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EFFICIENCY OF MICRO ENTERPRISES IN WEST BENGAL: A NON-PARAMETRIC ANALYSIS

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ABSTRACT :

With the development of microentrepreneurship under microfinance programme in rural India, the issue of long-term sustainability is a big challenge to the researcher of social sciences. Performance of an enterprise or an entrepreneur can also be judged in terms of 'efficiency'. The question regarding the compatibility of 'sustainability' and 'efficiency' comes up in the forefront. Based on a primary survey in West Bengal in India, the study attempts to determine average level of sustainability of microenterprises and also seeks to explore the performance of rural micro enterprise activities by investigating efficiency. In order to determine level of sustainability and efficiency, Principal Component Analysis and Data Envelopment Analysis (DEA) have been used as a tool respectively. The analysis suggests that 97% of sustainable microenterprises have performed at higher level of scale efficiency. It highlights the fact that sustainable microenterprises have been found to be efficient too. Few microenterprises having lower Composite Sustainability Index suffer from pure technological inefficiency. Some sustainable microenterprises have been found to perform well and some enterprises, though sustainable, have been found to be lagging behind due to lack of access to information, non-availability of market as well as poor infrastructural facilities.

KEYWORDS : *Microfinance; Microenterprise; Sustainability; Efficiency; DEA.*

INTRODUCTION

The microfinance was introduced to the economy as a tool of rural development to fill the lacuna left by the failure of formal credit institutions and informal lending system. This has happened perhaps due to the reasons of political interference, bureaucratic functioning, high degree of regulatory control, poor industrial relations, lack of customer-driven functioning, ignorance of local socio-economic conditions, lack of participation of clients in management, and the absence of realization regarding local problems and potentials. One of the expectations from the introduction of microfinance approach was that it would facilitate the start of new businesses by investing in viable micro-enterprises and from those new ventures people would earn profit through the use of local resources and local market opportunities and finally they would be able to reinvest a part of this profit in enterprises for their growth and capital accumulation.

An efficient financial system would ensure that a large number of poor and vulnerable people would enjoy consistent access to financial services through which they would be included in the mainstream of development. This access can be a tool of poverty alleviation and hence a key element of economic growth where micro-finance presents itself as a mechanism with a set of financial services towards the development of microentrepreneurship especially in the developing world. As it is characterized by generation and expansion of the opportunity of self-employment and positive contribution towards the national income of a country, it is accepted as a necessary condition for long-term sustainable economic development of a developing economy (Caree and Thurik, 2003). With the expansion of microenterprise development under different programmes, the issue of long-term sustainability of these rural enterprises with an efficient manner is the big challenge to the policy makers, donors, practitioners, financial institutions and of course, to the researchers of social sciences.

RELEVANCE

In Indian economy all the states are directly affected by the central macroeconomic conditions or decisions of the country and the central economic policies continue to have dominant effects on the employment-unemployment situation as well as basic amenities of human life in all the states. Non-farm sources of income are important for the rural poor in the economy of West Bengal like other states for two reasons. Firstly, the direct agricultural income of the poor is not enough to sustain their livelihoods, either because of being landless or because of leasing marginal land. Secondly, wage employment in agriculture is so far highly seasonal in most of the rural areas in West Bengal, so that the employment is the only source of supplementations in income. In the absence of viable investments in nonfarm enterprises, the pattern of job creation has shifted towards more casual, marginal, part-time and insecure contracts or self-employment (West Bengal, 2004). Thus the government of West Bengal has taken serious initiatives for industrialization through the development of non-farm enterprises by providing infrastructure facilities and support services since 1990's onwards. State Government has tried to strengthen the self-employment projects through the establishment of modern microenterprise in the past decades, specifically for the rural people.

