Further, value of adjusted R^2 with respect to regression equation of these variables is also very low and the F-Statistic is not statistically significant for all crops taken together. This means that rate of growth of area under food crops and all crops in the post-reform era were not significantly different from that in the 1980s.

For the rest, on the other hand, not only the t-Statistics and the F-Statistic are statistically significant, but also value of R^2 is quite high. Further, for each of these models the D-W Statistic shows that there is no positive or negative correlation in the random disturbance term. This means that these kinked exponential fits are statistically significant.

Table 6: Regression Results of Quadratic Trend Equation for Production, 1995-2004

Name of the Crop	Variable-t		Variable-t ²		Adj-R ²	F-Stat	D-W Stat
	Coeff.	t-Stat	Coeff.	t-Stat			
<i>Cereals</i>	8.179	1.227	-0.696	-1.070	-0.02	1.69	3.34
Rice	10.744	1.489	-0.968	-1.376	0.04	1.36	3.42
Wheat	12.268	1.954	-1.046	-1.707	0.25	2.97	2.82
<i>Coarse Cereals</i>	-3.696	-0.479	0.442	0.586	-0.23	0.38	3.36
Pulses	-3.202	-0.330	0.318	0.335	-0.31	0.14	3.08
Gram	-0.375	-0.026	-0.187	-0.131	-0.23	0.76	3.12
<i>Oilseeds</i>	-17.600	-1.008	1.366	0.802	-0.04	0.39	3.06
Groundnut & Mustard	-13.498	-0.872	0.986	0.653	-0.06	0.34	2.87

Rapeseed	-31.053	-1.280	2.321	0.981	0.12	0.81	2.75
<i>Fibres</i>	-19.700	-1.717	1.674	1.496	0.17	2.41	2.16
Cotton	-23.779	-1.789	1.994	1.539	0.21	2.39	2.13
Jute	6.201	0.889	-0.281	-0.413	0.27	11.42*	2.37
Mesta	1.804	0.550	-0.265	-0.827	0.00	0.29	1.05
<i>Plantation Crops</i>	9.946	3.979*	-0.537	-2.200	0.90	0.08	2.91
Tea	3.396	3.956*	-0.193	-2.309	0.89	8.34*	1.31
Coffee	12.931	1.077	-0.239	-0.204	0.63	8.09	1.53
Rubber	31.161	18.672*	-2.164	-13.296*	0.99	0.65	2.69
Sugarcane	13.395	2.517*	-1.447	-2.788*	0.45	13.28*	2.66
Tobacco	0.122	0.009	-0.405	-0.306	-0.02	1.38	2.27
Potato	16.504	1.102	-1.194	-0.817	0.07	0.22	2.71

Note : * Statistically significant at 5 percent level of significance

Source : *Economic Survey*, Various Issues.

Table 7: Regression Results of Quadratic Trend Equation for Yield, 1995-2004

Name of the Crop	Variable-t		Variable-t ²		Adj-R ²	F -Stat	D-W Stat
	Coeff.	t-Stat	Coeff.	t-Stat			
<i>Cereals</i>	3.850	0.960	-0.231	-0.591	0.15	0.92	3.19
Rice	4.107	0.936	-0.262	-0.613	0.08	1.17	3.33
Wheat	2.608	0.655	-0.047	-0.120	0.33	2.31	2.97
<i>Coarse Cereals</i>	4.580	0.861	-0.417	-0.804	-0.18	0.26	2.79
Pulses	1.625	0.275	-0.097	-0.169	-0.27	0.06	2.50
Gram	6.510	1.202	-0.587	-1.111	-0.06	0.25	2.03
<i>Oilseeds</i>	-6.770	-0.861	0.678	0.883	-0.18	0.84	2.71
Groundnut & Mustard	-12.004	-0.782	1.230	0.821	-0.20	0.78	2.85
Rapeseed	-8.599	-0.629	1.144	0.858	-0.05	1.55	3.04
<i>Fibres</i>	-18.715	-2.180	1.729	2.066	0.26	1.80	2.48
Cotton	-21.127	-2.144	1.918	1.996	0.26	2.04	2.44
Jute	0.073	0.026	0.283	1.031	0.72	2.51	2.05
Mesta	4.047	0.735	-0.364	-0.678	-0.22	1.02	1.50
<i>Plantation Crops</i>	0.224	0.116	-0.005	-0.026	-0.30	36.81*	1.64
Tea	-1.970	-0.852	-0.012	-0.052	0.65	32.42*	2.11

Coffee	7.922	1.806	-0.414	-0.968	0.64	7.91*	1.49
Rubber	-2.036	-0.164	0.495	0.409	-0.10	421.64*	1.30
Sugarcane	5.309	3.171*	-0.652	-3.991*	0.75	4.31	1.58
Tobacco	-4.353	-0.773	0.593	1.079	0.09	0.91	1.84
Potato	4.442	0.574	-0.367	-0.487	-0.24	1.28	3.24

Note : * Statistically significant at 5 percent level of significance

Source : *Economic Survey*, Various Issues.

Since the OLS estimates of the β coefficients give exponential growth rate in the respective sub-period, it can, therefore, be said that rate of growth production and yield of different crops and area under non-food crops in the second sub-period were significantly different from that in the first one. But what is more important is that growth rate of each these variables was not only lower but also negative in the post-reform era.

Table 8: Regression Results of Kinked Exponential Fit

		Coefficient			Adj-R2	F-Stat	D-W
		Constant	β_1	β_2			
Area	Food Crops	4.6128 (263.926)*	-0.0028 (-1.367)	0.0015 (1.911)	0.32	6.37	2.23
	Non-Food Crops	4.5765 (114.951)*	0.0186 (3.984)*	-0.0041 (-2.343)*	0.67	24.01	1.79
	All Crops	4.6032 (246.228)*	0.0028 (1.296)	-0.0003 (-0.311)	0.06	1.68	1.72
Production	Food Crops	4.6101 (103.155)*	0.0349 (6.638)*	-0.0049 (-2.474)*	0.81	51.66	2.07
	Non-Food Crops	4.5466 (97.260)*	0.0500 (9.099)*	-0.0092 (-4.466)*	0.91	111.80	1.47
	All Crops	4.5869 (106.992)*	0.0405 (8.048)*	-0.0066 (-3.468)*	0.87	81.46	1.82
Yield	Food Crops	4.6077 (142.448)*	0.0324 (8.521)*	-0.0045 (-3.175)*	0.88	85.12	1.72
	Non-Food Crops	4.5716 (156.631)*	0.0271 (7.911)*	-0.0032 (-2.471)*	0.85	68.19	2.04
	All Crops	4.5957 (155.224)*	0.0299 (8.600)*	-0.0038 (-2.899)*	0.88	83.05	1.81

*Statistically significant at 5 percent level.

Thus, there is no denying the fact that Indian agricultural sector experienced setback in terms of its growth performance in the post-reform era. Not only the rate of growth during this period was lower as compared to that in the 1980s, it was even negative. Further, except for production of sugarcane, the growth rate stagnated during 1995-2004. Experience across crops suggests that while area under majority of the crops declined, yield increased for most of them but only marginally except for coffee. The experience is, however, mixed in respect of production.

This retarded growth performance has put the sector in a very bad shape so far as output, productivity and input utilization are concerned. As the World Development Indicators (World Bank 2001) shows, not only India stands far behind many of the developing countries, even the neighbouring countries like Pakistan, Bangladesh and Sri Lanka have done better in many respects (Table 9). This has undoubtedly limited competitiveness of Indian agriculture in the international market place.

Table 9: Indian Agriculture Vis-à-Vis Selected Developing Economies

Indicator	Value	Economies Performing Better than India
Output Crop Production Index (As in 1998-00) (Base 1989-91 = 100)	122.1	Algeria (125.8), Chile (126.3), China (141.5), Egypt (141.4), Ghana (174.1), Pakistan (125.4), Sudan (162.0)
Food Production Index (Base 1989-91 = 100)	124.6	Algeria (131.1), Brazil (136.8), Chile (133.1), China (168.5), Egypt (149.5), Ghana (163.5), Malaysia (134.1), Mexico (128.4), Pakistan (143.3), Philippines (128.4), Sudan (155.9)
Productivity Value Added per (As in 1997-99) Worker (Measured in constant 1995 US \$)	395	Algeria (1,876), Brazil (4,300), Chile (4,997), Colombia (3,454), Egypt (1,222), Ghana (554), Hungary (4,860), Indonesia (742), Korea (12,252), Malaysia (6,578),

		Mexico (1,742), Pakistan (626), Philippines (1,342), Poland (1,554), Russian Federation (2,282), South Africa (4,070), Sri Lanka (734), Thailand (939), Turkey (1858), Zimbabwe (369)
Input Irrigation (Irrigated (As in 1996-98) land as a percentage of Crop Land)	33.6	Bangladesh (44.8), Chile (78.4), China (38.3), Egypt (99.8), Korea (60.5), Pakistan (81.2), Tajikistan (80.9)
Fertilizer Consumption (Kg per Hectare of Arable Land)	97.6	Bangladesh (146), Brazil (102), Chile (222.5) China (286), Colombia (282.6), Egypt (385.8), Indonesia (143.4), Korea (535.8), Malaysia (694), Pakistan (117.8), Philippines (128.3), Poland (114.8), Sri Lanka (251.7)
Tractor (Per 1,000 agricultural workers)	6	Algeria (39), Brazil (58), Chile (52), Egypt (11), Hungary (162), Korea (50), Malaysia (23), Mexico (20), Pakistan (12), Poland (285), Russian Federation (101), South Africa (60), Tajikistan (37), Thailand (10), Turkey (60)

Note : Figures in the parentheses against each of the countries in Column-IV indicate value of the respective indicator for that country.

Source : *World Development Indicators*, World Bank, 2001.

An Explanatory Note :

Existing studies highlight a large number of factors responsible for the deceleration in agricultural growth in the post-reform period. For example, according to RBI (2003), inadequate irrigation cover, improper adoption of technology, unbalanced use of inputs, decline in public investment and weakness in public delivery system were the main factors behind the deceleration phenomena. Rao (2003) explained the slow

down in terms of neglect of reform in the areas such as removal of restrictions on domestic trade and processing, stepping up public investment in agriculture, reforms in management of infrastructure, etc. that could have direct effect on the sector.

Thus, public investment vis-à-vis private investment and R&D efforts seem to have importance. In addition, extent of crop diversification and industrial deceleration may also have significant impact on growth performance of the agricultural sector. The present section analyses the phenomenon in terms of four major factors, viz. (i) declining investment, low R&D efforts, (ii) extent of crop diversification, and (iii) industrial deceleration. This is, however, an analysis at the aggregate level and the set of factors may differ across crops. Further, identifying the exact set of factors and assessing their relative impact on growth performance require rigorous econometric exercise; this is beyond the scope of this paper.

Declining Public Investment

In a developing country like India importance of public investment in agriculture is well recognized. Public investment is necessary not only for developing various infrastructure in the sectors like irrigation, roads, markets etc, but also to attract greater private investment into the sector and, thereby, accelerates the process of corporatization of the sector.

Table 10 shows that public investment in agriculture recorded a negative rate of growth of 1.6 per cent in the post-reform period⁶. Though private investment grew at the rate of 4.3 per cent, this was not adequate to raise total investment in the sector in a significant way. As a result, investment in agriculture as a percentage of GDP not only was very low during this period, but also declined continuously over the years. This decline in investment has undoubtedly slowed down the development of agricultural infrastructure like irrigation, roads, markets, etc, and thereby growth of the sector itself.

⁶ Decline in public investment is not a phenomenon of the post-reform period only. In fact, it started declining after 1980-81 and a number of studies dealt with this issue (e.g., Rath 1989; Rao 1994).

Table 10: Gross Capital Formation in Agriculture (at 1993-94 prices), 1992-93 to 2002-03

Year	Amount of Investment (Rs. Crore)			Share in GDP (%)
	Public Investment	Private Investment	Total Investment	
1992-93	4076	10432	14508	1.8
1993-94	4467	9056	13523	1.6
1994-95	4947	10022	14969	1.6
1995-96	4849	10841	15690	1.6
1996-97	4668	11508	16176	1.5
1997-98	3979	11963	15942	1.4
1998-99	3870	11025	14895	1.3
1999-00	4221	13083	17304	1.4
2000-01	3927	12979	16906	1.3
2001-02	4127	13201	17328	1.3
2002-03	4538	14119	18657	1.3
Average (1992-03)	4334	11657	15991	1.5
Growth Rate (%)	-1.6	4.3	2.7	-2.8

Source: Economic Survey, Various Issues

Low R&D Efforts

The other important reason for slow agricultural growth might be the low level of R&D activities in the sector in the nineties. Although the investment in agricultural research and education (at 1980-81 prices) increased from Rs. 733 million in 1965-66 to Rs. 2,994 million in 1998-99 its share in total government expenditure was only about 3.6 per cent in the Ninth Plan. Besides, the agricultural research intensity of 0.52 per cent during this plan period was too low compared to 2.5 per cent seen in many other developing countries. Such low R&D efforts limited product and process related innovative activities and hence competitiveness of Indian agriculture.

Stagnation in Crop Diversification

Growth of the agricultural sector of an economy depends considerably on the process of agricultural transformation, which is in turn well connected with shifts in production patterns, i.e., on the extent of crop diversification. A greater degree of

diversification from the traditional wheat-paddy system facilitates in overcoming various economic, social and ecological problems such as decline and deceleration in productivity growth, drop in agricultural employment, decline in soil fertility, etc. Further, crop diversification also reduces the risk of cultivating a particular crop.

Table 11 shows distribution of gross area under different crops during 1980 to 2004. It is observed that the distribution was concentrated towards four crops, namely rice, wheat, jowar and bazra. Further, there was no significant change in the distribution pattern after initiation of the reform process. Even in 2003-04 these four crops accounted for nearly 67 per cent of gross area under cultivation, which was exactly the same in 1990-91 while it was 69 per cent in 1980-81.

Table 11: Gross Area under Different Crops (in million hectares), 1980-81 to 2003-04

Crop	1980-81	1990-91	1994-97*	1997-00*	2000-03*	2003-04
Rice	40.1	42.7	43.0	44.5	43.3	42.4
Wheat	22.3	24.2	25.5	27.2	25.7	26.6
Jowar	15.8	14.4	11.4	10.3	9.6	9.5
Maize	6	5.9	6.1	6.3	6.4	7.4
Bazra	11.7	10.5	9.8	9.3	9.0	10.4
Gram	6.6	7.5	7.1	7.4	5.8	7.3
Tur	2.8	3.6	3.4	3.4	3.4	3.5
Groundnut	6.8	8.3	7.6	7.1	6.3	6
Rapeseed	4.1	5.8	6.4	6.5	4.7	5.1
Cotton	7.8	7.4	8.7	9.0	8.4	7.6
Jute	0.9	0.8	0.8	0.8	0.8	0.8
Mesta	0.4	0.4	0.2	0.2	0.2	0.2
Tea	0.4	0.7	0.4	0.5	0.5	0.5
Coffee	0.2	0.2	0.2	0.3	0.3	0.3
Rubber	0.2	0.3	0.4	0.5	0.6	0.6
Sugarcane	2.7	3.7	4.1	4.1	4.4	4
Potato	0.7	0.9	1.1	1.3	1.2	1.3

* Average for the period.

Source: *Economic Survey*, various issues.

This skewed distribution of land is reflected in the diversification index⁷. Though the extent of diversification was reasonably high, the sector failed to achieve maximum possible diversification. Further, the extent of diversification remained by and large stagnated during the whole period of 1980-2004 (Table 12). This means that there was no significant increase in the extent of crop diversification following economic reforms. Instead, value of the index was lower in 2003-04 as compared to what one observes in 1990-91.

Table 12: Extent of Crop Diversification in Indian Agriculture, 1980-81 to 2002-03

Year	Extent of Crop Diversification			
	Berry's Measure		Entropy Measure	
	Index	Degree (%)*	Index	Degree (%)*
1980-81	0.838	89	2.149	76
1990-91	0.840	89	2.180	77
1994-95	0.837	89	2.160	76
1995-96	0.837	89	2.168	77
1996-97	0.838	89	2.175	77
1997-98	0.837	89	2.173	77
1998-99	0.834	89	2.163	76
1999-00	0.827	88	2.139	76
2000-01	0.825	88	2.136	75
2001-02	0.827	88	2.139	76
2002-03	0.830	88	2.157	76
2003-04	0.834	89	2.164	76

Note : *Measures actual degree of diversification to maximum diversification possible for a given number of crops. While for Berry's Index this is measured as $DI_B/[1-(1/n)]$, for Entropy Index as $DI_E/\ln(n)$.