RESEARCH QUESTION

Performance of an enterprise or entrepreneur can be measured in two ways: one is long –run existence or 'sustainability' and the other is 'efficiency'. Sustainability is a wide-ranging and multi-dimensional subject. Its dimensions include continued flow of benefits, longevity and ability to cover recurrent cost and institutional capacity and performance (Ereda, 2007). World Business Council for Sustainable Development (WBCSD) defines sustainable entrepreneurship as the "continuing commitment of business to behave in an ethical way and contribute toward economic development while improving the quality of life of the workforce, their families, and the local and global community, as well as future generations". Thus, the concept of sustainability has multifaceted dimensions - financial or economic, social, political, cultural, legal, environmental and technological etc. Producers or enterprises are said to be efficient if they have produced as much as possible with the inputs they have actually employed and/or if they have produced that output at minimum cost (Greene, 1997). The measurement of effectiveness is the degree to which a system achieves programmes and policy objectives in terms of outcomes, accessibility, quality and appropriateness (Worthington and Dollery, 2000).

The performances of microenterprises in terms efficiency measures are crucial not only to creditors or entrepreneurs (investors) but also for policy makers. Thus an attempt has been made to understand the performance of microenterprises by investigating measure the ***'efficiency'*** in this study.

OBJECTIVE

The study attempts to determine average level of sustainability of microenterprises and also seeks to explore the performance of rural micro enterprise activities by investigating efficiency;

DATA

The study is based on primary survey in different districts of West Bengal. The districts have been selected in such a way that at least one district is included from each of the four industrial zones of West Bengal as well as from each of the three groups of concentration of microenterprises. The selected microenterprise owner households for survey are those who have been operating for at least five years or more. The selection has been done keeping in mind that most major categories of unorganized rural microenterprises were captured in the primary survey. Thus, the districts have been chosen purposively. Data were collected with the help of a structured questionnaire through direct interview at the household level. The questionnaire was formulated keeping the theoretical foundation of the study in mind.

METHODOLOGY

Concept of Efficiency

Producers or enterprises are said to be efficient if they have produced as much as possible with the inputs they have actually employed and/or if they have produced that output at minimum use of input (Greene, 1997). Thus, efficiency compares observed or the actual output or input with optimal values of its output or input (Lovell, 1993).This can be assessed in terms of **technical efficiency** which reflects the ability of a firm to obtain maximum output from a given set of inputs or to produce a given level of output with the use of minimum level of inputs compared to another firm (or other firms).Technical efficiency (TE) of a firm can be measured in two ways: input-oriented measure and output-oriented measure. Comparison of the observed level of inputs with the minimum level of inputs that could produce the observed level of output is used as input oriented measure of technical efficiency. Output-oriented technical efficiency for a given firm is defined as the ratio of output vector of the firm under consideration using the same input vector to the output vector of a fully efficient firm. It can be measured by the product of pure technical efficiency and scale efficiency (Coelli et al., 2005).The output-oriented pure technical efficiency (PTE) for a given firm is defined as the ratio of output of an observed firm using an input vector to the output of the firm operating under constant returns to scale (CRS) technology using the same input vector. Scale efficiency and technical efficiency are different concepts. One can get scale efficiency for each firm by assuming that technology exhibits variable returns to scale (VRS). The scale efficiency is defined by $\mathbf{SE = TE_{CRS} / TE_{VRS}, 0 \leq SE \leq 1}$. Thus, scale efficiency evaluates the ratio of efficiency scores of a firm under CRS and VRS assumptions and a firm can be called 'scale inefficient' when CRS and VRS technical efficiency scores of a that firm are different. Scale efficiency is an extent to which an organization can take advantage of returns to scale by altering its size towards optimal scale which is defined as the region in which there are constant *returns to scale* in the relationship between outputs and inputs (*ibid*).

'Efficiency' measurement is a normative approach which takes the values of all inputs and all outputs in order to move partial productivity to 'total factor productivity' measures. Moving from partial to total factor productivity measures by combining all inputs and all outputs to obtain a single ratio helps to avoid mistake of imputing gains of output due to one single factor that are really attributable to some other input. For example, an increase in output due to increase in capital or due to improved management might be mistakenly attributed to labour input when the partial or single input output ratio is used in analysis (Cooper, Seiford and Tone, 2007; Roy, 2004). Some other practical problems of traditional measurement of productivity or efficiency can be removed through 'benchmark' efficiency analysis by utilizing econometric techniques or mathematical programming that can handle large numbers of variables and relations (constraints) at a time.

In order to measure the performance of microenterprises by investigating ***'efficiency',*** there are two widely applied approaches–one is Stochastic Production Frontier Analysis and the other is Data Envelopment Analysis (DEA) which involve econometric methods and mathematical programming analysis respectively. Among these two, a relatively new non-parametric, alternative to the econometric, approach is the method of data envelopment analysis introduced by Farrell (1957) through his pioneering work on piece-wise-linear convex hull approach to frontier estimation. The term DEA was coined by Charnes, Cooper and Rhodes (CCR, 1978) and proposed as an input orientation model with the assumption of CRS. Subsequently, Banker, Charnes and Cooper (BCC, 1984) have considered alternative model with the assumptions of VRS. This methodology has been further developed and extended by Fare, Grosskopf and Lovell (1994; 1985), Lovell (1993) and Cooper, Seiford and Tone (2000).

In the present study, the DEA method has been used to measure as well as to compare the output-oriented technical efficiency of sustainable microenterprises. The study has used **'DEAP Version 2.1'** to calculate technical efficiency of Decision Making Units by assuming both CRS and VRS technologies.

MODEL AND VARIABLES

The study has tried to measure the technical efficiency of rural microenterprises. It is worthwhile to mention that as the enterprises included in the analysis do not operate under CRS, it is more appropriate to apply the BCC model with output orientation. For DEA, the study makes the following ***assumptions*** under BCC model (VRS) about the production technology without specifying any functional form.

i) All observed input-output combinations are feasible. An input-output bundle (x, y) is feasible when the output bundle y can be produced from input bundle x. Suppose that we have a sample of N firms producing m outputs from n inputs. Let $x^j = (x_{1j}, x_{2j}, \ldots, x_{nj})$ be the input set of firm j (j =1, 2,………, N) and $y^j = (y_{1j}, y_{2j}, \ldots, y_{mj})$ be its observed output.

ii) The production possibility set is convex. Consider two feasible input-output bundles (x^A, y^A) and (x^B, y^B). Then $(\bar{X}, Y)$ is also a feasible bundle, where
$X = \lambda x^A + (1-\lambda) x^B$ and $Y = \lambda y^A + (1-\lambda) y^B$; $0 \le \lambda \le 1$.

iii) Inputs are freely disposable. If (x^0, y^0) is feasible, then for any $x \ge x^0$, (x, y^0) is also feasible.

iv) Outputs are freely disposable. If (x^0, y^0) is feasible, then for any $y \le y^0$, (x^0, y) is also feasible.

Then the output-oriented measure of technical efficiency is obtained from the solution of the following Linear Programming Problem (LPP) under VRS assumptions:

$$\text{Max } \Phi: (x^t, \Phi y^t)$$

$$\text{s.t. } \sum_{j=1}^{N} \lambda_j x^j \le x^t;$$

$$\sum_{j=1}^{N} \lambda_j y^j \ge \Phi y^t;$$

$$\sum_{j=1}^{N} \lambda_j = 1;$$

$$\lambda_j \ge 0 \ (j= 1, 2, \ldots, N)$$

Again, define $\Phi^* y^t = y^t_*$. Now (x^t, y^t_*) is the efficient output oriented radial projection of (x^t, y^t) and $TE_O^V(x^t, y^t) = 1/\Phi^*$ where, value of TE varies between zero and one (Roy, 2004).

In efficient frontier analysis, the task of selecting ***input-output variables*** in the DEA is very important. The selection of the inputs and outputs influences the accuracy of the measurements (Stigler, 1976). Physical measures and monetary measures are the two common types of measures of input / output variables.

All the Decision Making Units (DMUs) that have been incorporated in the present study are unorganized and heterogeneous with respect to their activities. In the study, all of these DMUs have been classified into seven basic categories according to the nature of the inputs used and outputs produced. These types include Animal Husbandry, Food Processing, Handicrafts, Manufacturing, Pottery-Terracotta-Clay modelling, Readymade Garments and Service. Though "pottery-terracotta-clay modelling" is often included within the "handicraft" category, these two have been differentiated here on the basis of nature of inputs, volume of business, etc. On the other hand, zari-work and kantha stitching are considered to be important livelihood activities by themselves in some districts of the survey area but these are purely handicraft; therefore, these were merged with other type of "handicraft" activities. In case of service category all such activities as mobile repairing, cycle repairing, hand-pump or tube-well repairing, xerox centre, etc, were included.