Source : *Economic Survey*, Various Issues.

⁷ Here, we have computed two indices to measure extent of diversification, viz., Berry's Index (DI_B) based on Berry (1971) and Entropy Index (DI_E) as suggested by Hart (14). While DI_B is computed by using the $DI_B = 1 - \sum(A_{it}/\sum A_{it})^2$, to compute DI_E we have used the formula $DI_E = \sum[A_{it} * \ln(1/A_{it})]$. In either of these formulas, A_{it} stands for area under the i^{th} crop at time point t . Further, we have considered 17 crops to compute these indices at different time points (i.e., $i = 1, 2, \dots, 17$). DI_B or DI_E is expected to increase with increase in the extent of diversification and vice-versa.

Slow Industrial Growth :

Slow growth of the industrial sector might be another important factor responsible for the poor growth performance of the agricultural sector. This is so because there exists intimate relationship between agriculture and industry in an economy through various demand-supply linkages. On the one hand, a high rate of growth of the industry sector as a whole creates additional demand for wage goods. On the other hand, expansion of the agro-based industries generates additional demand for raw materials. Further, growth and development of the industrial sector also benefit agricultural sector by supply of modern inputs⁸.

Table 13 reviews growth performance of the industry sector in the post-liberalization era. It is evident that the industry sector as a whole grew at a rate of 6.1 per cent per annum during 1992-93 to 2002-03 and industrial production in 2002-03 was 76.7 per cent higher than what it was in 1993-94. This growth is largely attributable to the manufacturing sector and, to some extent, to the electricity sector, which registered average rate of growth of 6.5 per cent and 5.6 per cent per annum respectively with their respective weight of 79.36 per cent and 10.17 per cent in the sector.

Table 13: Growth Performance of Indian Industry Sector, 1992-2003

Sector	Weight	IIP, 2002-03 (Base 1993-94 = 100)	TGR(%)
General	100.00	176.7	6.1
Mining & Quarrying	10.47	139.6	3.2
Manufacturing	79.36	183.1	6.5
Electricity	10.17	164.3	5.6

Notes : IIP – Index of Industrial Production; TGR – Trend Growth Rate.

Source : Central Statistical Organization, Government of India, Ministry of Planning and Programme Implementation.

⁸ However, growth of the industrial sector also depends to a large extent on that of the agricultural sector as the latter supplies wage goods to the industrial sector as a whole and raw materials to the agro-based industries in particular. Besides, growth of agriculture also generates additional demand for the industrial products. Modeling of the linkages between agricultural and industrial growth has shown that a 10 per cent increase in agricultural output would increase industrial output by 5 per cent.

But, what is more important is that although rate of growth of the industry sector was marginally higher in the 1990s as compared to that in the 1980s and the manufacturing sector recorded a marked improvement in its growth performance, their share in GDP remained by and large the same (Mishra 2005). The rate of growth of the sectors like mining & quarrying and electricity, gas & water supply declined sharply during this period. The construction sector, on the other hand, has grown only at a marginally higher rate in the 1990s. Besides, many of the agro-based industries like food products, cotton textiles, jute and other vegetable, fibre industries, and wood and wood products have grown at a rate less than 5 per cent per annum during this period. This slow growth of the industry sector, specially that of the agro-based industries seems to have limited the demand for agricultural products and, thereby, the pace of their growth.

Conclusions :

Hence, growth of Indian agricultural sector not only stagnated in the post-reform era and the rate of growth was far lower and negative as compared to that in the pre-reform period. Experience across crops was also not encouraging. While area under majority of the crops declined, yield increased for most of them only marginally, except for coffee. The experience is, however, mixed in respect of production. In addition to the traditional factors like decline in public investment and low R&D efforts, as highlighted in the existing literature, stagnated crop diversification and slow down in industrial growth also seem to be responsible for this retarded growth performance of the sector.

This means that the National Agricultural Policy (NAP) needs a fresh look. While the importance of increasing public investment in the sector is well recognized, the responsibility has been shifted to the state governments in the Union Budget of 2005. Considering that there is severe crisis in the exchequer of many state governments, possibility of taxing the sector should, therefore, be seriously considered. As regards private investment, since it depends on rate of return, addition of new farm holdings, institutional credit and agricultural subsidies, in addition to

public investment (Chand and Kumar 2004), should be addressed. Further, purpose and direction of private investment should be clearly defined.

Secondly, there should be a comprehensive technology policy for the sector. The policy resolutions should aim at not only raising investment (both public and private) on R&D, but also in implementing new technologies by the farmers. 'Technology Pools' may be developed in the state-sponsored agricultural research laboratories and research institutes. There should be an effective system for disseminating information on new technologies to the farmers. Intermediary organisations / agencies with expert manpower may be engaged to bridge the gap between the developers and the users, particularly in guiding the farmers towards implementing new technologies successfully. Block level agricultural department and panchayats should play active role in this regard.

Efforts should also be made in having greater degree of crop diversification in the sector. Diversification of Indian diets from foodgrains to high value products like vegetables, fruits, etc. has created greater opportunity for crop diversification. With increase in the number of middle class people and rise in per capita income, the extent of diversification in the diet basket is expected to be enhanced further. Indian farmers should tap these opportunities. In the states like Punjab and Maharashtra, efforts are being made to promote crop diversification. Such efforts should be widely spread across other states of the country. Apart from emphasis on contract farming, encouraging agro-industries, developing infrastructure for easy marketing and boosting exports of agricultural commodities, this also requires an effective crop insurance policy to provide the farmers necessary confidence in this regard.⁹

Growth performance of the industrial sector needs to be enhanced. The Indian corporations should put greater emphasis on modernization of their enterprises and a significant portion of corporate investments should be directed for this purpose. Besides, the rate of implementation of the investment projects should be improved significantly to boost the confidence of the prospective investors. This requires

⁹ This is quite important as Indian agriculture is still dependent heavily on nature and crop failure due to natural calamities is a common phenomenon.

minimization or even abolition of regulatory stringency, red-tapism and procedural hassles as well as development of cooperative relationship between the investors and the related government departments, supporting agencies/organizations and local administration.

Furthermore, overall competitiveness of the sector as well as that of the key industries needs significant improvement. For this, the firm level initiatives should be accompanied by removal of imperfections in the trade, investment and technology related policies. The long pending labour reforms and ambiguities relating to objectives and processes of disinvestments should also be cleared and the policy framework for reforming the public sector enterprises should be reformulated to improve their competitiveness on urgent basis.

Finally, the policy measures should adequately put emphasis on relating the agricultural sector intimately to the industrial sector through various demand-supply linkages. Special attention should be paid in promoting food-processing industry. Although it recorded a high rate of growth of 6.62 per cent in the post-reform period as compared to 4.12 per cent in the pre-reform period (Singh 2003), there still exists enormous scope for enhancing the rate of growth. This is so because only 2 per cent of fruits and vegetables are processed in India as compared to 30 per cent in Thailand, 70 per cent in Brazil, 78 per cent in Philippines and 80 per cent in Malaysia (Patnaik 1997). Therefore, promotion of food processing industry will not only strengthen agriculture-industry linkages, but also reduce post-harvest losses⁵.

The draft national food policy 2005 recommends contract farming as a measure to facilitate greater processing. But, sustaining high rate of growth and boosting it further also require increase in demand for processed foods which in turn requires reduction in production costs and hence prices. More importantly, growth of food processing should not be viewed in isolation of growth of respective crops. Instead, there should be a common policy framework, which can vertically integrate the two effectively. There should also be a strong regulatory mechanism to protect the interest of the farmers.

¹⁰ Besides, this industry has high employment potential with significantly lower investment.

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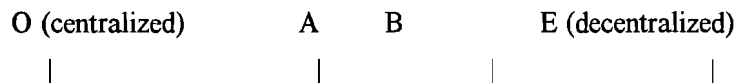
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Decentralization: Constraints and Opportunities

*Pabitra Giri**

Introduction

Terms ending with 'ization', like urbanization or industrialization have one thing common, that is, they represent a process of change. So is decentralization, a movement from a centralized situation to a decentralized situation. But there may be different levels of decentralization. In a unitary government system, introduction of a federal structure of government, with central and state governments, stands for decentralization, as in the case of some Latin American countries. In contrast, the Constitution of India from the very beginning provided for a federal structure of government, with central and state governments. Therefore in India in the recent period decentralization refers to the devolution of power to various local government units, which have been accorded constitutional recognition through the 73rd and the 74th Constitution Amendment Act of 1992. As shown below, we can think of a line on which various systems with increasing degree of decentralization are arranged with the starting point, O, representing 'centralized' state and the terminating point, E, standing for completely 'decentralised' one, and movement from any point on the line to a point on its right would represent greater decentralization. For example, we can think of A and B as two points on the line; where A represents a situation with central and state government, and B is a situation with central, state and local governments. A movement from A to B is a sort of decentralization.



As there could be different levels of decentralization, in the discussion of decentralization one should be very specific about the stage of decentralization, that is,

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whether we are talking about a movement from O to A or from A to B or from B to E should be clear (the straight-line arrangement is just for illustration, one can use a tree-chart also) because opportunities and constraints vary from one situation to another.

Decentralization: Economic vs. Political Perspective

Decentralization may be conceived in various contexts but most important of them is decentralization of governance, which means decentralization of decision-making power in the matters of public domain. Thus decentralization of planning or project implementation has much narrow scope compared to decentralization of governance. Here we are concerned with decentralization of governance.

Decentralization can be seen from two different perspectives - economic and political perspectives. From the economic perspective decentralization is an issue of deciding the allocation of functions and fiscal instruments between different levels of government. The traditional public finance theory, primarily based on experience of capitalist countries of the West, distinguishes three broad functions of the government – stabilization, distribution and allocation. Stabilization function consists of measures for combating economic fluctuations, while distribution function refers to activities for ensuring equity in income distribution and welfare levels. Allocation function is related to provision of various kinds of public goods. The discussion of merits and demerits of decentralization of governance is carried generally with reference to the allocation function or provision of various types of public goods. The stabilization and distribution functions because of their wider scope automatically fall in the jurisdiction of the central (national) government. However, in the developing countries growth and development, rather than stabilization, is the major economic agenda for government. Further, ensuring growth and development is a complex exercise. Therefore the debate on decentralization from the economic perspective should take into account the growth and development related functions of the government.

The question of prime interest to an economist is whether decentralization is economically desirable? Will it promote efficiency, equity and stability? Political scientists are more descriptive than normative. They put things as they are rather than as they should be.

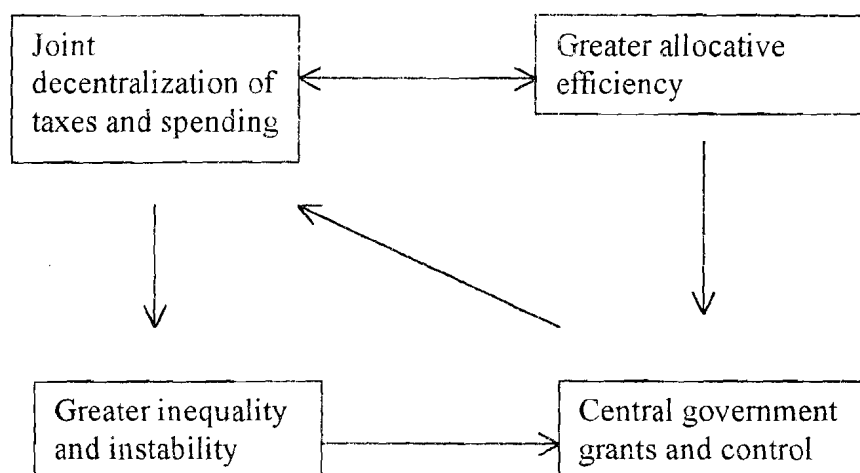
It is also important to look at decentralization from a political perspective for at least two reasons: first, decentralization serves political objective as much as or more than economic objectives. Decentralization is not only an institutional means to an economic end but an end in itself, or a means to reach political ends. In other words, even if decentralization is not desirable economically, it might still be worth having. The economic loss would be the premium paid for an insurance against authoritarianism. Second, decentralization is an institutional change. Institutional change can only be brought about by a political process, involving a complex interplay of various groups (professionals, politicians, regional bosses, economic pressure groups, bureaucracies, concerned citizens, and even terrorists). This is an understanding essential for applied economists. It is true for every policy, but much more in case of decentralization policy, as it has a higher political content than most other policies. The way it is introduced, the form it takes, and the sequencing that is used determine its success or failure as much as or more than the substance of decentralization policy itself.

Constraints of Decentralization

The constraints of decentralization emerge from the basic contradiction of decentralization, which is illustrated with the following diagram. The decentralization of taxes and spending to governmental units leads to greater allocative efficiency, which reinforces the process of decentralization. However, decentralization accentuates the inequality in income distribution and macro-economic instability. Macro-economic instability may be in either direction: an excess of expenditure over revenue if local government is allowed to operate with a soft budget, may lead to inflation. On other hand, if financing decentralization is through local taxation, this exerts a negative influence on the overall macro-economic activity. To avoid distributional inequality and macro-economic stability it is necessary that central government would exert its control over the local government and also provide grants. The central or the upper level government should take revenue-sharing and taxing decisions to a large extent. This goes against the process of decentralization.

It is also possible, though it is not usually recognized in the literature, that the

decentralization process may fail also with respect to allocative function – that is in the provision of local public goods, specifically for political reasons or for change in the nature of public good. Local governments may be more susceptible to capture by divergent forces and fears that these forces will behave in an irresponsible fashion. Such decentralization failures call for a good and strong central or upper-level government.



Paradox of decentralization is that it demands more central government and more sophisticated political skills at the national level to guide the process, at the same time that it requires breaking the habit of dependence on central government.

Opportunities of Decentralization

In many developing countries centralization has failed to deliver; then people turn to theories of decentralization (mostly based on US experience) and conclude that decentralization is highly desirable. But one must keep in mind that decentralization is essentially a political process, having various economic dimensions. The success of decentralization will depend as much on solving the economic problems as on political problems. Thus decentralization should not be considered as intrinsically a good thing that can be recommended without any conditionality. It should be further pointed out that the experiences of the developing countries should be studied extensively to cover

both the cases of successes and failures to identify the opportunities and constraints.

The potentialities of decentralization may go unrealized because of local political failures. Therefore one cannot be sure of the contribution of decentralization to economic performance just going by the economic theories. However, an analysis of the cross-country data relating to economic growth, measures of decentralization (share of sub-national government's share of total public expenditure) and self-reliance of sub-national governments (share of own revenues in total revenue) shows that the measure of decentralization has a positive effect on economic growth after controlling for other growth influencing variables like investment in physical capital, education etc.

The problems of growth and development in the developing countries are different from the macro economic instability problem of the Western Developed economies. Here the problem is providing the whole range of public goods and their management through proper institutional arrangement. In the early stage of development, many of the local public goods have strong complementarities with the national public good. At the same time creating institutions consistent with development needs local initiatives. It is necessary therefore to have an interpenetrating structure of governance where sub-national governments function in some respects as independent governments and in other respects as responsible agents of carrying out the functions of the upper level governments. Decentralization of governance with democratic participation provides the opportunity for experimenting with the growth and development initiatives according to the need of regional and local circumstances.

The West Bengal Scenario

West Bengal has achieved more progress in decentralizing governance compared to many other states of India. In fact, in the late 1970s, when Left-Front Government came into power, the local level government structure was reformed, both for the *panchayet* in rural areas and municipalities in urban areas, and the elected representatives, rather than nominated persons were at the helm of local government. Regular elections were held. Subsequently the Central Government took the initiative to change the Constitution and the 73rd and the 74th Constitution Amendment in 1992 gave the local government units constitutional status and made regular elections mandatory. Thus Indian federal structure has been expanded, formally, from a two-

tier system (consisting of central and state governments) to a three-tier system (consisting of central, state and local governments).

The decentralization process in West Bengal has been more successful compared to many other states of India for the following reasons: (a) the land reform and related movement has been successful to dismantle the feudal controls in the rural areas; (b) the leading political party of the Left Front Government has a broad-based decentralized organization which fitted well to the decentralization of governance; and (c) the majority of ruling leadership do not have vested interest in land property.

However, while assessing success of decentralization one should either compare actual decentralization with actual centralization, or between two situations of actual decentralization. Because it is understood that the actual decentralization will always be inferior to ideal decentralization. In West Bengal what we have achieved is in the form of an organizational set up for decentralization, but we have a long way to go for successful institutionalization of decentralization. There are many constraints - bureaucratic, cultural and attitudinal - that should be removed in the process. Finally, the upper level governments, central and state governments must play a role conducive to the decentralization and should not introduce schemes like MP and MLA funds which go against the autonomy and strength of the decentralized local governance. Because after all MP and MLA funds are individual oriented, and develop clientelism, which interfere with the spirit of democratic and participatory institutions of decentralization.

Conclusion

It is important to recognize both the political dimension as well as economic dimension of decentralization process. Further, one must take into consideration explicitly the level of decentralization, whether it is from center to states or from state to local government units, because the political and economic constraints and opportunities are likely to be different for different stages. While decentralization itself can be a political objective, but if designed properly, given the political scenario, it may be an effective instrument for growth and development in the developing countries. Finally, decentralization is an integrated structure of governance, with various governmental

units having spaces of their relative independence and cooperation, but it does not mean one unique structure. There can be large variations, both temporal and spatial, within a broad set up. Each country or each state within a country could have its own decentralization system of governance.

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Marine Fish Production in West Bengal : Application of a Bioeconomic Model

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Introduction

India is the seventh largest producer of fish in the world and perhaps second in inland fish production. Fisheries play an important role in the Indian economy. Importance of the fisheries sector to the Indian Economy is widely acknowledged. Its significance lies in three major areas. First, it is a source of animal protein for human consumption. The average human consumption of fish has been increasing gradually. In the year 2002-03, total demand for fish amounted to 11.68 lakh tonnes but production of fish was 11.20 lakh tonnes. As a result, there was a deficit amounting to 0.48 lakh tonnes. It is expected that that by 2020 the fish eating population would be around 650 million even if the rate of increase was only 50% of that in the last decade. Secondly, it is a source of employment. About 1.8 million fishermen draw their livelihood from fisheries, though they generally live on the verge of extreme poverty. Thirdly, it is a source of foreign exchange. Fish production increased to 6 million tonnes in 2001-02. Less than 10% of fish production is exported, bringing in foreign exchange earnings of Rs. 6370 crores in 2000-01 and Rs. 5800 crores in 2001-02. In dollar terms, export earnings from marine products exceeded over 1.2 billion dollars in 2001-02.

Broadly speaking, fishery resources of India are either marine or inland. The principal rivers and their canals, ponds, lakes, reservoirs comprise the inland fisheries. The rivers extend over about 17,000 miles and other subsidiary water channels comprise 70,000 miles. The marine resources comprise the two wide arms of Indian ocean and a large number of gulf and bays along the coast.

Despite the vast fishery resources, the production of fish in India is far from adequate. India produces 9% of total supply of fish in Asia. The importance of developing fishery resources lies in the fact that they can act as substitute for our land resources. However, we have not exploited our marine fisheries fully. The Indian Ocean Expedition has estimated that only 1% to 8% of fish available along the Eastern

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and Western coast is being caught at present. If modern methods of catching are employed, it is possible to increase the fish catch by 10 times. This indeed would make a tremendous impact on raising the nutritional standard of people and on raising the standard of living of our poverty-stricken fishermen, as also on enhancing our foreign exchange earnings.

From the very beginning of the plan period, planners are interested in the development of fisheries sector and the welfare of fishing community. However, for proper development and policy formulation some micro level study is needed. The studies on socio-economic condition of the fisherman are not large in number in India. These comprise Mathur (1978), Central Marine Fisheries Institute (CMFRI) (1981), Jhargram (1983), George and Rao (1986), Shukla (1986), Nair (1986), Paniokkar and Rao (1986), Sehra, Sathiadhas and Kaberi (1988), Samal and Meher (2003), Patel (2003) with reference to India and Pantalu (1967), Saha (1970), Central Marine Fisheries Research Institute (1985), Guha, Neogi, Das and Chakraborty (1994) and Dhar (2004, 2005) with reference to West Bengal. Das, Neogi and Guha (2000) studied sustainability of marine fishing in the Digha-Shankarpur coastal region through estimation of maximum sustainable yield based on a simple bio-economic model. Estimated results show that actual yields of all varieties are still below maximum sustainable yield except prawn, which has reached near optimal level. But the problem with their approach is that they have based their study on cross section primary data for the year 1992-93. Since MSY can be better judged by looking into the historical time series data, proper calculation of MSY need to be taken into account these figures. Further, their study is not recent as it was based on the data for 1992-93. Further, Das, Neogi and Guha (2000) have not calculated maximum economic yield (MEY) which also constitutes the subject matter of our study.

The present study has thus the following specific objectives:

1. To discuss the development process of coastal fisheries in West Bengal with mechanization,
2. To estimate the cost returns of mechanized fishing methods,
3. To draw some policy suggestions for the development and welfare of fishery community.

Our study is based on the data collected through primary survey taken from

Purba Midnapur district and also the relevant secondary information from different Government publications.

The plan of the present paper is as follows. In section 2 we present the methodology of the study. Section 3 describes calculation of data required for the analysis. Section 4 deals with results and discussions. Some concluding observations are made in section 5.

Relevant Concepts and Methodology

As a first step, we present the functional specification of the concepts of MSY, MEY in estimable form, which can be used for empirical analysis of the model.

By Maximum sustainable yield we indicate the level of yield that can be harvested without affecting the stock of biomass. The MSY concept refers to a steady state because 'sustained' means "sustained forever" under biological conditions change. Harvesting offsets natural growth so that if harvesting equals natural growth the biomass is stationary. This idea can be represented in terms of a formal model.

Biomass growth $\left(\frac{db}{dt} = \dot{b}\right)$ is the algebraic difference between natural

growth ($G(b)$) and the harvest (x): $\dot{b} = G(b) - x$

The steady state is defined as $\dot{b} = G(b) - x = 0$

i.e. $x = G(b)$

The steady state requires that the natural growth ($G(b)$) should be harvested (x), nor more nor less so that b is neither declining ($\dot{b} < 0$) nor growing ($\dot{b} > 0$).

The maximum sustainable yield is found as the solution to the problem

Max. x

(b)

S.T. $x = G(b)$

Here the choice is to be made from feasible stock levels of b . The solution is found by substituting the steady state constraints ($x = G(b)$) into the objective function. Maximum Sustainable Yield (MSY) can be represented by using Schaefer's surplus production model (1954). Maximum sustainable yield can be defined as the yield that can be harvested without affecting the stock level.

The function can be written in terms of catch and effort and is as follows-

$$Y = aE + bE^2 \dots\dots\dots (i)$$

Where, Y = total yield, E = effort.

The maximum sustainable yield can be obtained from equation (i) by taking partial derivative of Y w.r.t. E and setting it equal to zero as shown -

$$E_{MSY} = - \left(\frac{a}{2b} \right) \dots\dots\dots (ii)$$

The output at MSY can be obtained by substituting effort at MSY into equation (i).

$$Y_{MSY} = - \left(\frac{a^2}{4b} \right) \dots\dots\dots (iii)$$

Finally, we specify maximum economic yield (MEY). The maximum economic yield represents the level of output where marginal revenue of fishing becomes equal to marginal cost of fishing. Revenues (TR) are derived from the sale of harvested fish (x) at a fixed price (\bar{P}). Costs are incurred by employing fishing effort (a) at a fixed wage (\bar{W})

. In short, the problem is to

$$\begin{aligned} \text{Max. } \Pi &= TR - TC \\ &= \bar{P} x - \bar{W} a \dots\dots\dots (iv) \end{aligned}$$

Let B be a stock specific parameter.

The greater the B , the greater the $G(b)$ for any $b < \bar{b}$

$$G(b) = Bb(\bar{b} - b) \dots\dots\dots (v)$$

Where, \bar{b} = max. sustainable stock

Or,

min. sustainable stock is absence of fishing.

The relation (v) specifies a quadratic relation between the biomass and its growth –

$$G(b) = B (- b^2 + b \bar{b})$$

In a steady state, $x=G(b)$, implying

$$x = B (- b^2 + b \bar{b}) \dots\dots\dots (vi)$$

The technology of harvesting is generally discussed with the harvested product (x) depending in a positive way on both the stock (b) and the flow of effort expended in making the harvest (a).

$$x = F(a, b) \dots\dots\dots (vii)$$

Particular functional form representing fishing technology is taken to be,

$$x = Aab \dots\dots\dots(viii)$$

Output depends on multiplicative interaction of inputs. Technological efficiency is denoted by A . Bringing together the biology and the technology, the steady state is described by,

$$Aab = Bb(\bar{b} - b)$$

$$\text{Or, } a = B/A (\bar{b} - b) \dots\dots\dots (ix)$$

Since a and b are uniquely related to each others by equation (vi) in steady states, it is a choice of convenience to Max. Π W.r.t. either ‘ a ’ or ‘ b ’.

$$\begin{aligned} \text{Max. } \Pi &= TR - TC \\ &= \bar{P}x - \bar{W}a \end{aligned}$$

$$\text{S.T. } x = Bb(\bar{b} - b)$$

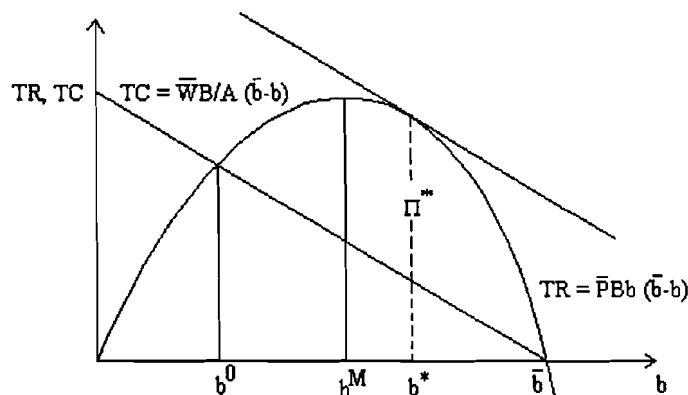
$$a = B/A (\bar{b} - b)$$

Profits are maximized S.T. output and effort, which depend upon the biomass alone in the steady state. After making substitutions, the problem is to

$$\text{Max. } \Pi = (TR - TC)$$

$$(b) = \bar{P}Bb(\bar{b} - b) - \bar{W}\frac{B}{A}(\bar{b} - b) \dots\dots\dots (x)$$

This is an unconstrained maximization problem that can be solved graphically.



Visual inspection reveals that Π -maximizing b is found where the slope of TR line equals to the slope of TC line. It is labelled b^* . b^* represents the maximum economic yield is the point where $MR = MC$.

To find out the actual value of b^* , let us rewrite the equation (x), which

can be presented as $\max. \Pi = \bar{P}B(-b^2 + b\bar{b}) - \bar{W}\frac{B}{A}(\bar{b} - b)$

The producer is to find the first derivative of profits (Π) with respect to fish stock (b). The value of this derivative is the slope of the profit function. The slope $\Pi(b)$ is zero at b^* . Proceeding,

$$\Pi' = \bar{p}B(-2b + \bar{b}) - \bar{W}\frac{B}{A}(0 - 1)$$

This can be set to zero and solving for $b = b^*$.

$$b^* = \frac{\bar{b}}{2} + \frac{1}{2} \frac{\bar{W}}{P} \frac{1}{A}$$

The maximum economic yield is seen once again to exceed

$$b^M = \frac{\bar{b}}{2} \text{ (Which supports MSY) owing to catching cost } (\bar{W} > 0)$$

Maximum economic effort required to achieve maximum economic yield can be calculated as follows:

At the open access point, fishing cost equals fishing revenue so that

$$E * \text{cost} = (aE + bE^2) * \text{price} \dots\dots\dots \text{(xi)}$$

Maximum Economic Effort required to achieve Maximum Economic Yield can be obtained by differentiating equation (iv) w.r.t. effort (E) and equating to zero. This gives us the effort level required to achieve maximum economic yield.

$$E_{MEY} = \frac{[(\frac{\text{cost}}{\text{price}} - a)]}{2b} \dots\dots\dots \text{(xii)}$$

Maximum economic yield is given by

$$MEY = (aE_{MEY} + bE_{MEY}^2) * \text{price} \dots\dots\dots \text{(xiii)}$$

The Data Base

The data on quantity, value of output, number of mechanized and non-mechanized boats, total number of boats are presented in table 1. Both mechanized and non-mechanized boats are added to get the total figure. The total fishing effort was estimated by assuming constant hours of actual fishing. The actual fishing hours were kept constant at 2.5 hours based on preliminary survey of fishermen and expert opinion. The data are collected through the primary survey from the different fish landing centers of Midnapore district of West Bengal. As revealed through the survey there exist broadly three types of technology for catching fishes, namely country boat, motorboat and trawler. Data from the representatives of three alternative types of technologies through a well-designed questionnaire. The actual fishing effort is calculated by applying the formulae :-

$$\begin{aligned} &\text{The actual fishing effort} = \\ &(\text{Actual fishing hour/ day}) * (\text{number of trips/ day}) * (\text{days allotted for fishing in a} \\ &\text{month}) * (\text{number of months for fishing in a year}) \dots\dots\dots \text{(xi)} \end{aligned}$$

Accordingly the data on actual fishing effort as given by equation (xi) will be different for the fisher men using three alternatives means of production. The actual fishing hours for three different types of boats are as follows:-

For trawler, the results becomes

$$2.5 \text{ hour/ day} * 3 \text{ trips} * 10 \text{ days} * 8 \text{ months} = 600 \text{ hours}$$

For non-mechanised boats

$$2.5 \text{ hour/ day} * 2 \text{ trips} * 20 \text{ days} * 7 \text{ months} = 700 \text{ hours}$$

For mechanized boats

$$2.5 \text{ hour/ day} * 2 \text{ trips} * 25 \text{ days} * 7 \text{ months} = 875 \text{ hours}$$

Average actual fishing effort (in hours) weighted by number of different types

$$\text{of boats} = \frac{(600 * 16) + (700 * 21) + (875 * 35)}{(16 + 21 + 35)}$$

$$= \frac{9600 + 14700 + 30625}{72}$$

$$\cong 763$$

Cost per kg. is calculated as the ratio of total operating cost per trip per boat to quantity harvested per trip per boat. In this way, the cost per kg. becomes Rs. 2.9, Rs. 1.5 & Rs. 16.1 for motor boat, country boat, and trawler respectively. In order to get cost per kg. / effort the costs calculated separately for three alternatives have been divided by the actual fishing effort spent by three alternatives, which is kept constant through out our analysis. Finally, the aggregate cost is calculated. In a similar fashion, price per trip is calculated as the ratio of revenue earned per trip to quantity harvested per trip for three alternatives. Aggregate price per kg. per effort is calculated in the same way as for aggregate cost. Finally, ratio of cost to price has been estimated. Lastly, actual fishing efforts have been calculated taking average of three efforts for three boats. In order to get total effort, number of boats available in a year as supplied by historical data is multiplied by the average fishing effort.