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On the basis of availability of data, the first input **(x_1)** that we have used to measure the efficiency of enterprises is **"operating cost"** obtained by combining all the costs that have been incurred by the entrepreneurs for production. It is worthwhile to mention here that the majority of surveyed enterprises are livelihood enterprises so that they have not been able to create any type of valuable assets. Thus, the present study does not include value of assets to measure efficiency. The 'operating cost' has been explained as the cost that the enterpreneurs actually incurred, and it includes all costs to conduct enterprise activities, such as the cost of rent, raw materials, fuels (e.g., kerosene, electricity, etc.), wage for hired labour, cost of transport, interest payments, taxes, and so on (Khandker et al., 2013).The operating costs of the enterprise do not include the cost of family labour (imputed cost) since the opportunity cost of household labour is often either negligible or zero in most of the enterprise households in our survey area (Khalily and Khaleque, 2013).

Capital and labour are the two traditional inputs that are used in most of the research studies. However, we have mentioned earlier that investment history is not available in such unorganized enterprises and it is very difficult to differentiate the business assets from household assets. Moreover, a majority of these enterprises is labour intensive in nature and the owner households have little capital assets. As it is not possible to apply traditional method of identification in this situation, an alternative physical measures or proxies of assets may be considered. The role of human capital for growth and prosperity and eventually sustainability, has been gaining importance and these tenets are now increasingly accepted (OECD, 1998; Jackson and Schuler, 1995; Coelli, 1996; Coelli et al. 2003). The term 'human capital' refers to the stock of skills and knowledge embodied in humans as they contribute to future production and in a broader sense, human capital may include social capital (Hayami, 2009). In the present study, the qualitative attributes: **entrepreneurial quality, entrepreneurial ability, entrepreneurial power, entrepreneurial trait, capability of enterprise and core competencies of enterprises** have been assessed on the basis of human resource or human capital. Thus in the present study the **"Composite Sustainability Index" (CSI^*)** score has been used as the second input **(x_2)** which is the proxy measure of human capital or managerial capabilities of the enterprises and entrepreneurs as a whole. CSI^* score, is the aggregate value of six attributes of entrepreneur and enterprise **(Appendix)**. The enterprises having CSI^* score greater than or equals to three ($CSI^* \geq 3$) have been selected for the measurement of efficiency.

Due to vast heterogeneity of output of these enterprises, total **"revenue" earning (Y)** has been used as a single and common **output (Y)** for all types of microenterprise activities.

ANALYSIS AND RESULTS

Sustainability of Enterprises

In order to deteremine the level of sustainability of different microenterprises, the sample has been categorized in 7 classes according to nature of activities . Determination of the average level of sustainability (Table-1) suggests that manufacturing enterprises are in the first ($CSI^*=3.40$) position followed by the other six types of enterprises – service (3.27), handicrafts (3.14), pottery-terracotta-clay modeling (3.06), food processing and readymade garments (3.05) and animal husbandry (2.92). The findings suggest that all types of enterprises except the enterprise of animal husbandry ($CSI^*<3$) scored the moderate level ($3 \leq CSI^* < 4$) of sustainability. The poor performance of animal husbandry, food processing and others is due to their employment of lower capital, lower marketing ability and poor scientific knowledge under own account enterprises. It is also remarkable to note that the manufacturing enterprises stood first not only in terms of the value of CSI^* but also in terms of the value of almost all sub-indices. The distinguishing feature of manufacturing enterprises arises due to its growth oriented nature, large scale production, use of modern technique and efficient marketing of products.