Table 1 Over-all View of Marine Sector in Midnapore District, 1994-95 to 2002-2003

(1) Year	(2) Total Yield (in M.T.) (Y)	(3) Value (in crores)	(4) No. of boats (mech.+non- mech.)	(5) Total effort (4)×763	Catch per unit effort (2)/(5) (CPUE)
1994-95	60506.098	47.67	3422	2610986	0.02317365
1995-96	92232.271	78.41	2957	2256191	0.04087963
1996-97	87431	77.55	2861	2182943	0.040051893
1997-98	68194.83	67.78	2925	2231775	0.03055632
1998-99	90460.83	90.46	2892	2206596	0.04099565
1999-00	91483.87	109.78	2551	1946413	0.04700126
2000-01	86172.604	108.58	2692	2053996	0.04195364
2001-02	93957.89	124.024	2921	2228723	0.04215772
2002-03	82541.76	115.5585	3236	2469068	0.03343033

The cost aspects of fishing activity are measured by cost of fishing per kg. per unit effort. For this purpose, only variable components are considered. This is consistent with the assumptions made in Hannesson (1993) who has mentioned that it will be appropriate to consider the short term cost only. The components of variable cost are ice, diesel, fuel used, commission, labour payments, costing rituals. These data are collected through the questionnaire. It is revealed from the survey that cost component is different for three different types of boats. The operating costs for three alternatives are Rs. 47770.67 for trawler Rs. 914.45 for motor boat, and Rs. 221.60 for country boat. The quantities harvested per trip are 125 kg. , 61 kg., 118 kg. for motor boat, country boat and trawler respectively.

Table 3 Cost, Returns and Efforts for Trawler, Motor Boat and Country Boat

(I) Capital Cost	Trawler (in Rs.)	Motor Boat (MB) (in Rs.)	Country Boat (CB) (in Rs.)	Average for 3 types of boats
1. Cost of Boat	12,000,0 0	2,000,00	50,000	48,3333.33
2. Cost of engine	450,000	4,000,00	-	28,3333.33
3. Cost of net	50,000	1,000,00	70,000	73333.33
Total Cost	17,000,0 0	7,000,00	120,000	84,0000
(II) Fixed cost per year				
4. Depreciation @ 10% of boat	120,000	20,000	5,000	483333.33
5. Depreciation @ 10% of engine	45,000	40,000	-	28333.33
6. Depreciation @ 30% of net	5,000	10,000	7,000	7333.33
7. Interest @ 12% of capital cost	204,000	84,000	144,00	100800
8. Repairs & maintenance	5,000,0 0	57,000	42,000	199666.66
Total fixed cost	874,000	211,000	68400	384466.66
(III) Operating cost per trip				
9. Ice @ Rs.50 / Block	700	150	-	283.33
10. Disel @ Rs.4800/ Barrel (7 barrel/ trip for trawler, 24ltr. for	34,000	430	23	11484.33

MB, ltr. for CB)				
11. Other fuel (Wood/ gas)	554	18	7	193
12. Commi-ssion	2,000	-	-	-
13. Labour (Driver)	7,300+3 ,200	315	190	3668.33
14. Cost in rituals	16.67	1.45	1.60	6.57
(IV) Total operating cost/ trip	47770.6 7	914.45	221.60	16236.57
(V) Amount of fish harvested/ Trip	1188 Kg.	125 Kg.	61 Kg.	458 Kg.
(VI) Actual fishing effort	600	875	700	763
(VII) Total operating cost/ Kg./ Trip =				3.0385
$\frac{\text{Price/Kg}}{\text{Total Actual fishing effort}} = \frac{3.93 + 2.616 + 16.25}{7.5} = 3.0385$				
(VIII) Total operating cost/ Kg./ per unit effort =				2.733
$\frac{\text{Total operating cost/ Trip/ Boat}}{\text{Total Actual Fishing Effort}} = \frac{2.9 + 1.5 + 16.1}{2.5 * 3} = 2.733$				
(IX) Total revenue/ Trip	772000	42950	8300	274416.66

Results and Discussions :

The catch effort relationship is estimated by fitting a regression equation with CPUE as dependent variable and effort as independent variable. The results of estimation are presented in Table 3.

Table 3 Estimated values of E_{MSY} , E_{MEY} , and Y_{MSY} , Y_{MEY}

Estimated Parameters		Calculated Value
1.	a	0.33259
2.	b	0.80930×10^{-7}
3.	E_{MSY}	20548004.4
4.	E_{MEY}	3502822.2
5.	Y_{MSY} (in M.T.)	3417030.4
6.	Y_{MEY} (in M.T.)	3956269.8

The results of estimation indicate $Y_{MSY} < Y_{MEY}$ and $E_{MEY} < E_{MSY}$. These are consistent with theoretical concepts. Maximum economic yield is also not desirable from the point of view of sustainability because maximum economic yield is greater than maximum sustainable yield and hence if the fishermen are allowed to go by profit motive it will violate the condition of sustainability. Definitely this requires some regulatory mechanism or reduction in fishing effort.

However, reduction in effort through regulatory mechanism means unemployment of fishermen,

specially when there is no alternative employment outside the fishing sector. In view of social and equity considerations people need to be accommodated within the fishing sector although their employment within that sector may cause harm to sustainability. This in turn requires creation of alternative employment opportunities to compensate

the unemployed fishing people. Further, diversification of skills could be done to make them more suitable for outside non-fishing sector's employment.

Conclusions and Policy Implication

Most of the fishing management can be viewed as a means of achieving certain social objectives through the use of appropriate regulatory investment to avoid overfishing. Such instruments provide an institutional and regulatory framework within which the desired level of fishing effort can be obtained. In this case, a biological reference point is first selected in fishery management as a measurement of optimal level. This measurement aims at stabilizing the stock at the biomass, which provides the MSY, which can be harvested under average environmental conditions. From this viewpoint, efforts level beyond MSY will cause a reduction in stock population and thereby constitute biological over-fishing. An economic reference point can be selected as an objective of fishery management, which will take into account economic factors such as value of output and cost of production.

The results of our study indicate that the optimum economic yield, though targeted, cannot be maintained unless there are some regulatory measures. This requires creation of alternative employment opportunity outside the fishery sector. This in turn places greater emphasis on poverty alleviation programmes and decentralized planning to take into account the remedial measure for the welfare of fishermen and the fishery sector. Alternative methods of compensating the people to relieve them from the impact of regulation would mean very high administrative and transaction costs which the developing countries generally can not support.

Developed countries have been trying with several alternatives for managing the fishing resources. In general, these alternatives are classified into two categories,

namely limitations on fishing effort and catch limitations. Important measures are licensing, limited entry, taxes, quotas etc.

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Research Methodology and Application of Computer

*Chiranjib Neogi**

Introduction

The word “science” comes from a Latin word “*scientia*”, which means “Knowledge.” Research is one kind of academic activity for the persuasion of better understanding of the observed phenomena of our daily life. Scientific and deeper analysis of the observed phenomena will provide the nature and causes of any type of happenings in the physical world and in society which otherwise regarded as obvious. Research may stem from pure intellectual curiosity. The inquisitiveness to understand inner causes of the apparently obvious happenings is the basic motivation of any researcher. Research should always be for the betterment of mankind and the knowledge is empowered by the application of scientific and logical arguments. It is, however, not always true that all the ideas of research originated from observations, rather they are some form of abstraction communicated through some notations by the scientist that refer to common properties among phenomena. We call them *concepts*. Most of the researches are cumulative effort of the past research activities to understand any new phenomenon. Research does not always lead to any discovery or invention but any research activity is equally important when the outcome of the researches gives clue or open up some genuinely new avenues for further researches. Proposition is a scientific term from which the causes of

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observed or observable events are logically deduced. Proposition of this sort are called *hypothesis* when their observable prediction have not yet been tested. Scientific explanation describes how facts and predictions logically follow from empirical generalization or law.

This academic pursuit is an integral part of human activity to understand his surroundings. The enquiry into the causes of different human behaviours is necessary for the development of society. Analysis of human behaviour in society falls in the purview of social science and research in economics is related to the understanding of different economic activities of people in a society. Any type of research has the following steps:

1. Consolidation of concepts or ideas
2. Formulation of hypothesis
3. Identification of methods of studying or getting the solution of the problem.
4. Building logical blocks in right direction for getting the solution.
5. Synthesis of various logical arguments.
6. Interpretation of findings.

In general, research emphasis on the development of generalization of any specific behaviour observed in society or nature. To explain empirical generalization or law, science introduces theories. Theories explain laws deductively in the same manner that laws explain facts. By following deductive logic one can move from proposition to hypothesis and laws to the prediction and explanation of observable events. The confirmation of a particular prediction, however, is not enough to confirm a theory and the basic idea of a theory is that it can be challenged and researchers' work is to

go beyond that theory and establish the work as superior to the earlier theory or to refute the existing theory. One theory is judged superior to other competing theories if (i) it involves the fewest number of statements and assumptions, (ii) it explains the broadest range of phenomena, and (iii) its prediction is more accurate. Now, in physical science the occurrence of any event is more regular than that of in social or behavioural science. Thus the formulation of any law regarding the genesis of the occurrence of the event in physical science is easier (not in intellectual sense) compared to that of social science due to stronger relationship among the variables in physical science than in social science. In physical science the relationships in most of the cases are time independent while in social science the relationship of the variables are basically time dependent and there are inter temporal variation of the relationships among the social variables. As a result the development of a generalization of different laws in behavioural science may not lead to any specific theory. However, analysis of various economic and social activities is pertinent to predict the behaviour of human activity in society more correctly in future and that help to develop any policy for betterment of society. There is nothing mechanical or programmed about scientific research. The development of theory, the formulation of hypothesis, and the application of methods to carry out tests all need a great deal of imagination and insight about the subject of research and reasoning of mind. Social scientists have created many different methods which are guided by the various scientific enquiries to resolve some defined problems.

To sum up we can characterise research as follows:

1. Research is directed towards the solution of the problem that is sought for.
2. Research is to find out relationship among different chosen variable according to the conjecture in mind.
3. Research emphasis a generalization of human activity or occurrences of some events by some definite laws.
4. Research is based upon some past and present experience or observations.
5. Research requires the aptitude of analyzing the problem and testing the validity of any argument to justify the opinion.
6. Research should be carefully recorded and reported for future investigation.

The paper is organized as follows. In the next section some terminologies in research is explained. Different types of researches are discussed in section three. In section four we will discuss about the methods of conducting applied researches. Some methodological issue for the solution of some specific empirical problem will be discussed in section six. Availability of computer software for the solution of some specific econometric problems is discussed in section seven. In the final section some future scope of researches in economics are discussed.

2. Terminologies in Research

During the course of our research work we are facing different concepts and terminologies which are used frequently in analysis. Science can be defined as a process and knowledge is the output of science. But the output of science could never be a finished product, and constantly

remolded for the process of next investigation of some newer facts. The sequence of steps followed in one scientific investigation is seldom repeated in another work and the end of one investigation is treated as the beginning of another investigation. Thus science is a continuous process of investigation of facts and a theory developed in a research work at any point of time could be disproved by different logical arguments in the future using the results of the that research.

It is argued that science must start with facts and ends with facts, no matter what theoretical structure it builds in between. In other words, at some point scientists observe facts; next they try to describe and explain what they see; then they make prediction on the basis of their theories, which they check against their observations (i.e., facts) again.

Figure1

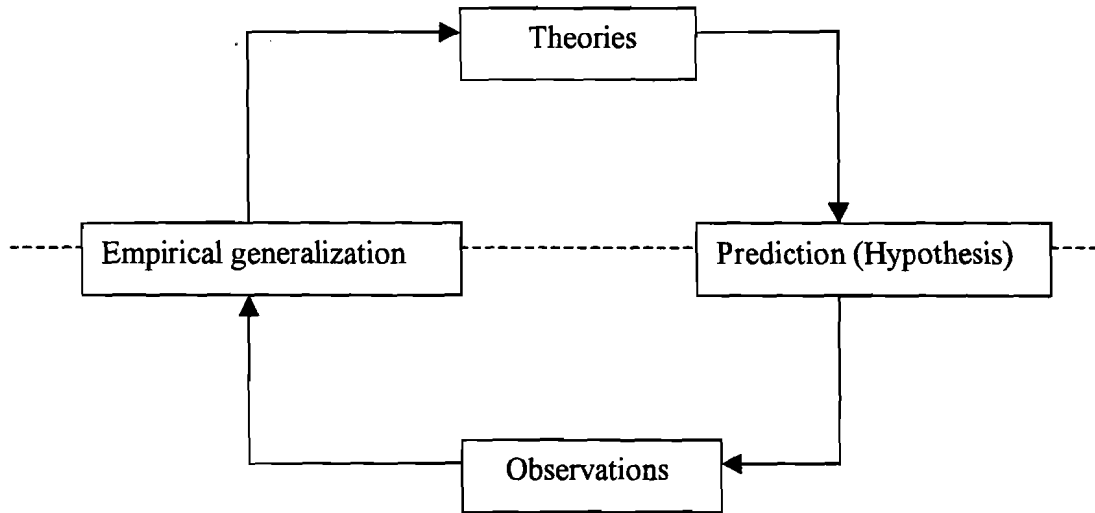


Figure-1 describes the chain of events in scientific researches. We can start from any arbitrary point of the chain and at some point theories generate predictions or hypothesis, hypotheses are checked against observations, the observations produce generalization and generalization either support or contradict theories or suggest modification of theories. The horizontal broken line in the diagram bisecting empirical generalization and predictions separates the world of theory from the world of research. The development of theory is the goal of science. Research supports this goal through systematic observation generates the facts from which theories are inferred and tested. The important point to remember is that science is process involving the continuous interaction of theory and research. The three key principles underlying this process are (i) empiricism, (ii) Objectivity and (iii) control.

Empiricism

The foremost characteristic of scientific enquiry is that it is based on empiricism. Empiricism is a way of knowing or understanding the world through some information or observations which are experienced by our senses for the purpose of research. We can observe the happening of any events directly through our senses or indirectly through some instruments designed to observe or to collect the information. Thus the evidence to prove or disprove any scientific hypothesis should be observable, directly or indirectly, through some tangible manifestation. In some subjects, for example in theology or in philosophy, theories are based on some nonempirical or intuitive logical arguments which are not considered as scientific evidence. Scientist can not accept the generalization of a fact (observable or unobservable) only because an authority or expert says it is true without any observable evidence. However, in social sciences in particular all the phenomena can not be observed or measurable directly but some manifestations of the actual measures can always possible to verify the theoretical arguments. Further discussion on the necessity of empiricism will be done in next section.

Objectivity

We often find the use of two very common words “Objective judgment” and “Subjective judgment”. These two terms, however are related. For example, when one examines a paper he or she judges the paper subjectively on the basis of his conjecture, ideas, emotions etc. But when the person gives score against his judgment we can define it as objective judgment. But this objectivity in true sense, i.e., the judgment which is free from any bias, is rarely possible. Fortunately, a limited and far more useful meaning of the term “Objective” could be assigned. It means that there will be a broad agreement among the scientists about the observation of the event and about the measure of the events (if the event is measurable/ quantifiable). The technical term of this is called *intersubjective testability*.

Control

The information or data gathered for the objective verification of a hypothesis or theory is supposed to be free from any bias of measurement. Biases may come from any source during the process of gathering information. Research design of any empirical analysis may not be free from biasness in choosing or selection of method of collecting information. There is a basic difference in collecting information or data between pure science and social science. In pure science the observations are made on the characteristics of events or matters which are less probabilistic in nature and free from bias. Information collected from scientific controlled experiments generally suffers from measurement bias. On the other hand, in the social science researches the subject of research is human characters who supply the purpose and meaning of their actions which are purely subjective and biased according to one's perception of the action. For this reason social scientists should aim to understand human behaviour from the subject's frame of reference only. An attempt to complete generalization of external causes of particular human behaviour may be erroneous even when the information collection is unbiased. Some social scientists deny the possibility and eliminating different forms of bias. There are social researchers who challenge the appropriateness of adopting the so-called **positivist** or **natural science** model.

Proposition

The fundamental elements of logical analysis consist of proposition and argument. A proposition is an expression of a judgment about some term or terms which is analogous to concept in pure science. In the grammatical sense, it is a declarative sentence. Proposition, by definition is either true or false. Researcher should establish the hypothesis by logical application of propositions and test what is true or false according to the proposition.

Argument

Argument is a way of giving explicit reasoning to make conclusion from evidences. Once an act of reasoning has taken place, the reasoning can be transformed into group of verbal or written statements that constitute an argument. The statement that is claimed to follow from the others in an argument is referred to as the **conclusion**.

Deductive and inductive logic

The two major types of reasoning in establishing any hypothesis are deduction and induction. The primary distinction between deduction and induction rests with the strength or certainty of the claim that is made about the conclusion on the basis of the premises. When one use deductive reasoning or present deductive arguments the person is claiming that the conclusion drawn on the basis of reasoning is absolutely true if all the premises are true. On the other hand if a person argues inductively, the conclusion made on the basis of arguments is probably but not necessarily true if all the premises are true.

Deductive reasoning is either valid or invalid and the conclusion on the basis of deductive argument cannot go beyond the content of the premises. Induction, on the other hand, involves the drawing of conclusion that exceeds the information contained in the premises.

Testing of hypothesis

The underlying logic of testing hypothesis in science is sometime called the **hypothetico-deductive method**. The first part of the term signifies that the scientific explanations tested are hypothetical in the sense that they are assumed to be true. Once the assumption is made about an explanation, then its observable consequences are deduced for testing - hence, the second part of the term. Forming a hypothesis and deducing consequences from the hypothesis are actually the first two of four steps in the hypothetico-deductive method. Step three involves checking by observation to see whether the deduced consequences are true and step

four entails making inference about the hypothesis on the basis of one's observations. One can increase the credibility of a hypothesis by repeated and varies testing, especially when such testing eliminate alternative hypotheses. If the evidence does not support a hypothesis, then one may logically conclude that the hypothesis is false.

3. Type of Research

Researches can be classified differently depending the on the nature and purpose of research activity. From now onward we will talk about the researches in social sciences, economics in particular. Researches in social science can be broadly classified in two categories (i) Theoretical research and (ii) empirical research.

Theoretical research

The type of research depends on the way of investigation of the specific problem that crop up in the mind of a researcher. In a theoretical research researcher may try to develop some new ideas in understanding the reality. The second group of researchers may try to develop or challenge some existing theories. All such theoretical researches are generally based on some theoretical models. Those models are more mathematical in nature and researchers try to understand the relationship among the variables using mathematical connotations. There are some well defined propositions which can be expressed in mathematical arguments and notations. These propositions are the representation of some ideas those are subjects to prove for the establishment of some hypothesis. The development of logical arguments is mostly based on mathematical reasoning. The development of existing theory may help to understand the problem in a different frame of mind and with newer concepts. Since theory is based on some assumptions, there is always scope for altering or formulating new set of assumptions and thereby adding new dimensions to the existing theory. These are very useful type of researches when some theories developed in the advanced

nations on the basis of their socio-economic environment are reconsidered and developed for a less advanced country according to that country's perspective.

Applied Research

Applied research is either the application of some existing theories with the real life data or for the verification of those models in the chosen field or to test the validity of some new hypothesis in actual operational field that originated from the conjecture of mind of the researcher. For example Lewis's growth model for labour surplus economies assumes that real wage rate for labour shall remain constant till the surplus labour is completely wiped out. It may be of interest to a researcher to investigate if it is valid for every labour surplus economy. Now if such model does not hold good in a similar country one may be interested to unearth the lacuna of the model and what modification is required to apply the model in this case. On the other hand, researcher may be interested to apply an existing model in a different situation with few modifications of the underlying assumptions of the model. The applied researches can be classified into different categories according to their objective of study (i) Ex-post facto research; (ii) Experimental research; (iii) Field research; (iv) Survey research; (v) Evaluation research.

Ex-post facto research

In many occasion researcher try to investigate the relation among the variables from the past observations. In such a situation the researchers have no direct control on the variables since their manifestation has already occurred. However, if the variables are properly identified or the relation between the variables can be appropriately stated the researcher may obtain valuable results regarding the strength of the relationship. The significance of the effect of independent variables can be measured by proper statistical or econometric techniques. In this type of research the independent variables could not be manipulated or controlled. The effect of these independent variables either independently or wholly produced impact on the dependent variable. The way to

get the strength and weakness of the effect of those independent variables on the dependent variable is to measure the impact of the independent variables in explaining the variability of the dependent variable. Now from establishing the relationship one can have idea of two things (i) how the variables are associated and (ii) the predictive values of the dependent variables for different set of values of independent variables. One may be interested in studying the cause and effect relation between variables which may help understanding the simultaneity of the variables. There are some other purposes of ex-post facto researches. Researchers may be interested to analyse the facts those are already observed in the society or economy. On the basis of their findings based on the past data it may be possible to prescribe some policies for the improvement of the society or economy. However there are some weaknesses of this type of research since there is no control over the variables to be studied. Another difficulty is that in many occasions it is difficult to disentangle the effect of independent variables on the dependent variables. In such cases the variables should be freed from the multicollinearity before any econometric analysis with those variables. But in reality it would be very difficult to work with such type of variables since any transformation to eradicate the multicollinearity may either reduce the strength of the analysis or give spurious results.

However, this type of research is widely accepted due to many reasons. Since in the social science research the information or the data on social behaviour can not be taken form experimental investigation (recently, in some studies information on social behaviour are collected from the experiment on human behaviour under controlled environment) most of the research works are based on the ex-post facto information. But the type of research should always depend on the nature and scope of the problem to be studied.

Experimental Research

As we know that experimental research means that there should be some control over the elements of observations. For example, we can take the readings of pressure of a specific volume of gas for some controlled temperature and the relation between temperature and pressure can be established. But in social science, particularly when the element of observation is human behaviour it is hardly possible to conduct experimental research. However, some form of experiment can be possible in understanding the pattern of behavioural changes in social science research. It is often found that some projects relating to the upliftment of some section or group of people are implemented. In such a programme we can think of observing the changes in the pattern of economic behaviour of that particular section of people (control group) over time. This programme can be considered as a form of experiment in social science. But in true sense the laboratory experiment as we find in pure science is not possible in social science and only some weak control can be imposed in order to find out the causal relationship among variables.

Field investigation Research

Field investigation is one kind of experimental research in social science where different kinds of characteristics of human behaviour are observed over a time span. This type of research is very popular in sociological study. Field experiments have the advantage of investigating more fruitfully the dynamics of inter-relationships of small group of variables. But one basic problem of this type of study is that a generalization from the results obtained from the study is difficult and generally this type of study is regarded as case study. Also the sample taken for such study is not random in statistical sense and thus the result may be biased in nature if one tries to generalize the result. But such type of study is very useful since the observations of behaviour are taken from close contact of the people and the data collected are more dependable to establish any hypothesis.

Survey Research

This type of research has become more popular these days as a scientific method for studying relevant impact and inter-relationship among social and economic variables. The popularity of this type of research is gaining due to the development of survey methods and sampling techniques, especially by the statisticians. The information for the analysis of the variables defined for the model is collected from surveying the unit of analysis. This unit of analysis could be any economic agent like person, household, production unit etc. depending on the nature of study. A set Information is collected by interviewing the unit of survey through questionnaires developed by the researcher according to the purpose and scope of the study. Questionnaires should be made in such a way that it can fetch the maximum information related to the purpose of study and caution should be taken to avoid spurious and multiple answer of any question. There are basically two types of interviews, one is called unstructured interviews and the other is called structured interviews. In the unstructured interviews the surveyor will get a general information about the unit of survey and many to not be very specific about the answers of the respondent. This type of survey is basically a journalistic approach than a serious research oriented approach. On the other hand, the structured interview is very specific to the problem of study and the answers given by the respondent are more accurate and objective. The main idea of such interviews is that the researcher can objectively define the variables from the answers and if possible can be quantified even if the answers are not in numeric. The researchers may use data taken from some secondary source where the data are collected from primary survey. The analysis of survey data by analyst other than the primary investigator who collected the data is called secondary analysis. One advantage of this type of research is that one can increase the sample size for the analysis by adding the information from various surveys if the sample frames are

same for all the surveys. There are steps to be followed for conducting a successful survey.

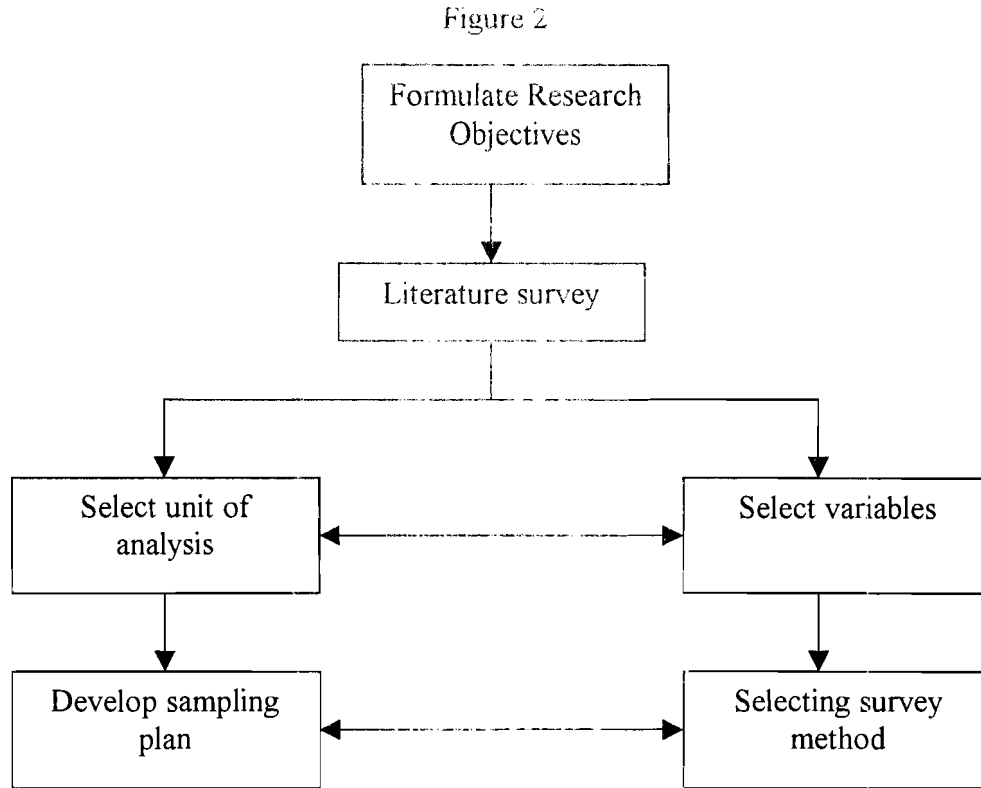


Figure 2 describes some steps to be followed before going for survey. All the steps are very important from the point of view of a researcher since the ultimate result of the analysis depends on the selection at each step. For example, if the construction of sampling frame of the survey is not followed the proper statistical rules the estimates obtained from the survey may be biased and do not represent the population. Before going to final survey a

pilot survey may be necessary to get an idea of the nature of answers from the respondent and the feasibility of the survey. During the time of survey continuous monitoring of the surveyor and the checking of the schedules are needed for getting accurate information from the respondents. The main difficulty of this type of survey research is that it is time consuming as well as expensive method unless it is a very small survey. But a very small survey does not give good results and is difficult to generalize the result obtained from the survey.

Evaluation Research

This type of research is to evaluate any projects undertaken by any government or non-government organizations mainly for the development of the socio-economic condition of the people. In very recent years there is vast project on the construction of roads is taken by the Government of India (Golden quadrilateral). In some parts of the country the projects has been completed and researcher are now interested to know the effect of this infrastructure development on the socio-economic conditions of the neighbouring people. This type of research is useful in evaluating a developmental project of a country or in any locality.

4. Research Design

Research is some time seen as an activity for the purpose of building some relationship or to asses to strength of associations among the variables in terms of some models developed for that purpose. However, not all research is conducted for the immediate purpose of testing the relationships. Research is undertaken for three broad purposes: (1) to explore a phenomenon to gain insight and understanding about it in order to formulate

a more precise research problem for further study; (2) to describe a section of population completely or accurately as possible to understand the behavioural pattern of the group; and (3) to examine and formally to test the relationships among the variables. Research design depends on the purpose of the research stated above. There are various types of studies like exploratory studies, descriptive studies, explanatory studies etc. Exploratory and descriptive type of studies deals with the problem of understanding of some broad phenomena when the very little is known about the subject of the study. Sociological and anthropological researches are in most cases fall in this category of research. When the researcher formally seek the answer to the problem and hypothesis or test the relationship among the variables we call it explanatory study.

Stages of Social Research

In all researches, particularly in empirical researches, there are some steps to be followed. But the steps are neither very rigid nor mandatory. The stages of researches depend on the type of researches and researches may arrange the stages according to their research problem.

Stage 1: Formulation of research problem

Research begins with a question or problem. The question or questions may arise from some common ideas or from some observations but that should be clearly delineated and must be contextual to any discipline. To make a question or problem more specific researcher should apply the logic for separating out the problem which may be entangled with various related problems. To make the problem narrower and sharper researches must have to do a thorough review of the current literature on the

subject. Literature review is also necessary to get the guideline to solve the problem and the proper variables required for the study. Also, one may get the idea of methods and process from the earlier research works addressing the related problem.

Stage 2: Preparation of Research design

Once the problem has been clearly formulated the researcher must develop an overall plan for framework for investigation. Research design includes all the steps from collection of information to the report writings. If there is any flaw in research design the researcher may not finish the research study in time. Selecting the units of observation and the variables to be studied is also the part of preparation of research design. If the variables for the investigation are not properly selected for any survey the researcher may not get the required data for testing the hypothesis and it may not always possible to collect the information once the survey has been conducted. Within the context of selecting an overall strategy, decision also must be made on the unit of analysis, on which variables to observe and control and how they should be measured and on how best to analyze the data.

Stage 3: Measurement

In any empirical researches the measurement of observable events and selection of the type of variable is important. There are basically two types of measures (a) Ordinal measure and (b) Cardinal measure. In any survey the nature of data collected depends on the character of the response from the unit or respondent. Answers to some questions may not be possible

to give in quantitative term and in such cases researches have to rely on the ordinal measure of the variables or the qualitative values of the variables.

Stage 4: Sampling

In any survey research sampling of the unit of analysis is the most important part of the total study. In most of the empirical studies in social science the objective is to generalize the findings that based on a few number of observations. There are many reasons for a researcher to test his or her hypothesis on the basis of small number of observations like, shortage of time and money. But the basic idea of sampling is that these few observations or *sample* should be an ideal representation of the whole observation or *population* otherwise the generalization of the finding will not be possible. In the researches of pure science the sample need not mean few observations because the character of any sample of material used in experiments is same for all other sample of the same material.

Before going to take the sample of any population a sampling frame should be needed for delineating the population. This is generally done by method of listing of all the units of observations. For example, if a researcher tries to characterize the pattern of consumption of particular goods in a city the researcher may list the population from the telephone directory of that city and put number to each person. Similarly, for a house hold survey of any particular area the researcher may rely on the voter list of that area which is available with the local municipality. Thus the sampling frame is not a sample but the operational definition of the population that provide the basis for sampling.

There are two broad category of sampling (1) Probability sampling and (2) Non-probability sampling. **Simple random sampling** is the most widely used sampling technique of any survey in social science. The defining property of a simple random sampling is that every possible combination of cases has an equal chance of being included in the sample. The selection of sample from the list of population is random it is based on the random number generated for the purpose. As we know from the elementary statistics that sample estimates of population parameters are called statistics. Now, if we think of a particular statistics obtained from different sample of same size for a given population then the resulting distribution of the statistics is called **sampling distribution**. From this sampling distribution one can judge the significance of any sample statistic. The amount that a given sample statistic deviate from the population parameters it estimates is known as **sampling error**. The statistical measure of the average of such error for the entire sampling distribution is called the **standard error**. Theoretical knowledge about the sampling distribution is utilized to attach a probability, or level of confidence, to a calculated range within which the population characteristic should fall. This range, called a **confidence interval**, is established around the sample statistic.

The other very common sampling technique is **stratified random sampling**. In stratified random sampling, the population is first subdivided into two or more mutually exclusive segments, called **strata**, based on categories of one or a combination of related variables. Simple random samples then are drawn from each stratum, and these sub-samples are joined

to form the complete, stratified sample. **Clustered sampling** and **systematic sampling** are other two types of sampling techniques used in survey.