Table 1
Average Level of Sustainability and percentage of sustainable enterprises under Different Types of Activities

Indices / Types of Enterprises	EQI	EAI	EPI	ETI	ECPI	ECMI	CSI*	% of sustainable enterprises
Animal Husbandry	2.86(L)	2.99(L)	2.97(L)	3.30(M)	2.80(L)	2.61(L)	2.92(L)	43
Food Processing	3.05(M)	3.33(M)	3.19(M)	3.46(M)	2.77(L)	2.52(L)	3.05(M)	56
Handicrafts	3.21(M)	3.44(M)	3.06(M)	3.54(M)	2.94(L)	2.66(L)	3.14(M)	56
Manufacturing	3.41(M)	3.78(M)	3.47(M)	3.94(M)	2.99(L)	2.83(L)	3.40(M)	73
Pottery-Terracotta-Clay Modelling	3.21(M)	3.32(M)	2.95(L)	3.43(M)	2.82(L)	2.65(L)	3.06(M)	51
Readymade Garments	3.23(M)	3.40(M)	2.96(L)	3.49(M)	2.63(L)	2.60(L)	3.05(M)	54
Service	3.29(M)	3.57(M)	3.35(M)	3.73(M)	2.83(L)	2.84(L)	3.27(M)	66

Source: Sample Survey
Level of Indices: High ≥ 4; 3 ≤ Moderate < 4; Low < 3.

Table 2
Distribution (in Percentage) of Scale or Economic Efficiency (SE) of Various Type of Activities into Different Levels

Activities / SE	Animal Husban-dry	Food Processing	Handi-Crafts	Manu-facturing	Pottery,-terracotta - clay modelling	Ready-made Garments	Service
SE=1	35.7	10.0	6.8	27.8	31.2	18.2	19.3
0.900 ≤ SE ≤1.0),	35.7	63.3	58.1	61.1	68.8	69.7	71.0
0.600≤SE<0.900	28.6	20.0	29.7	11.1	00	12.1	9.7
SE<0.600	00	6.7	5.4	00	00	00	00
Total	100	100	100	100	100	100	100

Source: Primary Survey

(II) The efficiency of TE and PTE distributions for all types of microenterprises into different levels are shown in Table - 3 and Table-4. Regarding technical efficiency, 'manufacturing' enterprises occupy the leading position, with 78% of sustainable enterprises having TE greater than or equal to 0.9, followed by the sustainable enterprises under 'animal husbandry' and 'pottery-terracotta-clay modelling'. It is important to mention that although 'readymade garment' as well as 'service' enterprises have been found to perform well as far as scale efficiency is concerned, a large share of the sustainable enterprises belonging to these two categories shows technical efficiencies lying between 0.6 and 0.9. Looking back the enterprises under 'food-processing' and 'handicrafts', it has been observed that almost 13% and 53% of enterprises respectively having lower level technical efficiency (less than 0.6).

As far as PTE (Table 4) is concerned, 'manufacturing' enterprises holds the first position with almost 89% of enterprises having PTE more than 0.9, i.e. enterprises lying either on VRS frontier or in the " close to frontier region". All others except 'food-processing' and 'handicrafts' exhibit more or less same performance with no enterprises lying under lower level of PTE. In case of 'food-processing' and 'handicrafts' about 7% and 39% of enterprises respectively have been found to have lower level of PTE (less than 0.6).

Table 3
Distribution (in percentage) of Technical Efficiency (TE) of Various Type of Activitie sinto Different Levels

Activities / TE	Animal Husbandry	Food Processing	Handi-crafts	Manu-facturing	Pottery-terracotta-clay modelling	Ready made Garments	Service
TE=1	35.7	10.0	5.4	27.8	25.0	9.1	16.1
0.900≤TE<1	28.6	13.3	6.8	50.0	37.5	12.1	22.6
0.600≤TE<0.900	35.7	63.4	35.1	22.2	37.5	78.8	61.3
TE<0.600	00	13.3	52.7	00	00	00	00
Total	100	100	100	100	100	100	100

Source: Primary Survey

Table 4
Distribution (in percentage) of Pure Technical Efficiency (PTE) of Various Type of Activities into Different Levels

Activities / PTE	Animal Husbandry	Food Processing	Handi-crafts	Manu-facturing	Pottery-terracotta- clay modeling	Ready made Garments	Service
PTE=1	50.0	36.7	20.3	50.0	50.0	33.3	32.3
0.900≤PTE<1	28.6	16.7	2.7	38.9	18.8	3.1	29.0
0.600≤PTE<0.900	21.4	40.0	37.8	11.1	31.2	63.6	38.7
PTE<0.600	00	6.6	39.2	00	00	00	00
Total	100	100	100	100	100	100	100

Source: Primary Survey

(III) The average level of efficiency (SE, TE and PTE), Standard Deviation (SD) and Coefficient of Variation (CV) have been presented in Table 5 for CV of enterprises under different categories has been drawn. It is also worthwhile to mention that the mean efficiency for SE, TE and PTE of enterprises under 'manufacturing' is the highest having the least variation, followed closely by the enterprises under 'pottery-terracotta-clay modelling' whereas the enterprises under 'handicrafts' enterprises have the least mean efficiency and maximum variation. Moreover, the enterprises belonging to 'pottery-terracotta-clay modelling' category

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have turned out to be the most efficient as well as consistent when compared by coefficient of variation (CV) of SE; those under 'manufacturing' enterprises have been found to be the most efficient and most consistent ,when compared by CV of technical and pure technical efficiency. Average output-oriented PTE suggests that enterprises under 'manufacturing' activities can increase their revenue by only 3% with existing level of input through the efficient utilization, followed by animal husbandry(4%), pottery-terracotta-clay modelling (7%), service (10%), food-processing(14%), readymade garments (15%) and handicrafts (30%). On the other hand, the average of value of TE has been observed to be greater than or equal to 0.90 for enterprises operating under 'manufacturing', 'pottery-terracotta-clay modelling' and 'animal husbandry'; average TE almost lying between 0.75 to 0.85 for 'readymade garments', 'food-processing' and 'services' related enterprises and it is only 0.6 for 'handicraft' enterprises. It signifies the fact that technical inefficiency occurs to some extent in some types of activities due to higher pure technical inefficiency rather than scale inefficiency among all types of enterprises.

Table 5
Distribution of Mean and CV of SE, TE and PTE of Various Types of Activities

Activities / Mean	Animal Husbandry	Food Processing	Handi-crafts	Manu-facturing	Pottery-terracotta-clay modelling	Readymade Garments	Service
Mean -SE	0.94	0.90	0.89	0.98	0.97	0.97	0.95
SD	0.075	0.141	0.136	0.039	0.033	0.054	0.067
CV	8.0	15.7	15.3	4.0	3.4	5.6	7.1
Mean-TE	0.90	0.77	0.61	0.95	0.90	0.82	0.85
SD	0.110	0.163	0.185	0.056	0.087	0.115	0.114
CV	12.2	21.2	30.3	6.0	9.7	14.1	13.4
Mean-PTE	0.96	0.86	0.70	0.97	0.93	0.85	0.90
SD	0.065	0.166	0.205	0.046	0.091	0.123	0.102
CV	6.8	19.3	29.3	4.8	9.8	14.5	11.3

Source: Authors calculation on the basis of Table -2, table -2 and table 4

CONCLUSION

Micro, Small and Medium Enterprises contribute significantly to social and economic development objectives such as labour absorption, income distribution, rural development, poverty reduction, regional balance and promotion of entrepreneurship. Although this sector has acquired a crucial place in the socio-economic development of the country even in the era of liberalization, privatization and globalization (LPG) of India, it yet suffers from several vital lacunas. Lack of adequate and timely institutional credit, problem of marketing, coupled with inadequate, uncertain and breakdown of supply of power, problems related to the unavailability and irregular supply of sufficient amount of raw material along with poor technical knowledge and of course lack of professional attitude create hindrances in the path of sustainability as well as efficiency.