Stage 5: Data Collection

Collection of data and the sources of data depend purely on the nature of the research study. There are primarily two sources of data: (i) **primary source** and (ii) **secondary source**. When the data are collected from the field survey using questionnaire or any other techniques they are primary data. Some time researchers collect data from any published documents that are already collected and tabulated by some individual or any organization (like, National sample Survey Organization, India or Penn World table of University of Pennsylvania, USA). Collection of primary data requires a good knowledge about the objective of study and about the variables required for the analysis. Checking of raw data collected from the survey is needed for reduction of absurd and abnormal figures. Similarly when data are collected from any secondary sources care should be taken about the transcription error during the copying of data in papers or in computer. But now a day data on different topics are available in Internet and in soft copy. So the chances of committing error during copying are reduced in a great deal.

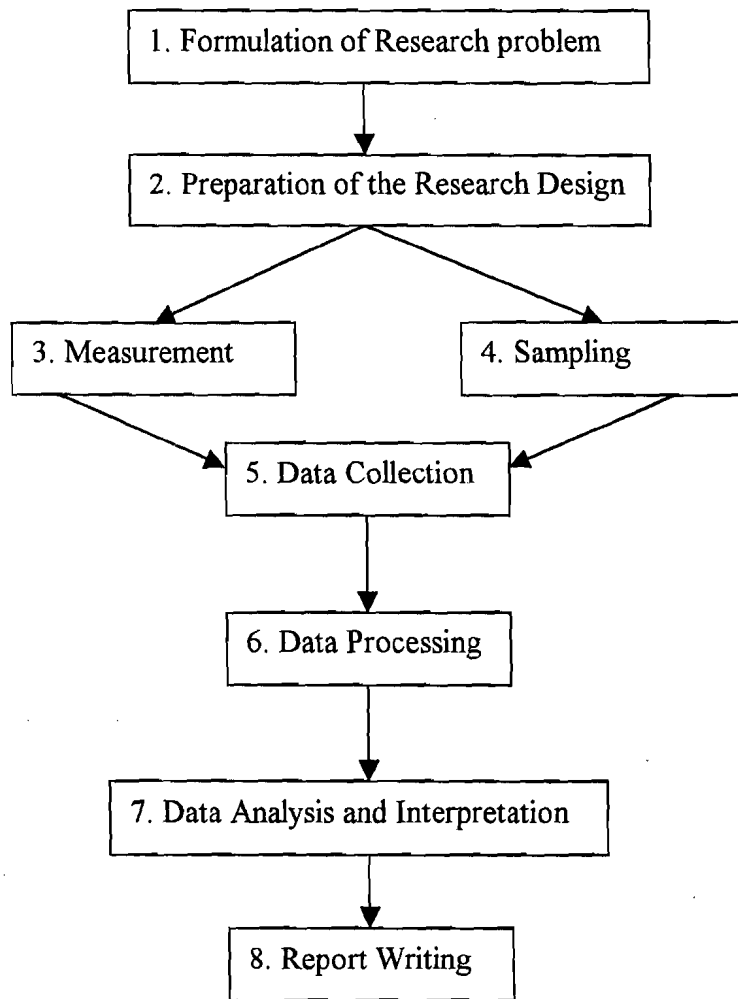


Figure 3: The Stages of Social Research

Stage 6: Data analysis

After collecting data either through experiment or through field survey or from any secondary sources the researcher should pay attention how these data can be fully utilized for the analysis of the hypothesis. The model of analysis should be such that there will be little or no scope of information loss. Data analysis is a vast area and what will be the most suitable method of analysis of data depends on the nature of study. In any empirical analysis there are two basic approaches of analysis: (i) **Parametric** and (ii) **Non parametric**. Some time researchers do not go into any modeling for the analysis but depend on some descriptive analysis using bivariate or multivariate tables. One very common parametric analysis is the regression method to analyze the effect of one or more variables for the variation of a particular variable, which is supposed to depend on those variables. There are many such parametric methods in economics like, frontier production function analysis, time series analysis etc. Association tests of categorical variables and the data envelopment analysis are some common application of non-parametric methods in economics. There is vast scope of discussion on the data analysis. However, for our purpose we will restrict ourselves on some elementary ideas on the data analysis.

Stage 7: Report Writing

The final stage of a research is to report the analysis in a well-organized manner. At the beginning of the report the motivation of the paper or the thesis should be clearly written. Then one should write on the review of literature from which the researcher gets the impetus and the issue of the research comes up. Then the proposition and the hypothesis of the research should be logically built and the topic of analysis should be focused clearly. Models and method of analysis will come next followed by the description of collection and sources of data for the analysis. Reporting on the analysis of data should be clearly done along with the tables of result in favour of the arguments to establish the hypothesis is an important part of any thesis writing. The concluding observations on the results

coming out from the analysis are to be summarized in the final section. This structure can be followed for each chapter of any thesis or for preparing a paper for any scientific journal.

5. Specific Research Problem and Corresponding Methodology

So far we have discussed about the structure of the research approaches in social science. Selection of suitable model for any specific research problem and the method of analysis of data are major area of any empirical research. In this section we introduce a research problem which is a recent development of standard micro economic theory of production. The following issue of research is a typical example of ex-post facto research and empirical research where knowledge of computer packages is needed for the solution of the problem. Also, this problem can be solved by both parametric and non parametric approaches.

Concept of Efficiency

In standard microeconomic analysis, producers are assumed to behave optimally and the production relations are represented by the production function, cost function and profit function. Isocost and isoquant lines are frequently used to describe the production behaviour of an individual firm. In the analysis of efficiency, however, it is not assumed that producers always behave optimally and hence they can operate inefficiently. The orthodox school of microeconomics, however, does not admit such inefficiency. Theoretically, a competitive market in equilibrium can not allow inefficiency of this type. In measuring efficiency a benchmark production function has to be constructed to judge the performance of production units. This efficient production function is called as frontier. The method of comparing the observed performance of production unit with the postulated standard of perfect efficiency is the basic problem of measuring efficiency. This is primarily a two stage problem. First, an ideal production frontier should be estimated with the observed production information. Then in the second

stage efficiency of production units are measured correctly from the departure of the observed to potential values.

The literature on production and cost frontier and calculation of efficiency begins with Farrell's seminal work "The Measurement of Productive Efficiency" published in the Journal of Royal Statistical Society in 1957. The empirical counterpart of the idea of efficiency mooted by Farrell, fall into an econometric approach in which the efficiency is identified with disturbance in production or cost function. The distributed disturbance terms in the production function analysis is the basic consideration in measuring frontier production function.

Let us consider for simplicity that the production unit produces single output using two inputs and the production process follows constant return to scale. It is also assumed that the efficient production function is known.

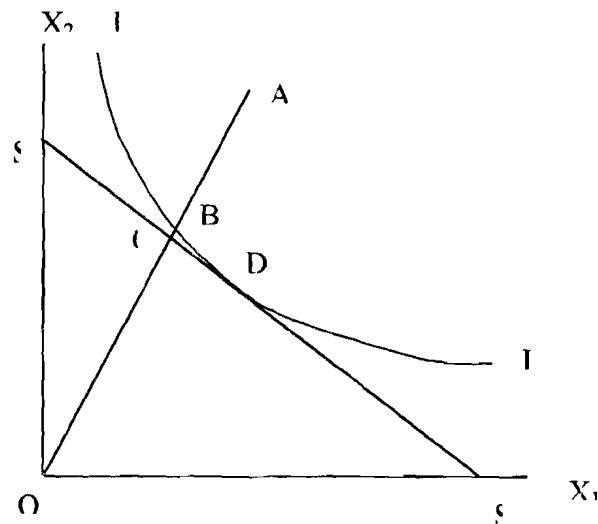


Figure -4

The curve II in Figure-4 represents the unit isoquant of an efficient producer. Let A be a point which represents the combination of two inputs X_1 and X_2 per unit of output. If we draw a line from the origin to point A it

will cut the efficient isoquant at point B. It means that if the inputs can be reduced equiproportionately the efficient point will be at B, which must lie on the efficient isoquant II. Thus the point B represents the combination of inputs in the same proportion as in point 'A' but with a lesser amount of both inputs to produce a unit level of output. OB/OA fraction of inputs is now needed to produce the same level of output or in other words OA/OB times of output can be produced from the same level of input. The ratio OB/OA can be interpreted as technical efficiency of any production unit. Thus if the production unit is technically efficient the value will be 1 and any value below 1 ($OB < OA$) indicates technically inefficient unit.

In the above definition of efficiency the role of input price in measuring efficiency is not considered. Now if one has to assess the efficient allocation of inputs in terms of input price then the price line or isocost line SS in Figure-4 should be introduced to measure efficiency. The point C on the line SS represents the minimum cost required given the price of inputs for the use of same proportion of inputs as is used at point B. Thus the ratio OC/OB gives the measure of price efficiency or allocative efficiency. Now if the firm can change the proportion of inputs to the point D then the firm can attain both the minimum cost of input as well as optimum efficiency from the input used. However, it may not be always possible to change the proportion of inputs keeping the same level of technical efficiency. If the production unit is perfectly efficient, both technically and in respect of price the ratio OC/OA will be the measure of overall efficiency.

If the objective of a producer is to minimize the wastage of input use the performance of the production unit can be measured in terms of technical efficiency/inefficiency. On the other hand, if the objective of a production unit is to minimize cost for a given level of output or maximization of profit by allocating inputs and outputs then the performance of production unit can be defined in terms of economic efficiency.

Before going into the detail of the econometric technique for modeling and measurement of technical efficiency it will be wise to describe briefly the physical structure of different production technology in terms of graphs.

A production technology transferring inputs

$x = (x_1, x_2, \dots, x_N) \in R_+^N = \{x : x \in R_+^N, x \geq 0\}$ into output

$y = (y_1, y_2, \dots, y_M) \in R_+^M$ can be represented by the output correspondence P, the input correspondence L, or the graph of the technology GR.

The output correspondence $P : R_+^N \rightarrow 2^{R_+^M} [2^{R_+^M} \Rightarrow \{A : A \subseteq R_+^M\}]$ (A is a subset of Euclidian space of dimension M) maps input $x \in R_+^N$ into subset $P(x) \subseteq R_+^M$ of output. The set $P(x)$ is called output set and it denotes the collection of all output vectors $y \in R_+^M$ that are obtainable from the input vector $x \in R_+^N$.

The input correspondence $L : R_+^M \rightarrow 2^{R_+^N}$ maps the output $y \in R_+^M$ into subset $L(y) \subseteq R_+^N$ of inputs. The input set $L(y)$ denotes the collection of all inputs vector $x \in R_+^N$ that yields at least output vector $y \in R_+^M$.

The input and output correspondence can be derived from one another by means of the relationships

$$L(y) = \{x : y \in P(x)\}$$

and
$$P(x) = \{y : x \in L(y)\}$$

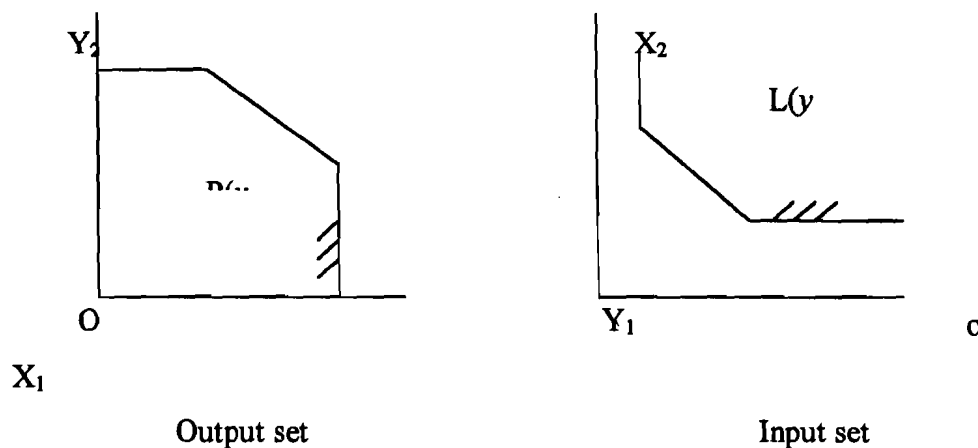


Figure -5

Now the graph of the production technology is the collection of all feasible input-output vectors, i.e.

$$GR = \{(x, y) \in R_+^{N+M} : y \in P(x), x \in R_+^N\}$$

and
$$GR = \{(x, y) \in R_+^{N+M} : x \in L(y), y \in R_+^M\}$$

Thus the input output correspondence can be derived from the graph as

$$P(x) = \{y : (x, y) \in GR\} \text{ and}$$

$$L(y) = \{x : (x, y) \in GR\}$$

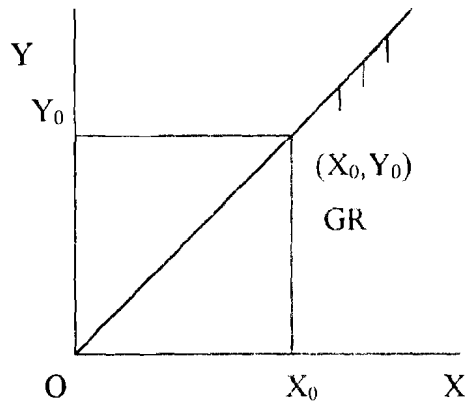


Figure-6

The graph (Figure-6) models both input and output substitution in addition to modeling input output transformation. The input set, the output set and the graph provides representation of technology in terms of input quantities and output quantities.

Let us introduce the concept of production frontier as a functional characteristic of the boundary of graph of production technology. The boundary of the graph represents the maximum possible output obtained from a given level of input or minimum input use for a given level of output. In a single output multiple input case the production frontier can be defined as

$$\begin{aligned}
 f(x) &= \max\{y : y \in P(x)\} \\
 &= \max\{y : x \in L(y)\}
 \end{aligned}$$

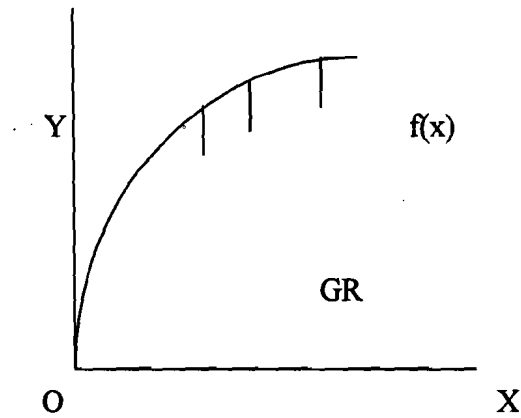


Figure -7

In figure-7 the production function $f(x)$ describes the maximum output that can obtain with any given input vector. The different combination of inputs and outputs fall on or below the production frontier. The basic idea of efficiency is to measure the distance of a particular combination of input and output of a production unit from the respective production frontier. There are two concept of distance function. The input distance function measures the maximum possible conservation of input to reach the boundary of production frontier. The concept can be illustrated in the following figures.

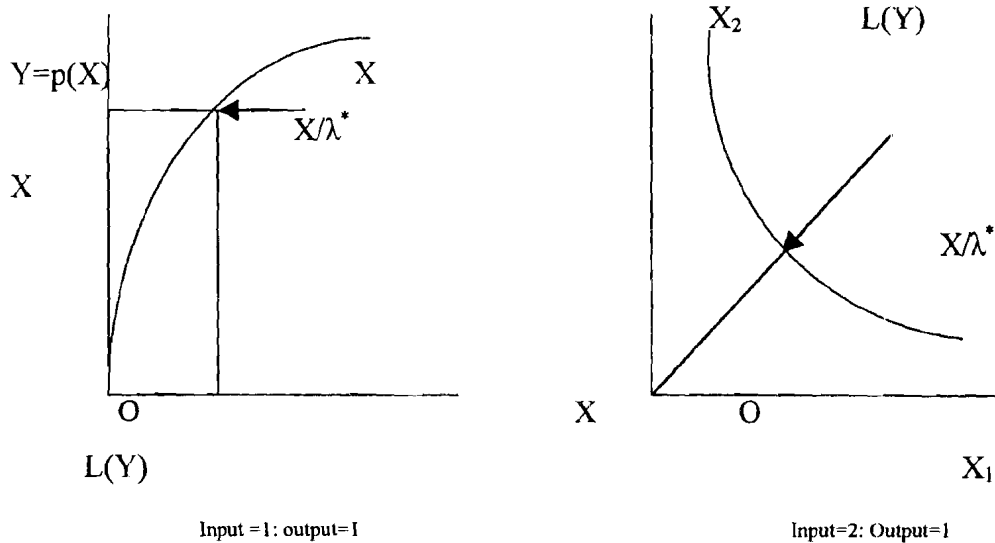


Figure-8

An input distance function can be defined as

$$D_i(y, x) = \max\{\lambda : x/\lambda \in L(y)\}$$

λ is the contraction factor by which inputs can be reduced to produce output y . Figure 6 is the graphical presentation of the input distance function.

An output distance function can be defined as

$$D_o(y, x) = \min\{\mu : y/\mu \in P(x)\}$$

μ is the output expanding factor by which output can be maximize by $\mu < 1$ with a given level of input. A graphical representation of the output distance function is given in Figure -9.

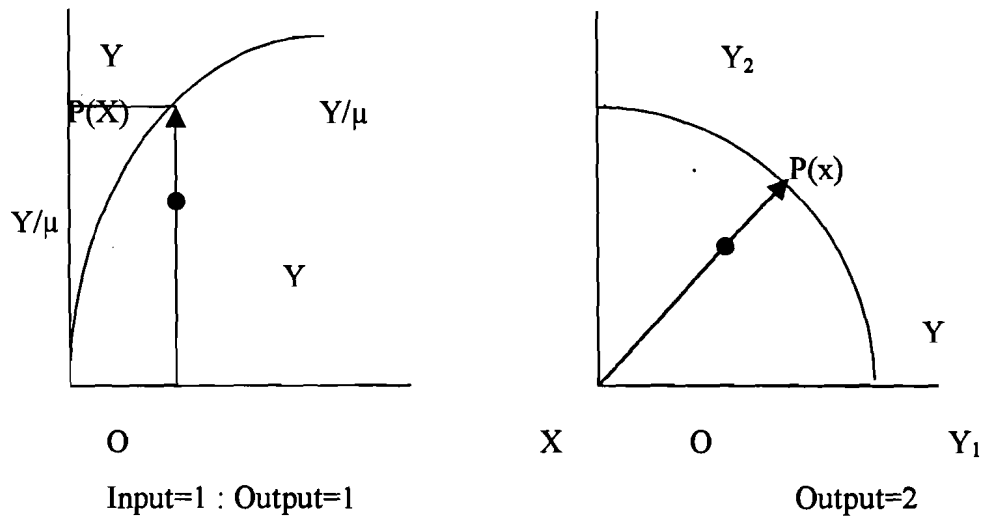


Figure -9

The method of efficiency measure is based on the estimates of the best practice frontier production function which is a natural reference or basis of efficiency measure. Efficiency can be of three types: (i) Technical, (ii) Economic and (iii) Scale. In the following paragraphs the correspondence between these efficiencies with distance function will be described. Before going into the functional specification let us briefly describe the concept of these efficiencies diagrammatically.

Efficiency measure provides a description of the structure of an industry and a necessary step for identifying the causes of inefficiencies. Figure-10(a) describes the concept of feasible production set which is the set of all input-output combinations those are feasible and the set consists of all points between the production frontier and the

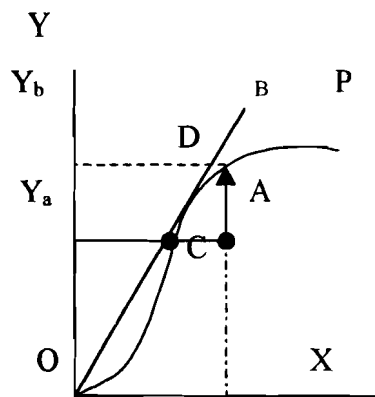


Figure -10(a)

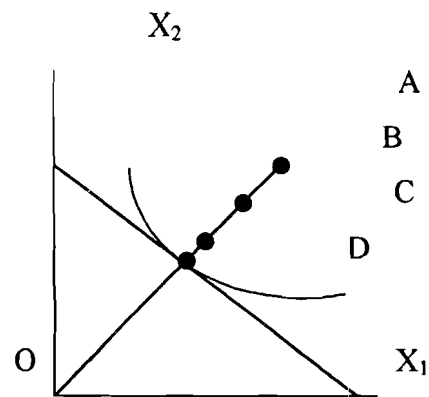


Figure -10(b)

X-axis. The points along the production frontier line OP defines the efficient subset of all the feasible production set. If the firm operating at point A moves to point B the firm can achieve the output augmenting efficiency. Similarly, if the firm switches from point A to point C the firm will be technically efficient from input saving measure. Point D in figure gives the technically optimal scale where output per unit of input is maximized. Figure-10(b) represents the corresponding points of figure -10(a) in an isoquant frame. Now, one measure of technical efficiency E_1 is measured by comparing an observed point of input requirement to produce output Y_a with the input requirement on the frontier production function corresponding to that level of output. In the input coefficient space this means comparing an observed input coefficient point with the point on the transformed isoquant of the frontier function corresponding to the observed output with observed factor proportions. In figure-10(b) this can be stated as

$$E_1 = \frac{OC}{OA}$$

Another measure E_2 is obtained by comparing a observed point of input requirements for an observed output Y_a with the output Y_b obtained on the

frontier production function for the same amount of input. In Figure -10(b) this can be represented by the ratio

$$E_2 = \frac{OB}{OA}$$

Let us now define the efficiencies in terms of distance function described earlier. First, we can consider the case of single output and multiple inputs. The input oriented measure of technical efficiency is given by the function

$$TE_i(y, x) = \min\{\lambda : y \leq f(\lambda x)\}$$

and the output oriented TE is defined as

$$TE_o(y, x) = \max\{\mu : y\mu \leq f(x)\}$$

Similar to our earlier discussion the input oriented TE can be described as a measure of maximum radial contraction in X that enable to produce Y and $\lambda < 1$. Output oriented technical efficiency on the other hand is the maximum radial expansion in Y for a given set of input X.

So far we have not discussed the issue of costs and price of inputs in measuring efficiency. When the prices of inputs are introduced in explaining the production technology it will be possible to measure the efficiency of units in terms of costs and allocation of inputs. Cost frontier is defined as the locus of minimum possible costs to produce a given level of output. A cost function is defined as

$C(y, w) = \min\{W : x \in L(y)\}$, where $W = \sum w_i x_i$; w_i is the price of inputs.

Let us now explain the concept cost efficiency and allocative efficiency. The measure of cost efficiency is defined as

$$CE(y, x, w) = C(y, w) / W$$

In other words it is the ratio of minimum cost to actual costs. The concept is described graphically in the following figure.

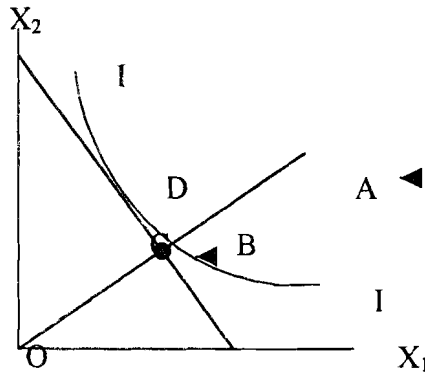


Figure -11

Let A is a set of inputs to produce a given level of output indicated by the isoquant II. This point is neither technically efficient nor cost efficient point. If the point can be brought down to a point along the ray through origin where it cuts the price ratio line of inputs the intersecting point will be the cost efficiency- the ratio of minimum cost of production with a given input prices to observed cost. From Figure -11 we can write

$$CE = \frac{OC}{OA}$$

Now it is understood that all the cost efficient points may not lie on the isoquant, i.e. all are not technically efficient points. Input combination at C in figure is cost efficient but not technically efficient. On the other hand point B is technically efficient but not cost efficient. Here the concept of

allocative efficiency is introduced in the efficiency literature. Allocative efficient point is such a point which gives both technically and cost efficient combination of inputs. Point D in Figure -11 is such a point where the production unit is both technically and cost efficient. This point then will be a tangential point between the price line and isoquant. The measure of allocative efficiency is defined as

$$AE(y, x, w) = CE(y, x, w) / TE(y, x)$$

Thus the measure of input allocative efficiency is given by the ratio of cost efficiency to input-oriented technical efficiency.

Measures of Technical Efficiency

The estimation of production function by least square approach actually contradict the theoretical notion of maximization of quantity of output from a given level of inputs, since the regression represents the average rather than best practice technology. Farrell (1957) provides “an intellectual basis for redirecting attention from production or cost function specifically to the deviation from that function, and respecifying the regression technique accordingly” (Green, 1993)

The approaches to estimate production frontier are of two types, viz. (i) non-statistical and (ii) statistical. The basic difference between these two approaches is that while statistical approach depends on the stochastic properties of the data the other does not depend on such property. In statistical approach the analysis of the data yields standard error for the estimates while in non-statistical approach analysis gives only measurements of efficiency and does not contain any statistical properties. Non statistical measure can further be classified into two groups (i) non-

statistical non-parametric and (ii) non-statistical parametric. In the first type of model it is assumed that all the inputs and outputs are properly identified and measurable and there is no measurement error. Thus there will be no scope of statistical noise in the measurement of efficiencies. The study by Afriat (1972), Hanoch and Rothschild (1972), Diewart and Parkan (1983) belong to this approach. Banker and Manindiratta (1985) allowed statistical "noise" in the non-statistical non-parametric model to measure efficiencies. Another competing approach which belongs to this category is Data Envelopment Analysis (DEA) which is basically a linear programming approach with multiple input and output data. The study of Charnes, Cooper and Rhods (1978) is the pioneering work in this area and a rich literature on DEA has been developed during recent years.

Thus there are basically two approaches in measuring the technical efficiency. We will discuss very briefly about the models and how to get the technical efficiency of any production units empirically using computer packages.

Parametric or Econometric approach

Let us consider a simple C-D production function in its linear form.

$$y_i = \beta_0 + \sum \beta_k x_{ik} + u_i$$

where y_i and x_{ik} are the logarithm of output and inputs respectively. u_i is the random disturbance term that lies between 0 and 1. The parameters of the equation should first be estimated by OLS to get the consistent unbiased estimate of the slope parameters and a consistent but biased estimate of the intercept term β_0 . In the next step the intercept term is to be corrected by

sifting up until no residual is positive and at least one is zero. Now the estimated residual u^* can be used to estimate the technical efficiency

$$TE = e^{(-u_i^*)}$$

Richmond (1974) suggested a similar technique considering a simple C-D production function in its linear form. Taking μ as mean of u_i , the equation can be written as

$$y_i = (\beta_0 - \mu) + \sum \beta_k x_{ki} - (u_i - \mu)$$

If the distributional specification of the error term is half-normal it satisfies all the ideal conditions except normality. Therefore, the above equation may be estimated by OLS for obtaining the BLUE of $(\beta_0 - \mu)$ and β_i 's. Richmond procedure is very similar to COLS but the intercept term here is to shift up by the mean of one-sided disturbance μ . This technique is called MOLS or Modified Ordinary Least Square. The OLS residuals can then be used as the estimates of technical efficiency. The difficulty with this technique is that even after correcting the constant term some residuals may have wrong sign and those observations may be above the estimated frontier.

A stochastic frontier model is a major improvement over the former models in the sense that it makes a clear distinction between the so-called white noise and inefficiency as such. Aigner, Lovell and Schmidt (1977) proposed this stochastic model with the idea that the error term is composed of two parts and form of the function is

$$y_i = f(x_i; \beta) e^{(v_i - u_i)} \quad [i = 1, \dots, n]$$

The random error term v_i has some symmetric distribution to capture the random effect of measurement error and exogenous shock, while u_i 's assumed to be non-negative truncation of the $N(0, \sigma^2)$ distribution, provided the measurement of technical efficiencies relating to stochastic frontier. Now, simple OLS type of estimate can provide the test of presence of technical efficiency in data i.e. if $u_i = 0$ then the variation in production from the frontier level is only due to the random error or white noise. If it is assumed that technical efficiency is present among the production units then a stochastic frontier approach to estimate the (in) efficiencies can be obtained from the estimates of the parameters of the model.

Now one should take assumptions on the distribution of the two disturbances. The most common distributional assumptions are the followings. The Normal-half normal model, i.e. the v_i 's are iid with $N(0, \sigma^2)$ and the u_i 's are iid with non-negative half normal. The log likelihood function can be written as

$$l(\alpha, \beta, \sigma, \lambda) = \text{const} - \frac{n}{2} \log \sigma^2 + \sum [\log \phi(\frac{-\varepsilon_i \lambda}{\sigma}) - \frac{1}{2} (\frac{\varepsilon_i}{\sigma})^2]$$

$\lambda = \frac{\sigma_u}{\sigma_v}$, $\sigma = \sigma_u + \sigma_v$ and $\phi(\cdot)$ is the cumulative distribution function of the standard normal distribution. u_i 's and v_i 's are distributed independently of each other, and of regressors. The assumption of half normal means that the modal value will be zero with the occurrence of technical inefficiency becomes less as one moves away from the frontier. The density function of v_i 's is then

$$f(v) = \frac{2}{\sqrt{2\pi\sigma_v^2}} e^{\left(-\frac{v^2}{2\sigma_v^2}\right)}$$

The half normal distribution parameters σ_u and σ_v are estimated along with the technology parameters of the production function and the hypothesis $\lambda=0$ is tested by appropriate test statistics. After getting the estimates values of the parameters the next step is to obtain the estimates of technical efficiencies from the values of u_i . Technical efficiency of each producer can then be obtained from $TE = e^{(-\hat{u}_i)}$. Where \hat{u}_i is the mean of the conditional distribution of u_i given by either

$$E(u_i | \varepsilon_i) = \bar{\sigma} \left[\frac{\phi(\varepsilon, \lambda / \sigma)}{1 - \phi(\varepsilon, \lambda / \sigma)} - \left(\frac{\varepsilon, \lambda}{\sigma} \right) \right],$$

where $\bar{\sigma} = \sqrt{\sigma_u^2 \sigma_v^2 / \sigma^2}$, $\sigma = (\sigma_u^2 + \sigma_v^2)^{1/2}$ and $\lambda = \frac{\sigma_u}{\sigma_v}$.

Battese and Coelli (1988) proposed the estimates for technical efficiency as

$$TE \hat{E} = \left\{ \frac{1 - \phi(\bar{\sigma} - (\bar{M}_i / \bar{\sigma}))}{1 - \phi(-\bar{M}_i / \bar{\sigma})} \right\} e^{(-\bar{M}_i + \bar{\sigma}^2)}$$

where \bar{M} is the conditional mean of the distribution.

There are some other distributional assumptions of error term u_i which have been considered to estimate the parameters of production frontier.

Normal-Exponential model is another distributional assumption where along with the normal distribution of white noise u_i is considered as iid exponential. The point estimates of technical efficiency can be obtained just as in the Normal-Half-normal case. Normal-Truncated normal and Normal-

Gamma are the two other distributional assumptions which are taken for estimation of production frontier and the technical efficiencies from the point estimation of u_i 's.

Non Parametric Approach

Non-Radial Measures of Technical Efficiency

Consider the production possibility set:

$$T = \{(x, y) : y \text{ can be produced from } x\}, \quad (1)$$

where x is an n -element input bundle and y is an m -element output bundle. Unlike parametric models, the non-parametric approach DEA does not specify the production possibility set explicitly. Instead, it only assumes that: (a) all observed input-output bundles are feasible; (b) inputs are freely disposable; (c) outputs are freely disposable; and (d) the production possibility set is convex.

The Debreu-Farrell input-oriented measure of technical efficiency of the bundle (x^0, y^0) is

$$TE^I(x^0, y^0) = \min \theta : (\theta x^0, y^0) \in T. \quad (2)$$

Similarly, the corresponding output-oriented measure is

$$TE^O(x^0, y^0) = \frac{1}{\phi^*} \quad (3)$$

where $\phi^* = \max \phi : (x^0, \phi y^0) \in T$.

Both of the measures above are *radial* measures because all inputs are contracted (as in (2)) or all outputs are expanded (as in (3)) by the same proportion.

In general, many input bundles other than x^0 can also produce y^0 . For the specific output bundle y^0 , we can define the *input (requirement) set*

$$V(y^0) = \{x : y^0 \text{ can be produced from } x\}.$$

(4)

For each specific output bundle y , there is a specific input set $V(y)$. Thus, the same production possibility set T generates a family of input sets. Every observed input bundle x^j lies in the input set of the corresponding output bundle y^j . Further, if $x^0 \in V(y^0)$ and $x^1 \geq x^0$, then $x^1 \in V(y^0)$. Also, if $x^1 \in V(y^0)$ and $y^1 \leq y^0$, then $x^1 \in V(y^1)$. If the production possibility set T is convex, the input sets are also convex.

Many input bundles in the input set of a specific output bundle are inefficient, because one can produce the target output from a smaller input bundle. These are strictly interior points of the input set. By contrast, the isoquant of an output bundle y^0 consists only of boundary points of $V(y^0)$. The isoquant of y^0 is

$$\bar{V}(y^0) = \{x : x \in V(y^0) \text{ and } \lambda x \notin V(y^0) \text{ if } \lambda < 1\}.$$

(7)

Thus, if $x \in \bar{V}(y^0)$, then it is not possible to reduce all inputs even by the smallest amount and still produce the output level y^0 . The quantity of at least one input in the x^0 bundle must be strictly binding. From the definition of the isoquant, if $x^0 \in \bar{V}(y^0)$, then the input-oriented technical efficiency of (x^0, y^0) equals unity. Indeed, every input-oriented radial projection of an inefficient input-output bundle (x, y) lies in the isoquant of the output bundle y . The *efficient subset of the isoquant* of any output bundle y^0 is defined as

$$V^*(y^0) = \{x : x \in V(y^0) \text{ and } x' \notin V(y^0) \text{ if } x' \leq x\}. \quad (8)$$

Note that if $x^0 \in V^*(y^0)$, then reducing *any* input in the x^0 bundle renders the output bundle y^0 infeasible. Thus, every input bundle in the efficient subset of the isoquant of an output bundle is technically efficient and no slack exists in any individual input. The non-radial measure, proposed by Färe and Lovell (1978), measures the technical efficiency of a firm relative to a point in the efficient subset of the isoquant.

In an output-oriented analysis of technical efficiency, the objective is to produce the maximum output from a given quantity of inputs. For this, we first define the (*producible*) *output set* of any given input bundle. For the input bundle x^0 , the output set

$$P(x^0) = \{y : (x^0, y) \in T\} \quad (9)$$

consists of all output bundles that x^0 can produce. Because different output sets exist for different input bundles, the production possibility set is equivalently characterized by a family of output sets. If (x^j, y^j) is an actually observed input-output combination, then $y^j \in P(x^j)$. Further, if $y^0 \in P(x^0)$ and if $x^j \geq x^0$, then $y^0 \in P(x^j)$. Similarly, if $y^0 \in P(x^0)$ and if $y^j \leq y^0$, then $y^j \in P(x^0)$. Finally, convexity of T ensures that each output set $P(x)$ is also convex.

The *output isoquant* of any input bundle x^0 is defined as

$$\bar{P}(x^0) = \{y : y \in P(x^0) \text{ and } \lambda y \notin P(x^0) \text{ if } \lambda > 1\}. \quad (10)$$

Thus, if $y^0 \in \bar{P}(x^0)$, then the output-oriented radial technical efficiency of the pair (x^0, y^0) equals unity, because one cannot increase *all* outputs holding the input bundle unchanged. This does not, of course, rule out the possibility that one can increase some individual components of the y^0

output bundle. The *efficient subset* of the output isoquant of x^0 , on the other hand, is

$$P^*(x^0) = \{y : y \in P(x^0) \text{ and } y' \notin P(x^0) \text{ if } y' \geq y^0\}. \quad (11)$$

Therefore, an output-oriented radial technically efficient projection of y^0 produced from x^0 onto $P(x^0)$ may include slacks in individual outputs. But no such slacks may exist, if the projection is onto $P^*(x^0)$. The radial measure of output-oriented technical efficiency does not reflect any unutilized potential for increasing individual outputs. Again, as shown below, a non-radial, output-oriented measure does include all potential increases in any component of the output bundle.

The problem of slacks in any optimal solution of a radial DEA model arises because we seek to expand all outputs or contract all inputs by the same proportion. In non-radial models, one allows the individual outputs to increase or the inputs to decrease at different rates. Färe and Lovell (1978) introduced the following output-oriented, *non-radial* measure of technical efficiency, which they called the Russell measure:

$$RM_y(x^0, y^0) = \frac{1}{\rho_y}, \quad (12a)$$

where

$$\begin{aligned} \rho_y &= \max \frac{1}{m} \sum_r \phi_r \\ \text{s.t. } \sum_j \lambda_j y_{rj} &\geq \phi_r y_{r0}; \quad (r = 1, 2, \dots, m); \\ \sum_j \lambda_j x_{ij} &\leq x_{i0}; \quad (i = 1, 2, \dots, n); \\ \sum_j \lambda_j &= 1; \quad \lambda_j \geq 0; \quad (j = 1, 2, \dots, N). \end{aligned} \quad (12b)$$

When output slacks do exist at the optimal solution of a radial DEA model, the non-radial Russell measure falls below the conventional measure obtained from an output-oriented BCC model. That is, because the radial projection is always a feasible point for this problem, $\rho_y \geq \phi^*$. Hence, the non-radial Russell measure of technical efficiency never exceeds the corresponding radial measure.

7. Computer Application for the Specific Problems

As we have already said that there are two approaches for getting the estimates of efficiencies of any decision making unit. Thus, for each approach separate programs are developed for the purpose of estimation of efficiencies. The data for the analysis are unit level information on production of output or value added and the values of different inputs used for the production. In the econometric approach output should be restricted to one while in the non parametric DEA approach the number of output could be more than one. The data can be collected from any secondary sources like Annual Survey of Industries, Reserve Bank of India etc. or data can be collected from the primary sources by survey. In studying with the problem of small scale manufacturing units (unorganized sector) Researchers can collect data by surveying the units using questionnaires. After collecting the data it should be properly checked and cleaned and arranged the require variables according to the requirements of computer packages.

THE FRONTIER PROGRAM

FRONTIER Version 4.1 differs in a number of ways from FRONTIER Version 2.0 (Coelli, 1992), which was the last fully documented version. People familiar with previous versions of FRONTIER should assume that nothing remains the same, and carefully read this document before using Version 4.1. You will, however, find that a number of things are the same, but that many minor, and some not so minor things, have changed. For example, Version 4.1 assumes a linear functional form. Thus if you wish to estimate a Cobb-Douglas production function, you must log all of your input and output data before creating the data file for the program to use. Version 2.0 users will recall that the Cobb-Douglas was assumed in that version, and that data had to be supplied in original units, since the program obtained the logs of the data supplied to it. A listing of the major differences between Versions 2.0 and 4.1 is provided at the end of this section.

Files Needed

The execution of FRONTIER Version 4.1 on an IBM PC generally involves five files:

- 1) The executable file FRONT41.EXE
- 2) The start-up file FRONT41.000
- 3) A data file (for example, called TEST.DTA)
- 4) An instruction file (for example, called TEST.INS)
- 5) An output file (for example, called TEST.OUT).

The start-up file, FRONT41.000, contains values for a number of key variables such as the convergence criterion, printing flags and so on. This text file may be edited if the user wishes to alter any values. This file is discussed further in Appendix A. The data and instruction files must be created by the user prior to execution. The output file is created by FRONTIER during execution.¹ Examples of a data, instruction and output files are listed in Section 4.

The program requires that the data be listed in an text file and is quite particular about the format. The data must be listed by observation. There must be $3+k[+p]$ columns presented in the following order:

- 1) Firm number (an integer in the range 1 to N)
- 2) Period number (an integer in the range 1 to T)
- 3) Y_{it}
- 4) $x1_{it}$
- ...
- $3+k)$ xk_{it}
- $[3+k+1)$ $z1_{it}$
- ...
- $3+k+p)$ $zp_{it}]$

The z entries are listed in square brackets to indicate that they are not always needed. They are only used when Model 2 is being estimated. The observations can be listed in any order but the columns must be in the stated order. There must be at least one observation on each of the N firms and

¹Note that a model can be estimated without an instruction file if the program is used interactively.

there must be at least one observation in time period 1 and in time period T. If you are using a single cross-section of data, then column 2 (the time period column) should contain the value “1” throughout. Note that the data must be suitably transformed if a functional form other than a linear function is required. The Cobb-Douglas and Translog functional forms are the most often used functional forms in stochastic frontier analyses. Examples involving these two forms will be provided in Section 4.

The program can receive instructions either from a file or from a terminal. After typing “FRONT41” to begin execution, the user is asked whether instructions will come from a file or the terminal. The structure of the instruction file is listed in the next section. If the interactive (terminal) option is selected, questions will be asked in the same order as they appear in the instruction file.

The Three-Step Estimation Method

The program will follow a three-step procedure in estimating the maximum likelihood estimates of the parameters of a stochastic frontier production function.² The three steps are:

1) Ordinary Least Squares (OLS) estimates of the function are obtained. All β estimators with the exception of the intercept will be unbiased.

2) A two-phase grid search of γ is conducted, with the β parameters (excepting β_0) set to the OLS values and the β_0 and σ^2 parameters adjusted according to the corrected ordinary least squares formula presented in

²If starting values are specified in the instruction file, the program will skip the first two steps of the procedure.

Coelli (1995). Any other parameters (μ , η or δ 's) are set to zero in this grid search.

3) The values selected in the grid search are used as starting values in an iterative procedure (using the Davidon-Fletcher-Powell Quasi-Newton method) to obtain the final maximum likelihood estimates.

Grid Search

As mentioned earlier, a grid search is conducted across the parameter space of γ . Values of γ are considered from 0.1 to 0.9 in increments of size 0.1. The size of this increment can be altered by changing the value of the GRIDNO variable which is set to the value of 0.1 in the start-up file FRONT41.000.

Furthermore, if the variable, IGRID2, in FRONT41.000, is set to 1 (instead of 0) then a second phase grid search will be conducted around the values obtained in the first phase. The width of this grid search is GRIDNO/2 either side of the phase one estimates in steps of GRIDNO/10. Thus a starting value for γ will be obtained to an accuracy of two decimal places instead of the one decimal place obtained in the single phase grid search (when a value of GRIDNO=0.1 is assumed).

Iterative Maximization Procedure

The first-order partial derivatives of the log-likelihood functions of Models 1 and 2 are lengthy expressions. These are derived in appendices in Battese and Coelli (1992) and Battese and Coelli (1993), respectively. Many of the gradient methods used to obtain maximum likelihood estimates, such as the Newton-Raphson method, require the matrix of second partial derivatives to be calculated. It was decided that this task was

probably best avoided, hence we turned our attention to Quasi-Newton methods which only require the vector of first partial derivatives be derived. The Davidon-Fletcher-Powell Quasi-Newton method was selected as it appears to have been used successfully in a wide range of econometric applications and was also recommended by Pitt and Lee (1981) for stochastic frontier production function estimation. For a general discussion of the relative merits of a number of Newton and Quasi-Newton methods see Himmelblau (1972), which also provides a description of the mechanics (along with Fortran code) of a number of the more popular methods. The general structure of the subroutines, MINI, SEARCH, ETA and CONVRG, used in FRONTIER are taken from the appendix in Himmelblau (1972).

The iterative procedure takes the parameter values supplied by the grid search as starting values (unless starting values are supplied by the user). The program then updates the vector of parameter estimates by the Davidon-Fletcher-Powell method until either of the following occurs:

a) The convergence criterion is satisfied. The convergence criterion is set in the start-up file FRONT41.000 by the parameter TOL. Presently it is set such that, if the proportional change in the likelihood function and each of the parameters is less than 0.00001, then the iterative procedure terminates.

b) The maximum number of iterations permitted is completed. This is presently set in FRONT41.000 to 100.

Both of these parameters may be altered by the user.

Program Output

The ordinary least-squares estimates, the estimates after the grid search and the final maximum likelihood estimates are all presented in the output file. Approximate standard errors are taken from the direction matrix used in the final iteration of the Davidon-Fletcher-Powell procedure. This estimate of the covariance matrix is also listed in the output.

Estimates of individual technical or cost efficiencies are calculated using the expressions presented in Battese and Coelli (1991, 1995). When any estimates of mean efficiencies are reported, these are simply the arithmetic averages of the individual efficiencies. The ITE variable in FRONT41.000 can be used to suppress the listing of individual efficiencies in the output file, by changing it's value from 1 to 0.

A Translog production frontier using cross-sectional data and assuming a truncated normal distribution.

In this example we wish to estimate the Translog production frontier:

$$(8) \quad \ln(Q_i) = \beta_0 + \beta_1 \ln(K_i) + \beta_2 \ln(L_i) + \beta_3 \ln(K_i)^2 + \beta_4 \ln(L_i)^2 + \beta_5 \ln(K_i) \ln(L_i) + (V_i - U_i),$$

where Q_i , K_i , L_i and V_i are as defined earlier, and U_i has truncated normal distribution. We follow a similar presentation to that in Section 4.2, but only list 4 tables: 2a to 2d. We suppress the listing of the output file to conserve space. The main differences to note between the procedure in Section 4.1 and here are that: the squared and interaction terms have to be

generated in the SHAZAM instruction file (refer to Table 2b); because of this the file EG2.DTA contains three more columns³ than EG1.DTA; and in EG2.INS we have made the number of regressors equal to 5 and answered yes (y) to the μ question (because we wish U_i to be truncated normal).

Table 2a - Listing of Data File EG2.DAT

1.	1.	12.778	9.416	35.134
2.	1.	24.285	4.643	77.297
3.	1.	20.855	5.095	89.799
.
58.	1.	21.358	9.329	87.124
59.	1.	27.124	7.834	60.340
60.	1.	14.105	5.621	44.218

Table 2b - Listing of Shazam Instruction File EG2.SHA

```
read(eg2.dat) n t y x1 x2
genr ly=log(y)
genr lx1=log(x1)
genr lx2=log(x2)
genr lx1s=log(x1)*log(x1)
genr lx2s=log(x2)*log(x2)
genr lx12=log(x1)*log(x2)
file 33 eg2.dta
write(33) n t ly lx1 lx2 lx1s lx2s lx12
stop
```

Table 2c - Listing of Data File EG2.DTA

1.000000	1.000000	2.547725	2.242410	3.559169
5.028404	12.66769	7.981118		
2.000000	1.000000	3.189859	1.535361	4.347655
2.357333	18.90211	6.675219		
3.000000	1.000000	3.037594	1.628260	4.497574
2.651230	20.22817	7.323218		

³ Note that the SHAZAM WRITE command will only list five numbers on each line. If you have more than five columns, the extra numbers will appear on a new line. FRONTIER has no problems reading this form of data file.

58.00000	1.000000	3.051426	2.233128	4.467332
4.986860	19.95706	9.976124		
59.00000	1.000000	3.300419	2.058473	4.099995
4.237312	16.80996	8.439730		
60.00000	1.000000	2.646529	1.726510	3.789132
2.980835	14.35752	6.541973		

Table 2d - Listing of Instruction File EG2.INS

```

1      1=ERROR COMPONENTS MODEL , 2=TE EFFECTS MODEL
eg2.dta DATA FILE NAME
eg2.out OUTPUT FILE NAME
1      1=PRODUCTION FUNCTION, 2=COST FUNCTION
1      LOGGED DEPENDENT VARIABLE (Y/N)
60     NUMBER OF CROSS-SECTIONS
1      NUMBER OF TIME PERIODS
1      NUMBER OF OBSERVATIONS IN TOTAL
1      NUMBER OF REGRESSOR VARIABLES (Xs)
1      MU (Y/N) [OR DELTA0 (Y/N) IF USING TE EFFECTS MODEL]
1      ETA (Y/N) [OR NUMBER OF TE EFFECTS REGRESSORS (Zs)]
1      STARTING VALUES (Y/N)
1      IF YES THEN BETA0
          BETA1 TO
          BETAK
          SIGMA SQUARED
          GAMMA
          MU          [OR DELTA0
          ETA          DELTA1 TO
          DELTAK]

```

NOTE: IF YOU ARE SUPPLYING STARTING VALUES
AND YOU HAVE RESTRICTED MU [OR DELTA0] TO BE
ZERO THEN YOU SHOULD NOT SUPPLY A STARTING
VALUE FOR THIS PARAMETER.

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