The summary of findings indicates that more than 97% of sustainable microenterprises have performed at higher level of scale efficiency (SE≥0.6). All types of microenterprises having greater CSI* score are scale efficient at optimal level or the efficiency in the "frontier region" (SE ≥ 0.9). This supports that sustainable microenterprises would be considered to be efficient too. On the contrary, there exists pure technical inefficiencies to some extent in few microenterprise activities having relatively lower CSI* score. According to performance in respect of efficiency, the microenterprise activities of "manufacturing" and "pottery-terracotta-clay modelling" seem to perform well, perhaps due to larger amount of investment, use of skilled hired labour, large scale of operation and use of modern techniques. As far as 'handicraft', 'food processing' and 'readymade garments' are concerned, the enterprises are lagging behind because they are subsistence in nature and in most of the cases entrepreneurs have poor access to information and non availability of market and other infrastructural facilities. Most of the inefficient enterprises are households in nature those who have tried to survive by using unskilled family labour. Sometimes entrepreneurs remain engaged in the present nonfarm activity, but their contribution is hardly ever as an entrepreneur. Often they act only as wage labour which yields them the so-called "best income". Moreover, the rural microenterprises suffer from lack of technical knowledge. Firstly, they have no rigorous book keeping or record keeping system of investments and returns so that the actual cost of their inputs and value of outputs are often difficult to assess. Secondly, in most of the households the income (return or profit) generated by the enterprises cannot be differentiated from wage earnings or other earnings of the household members. Thirdly, the use of business assets and household assets are not distinguishable by any means thereby rendering it almost impossible to assess the profit as a percentage of enterprise assets, or to measure how well the enterprise utilizes assets to generate profits. Fourthly, the majority of microenterprises have not been able to create any type of valuable assets from the earning of their enterprise to cope with shocks or depression. Fifthly, the enterprises have frequently used family members (mainly women and children) as unpaid labour so that the cost of family labour (imputed cost) was never considered as a part of the production cost. Seventhly, there is vast heterogeneity not only inter-category but also intra-category of enterprises in terms of inputs, output, marketing, financing, etc. Finally, most of the rural microentrepreneurs often operating below the optimum level only look as if "entrepreneurship" is a way of buying a job (self employment) rather than a creative venture to develop an enterprise. Therefore, the training programmes should be reoriented and repackaged in such a way that not only the growth-oriented progressive entrepreneurs are benefitted but also the survival-oriented subsistence entrepreneurs can be upgraded in terms of productivity through the implementation of product diversification and modern production techniques, or even sometimes only by simple tips like do's and don'ts regarding entrepreneurship.

APPENDIX

Construction of Sustainability Indices

The attributes are specific on the basis of 30 characteristic indicators that qualify entrepreneurs as well as enterprises. Every qualitative indicator of sustainability has been measured in the five-point **Likert Scale**: very high (5), high (4), medium (3), fair (2) and low (1). All the attributes leading to sustainability are assumed to have equal weights (i.e., exogenous weights). The sustainability index has been determined by aggregating these 30 indicators under six attributes.

As for example, an individual entrepreneur, who scores "very high" on all the indicators of "sustainability", has a total maximum score of 150 (5 multiplied by 30), while that who scores "low" on all the indicators of "sustainability", has a total score of only 30 (1 multiplied 30). The level of sustainability, however, is measured by the average score (simple arithmetic mean) for each individual. The average score for the former is 5 (total score: 150, divided by total number of indicators of sustainability: 30), while the latter is 1 (total score: 30, divided by total number of indicators of sustainability: 30). The study assumes that if the level of sustainability is greater than or equal to 4 (80% or more), the enterprises would be considered to be **"highly sustainable"**. If the level of sustainability is less than 4 but greater than 3 (60% or more but less than 80% of the scale), the enterprises would be regarded as **"moderately sustainable"**. Otherwise, the enterprises would be considered as **"unsustainable"** (having lower level of sustainability), having an index value less than 3.

However, the method of assigning equal weights in the indicators has often been criticized for its arbitrariness. Practical experience tells us that all the indicators do not have equal weights, and equal weighting implies perfect substitutability between components of a composite index. For example, when a composite index of sustainability is constructed by giving equal weights to all the indicators, it implies that any variable, say, education is exactly as important as another, say, risk taking power or operational efficiency. But it need not always be true. On the other hand, it may also happen that by combining variables with a high degree of correlation, an element of double counting may be introduced into the index. We, therefore, require a method that can assign weights to the different components of a composite index in an objective manner and find out the factors responsible for achieving high level of sustainability of enterprises. The statistical technique such as the **Principal Component Analysis (PCA)** provides a convenient way of aggregating the indicators into a composite index where the weights assigned to the indicators are determined 'endogenously' on the basis of the given data set.

The PCA has been used in the present study in two stages to determine the composite index of sustainability. At the first stage, with the help of PCA, six (6) sub-indices have been constructed on the basis of 30 indicators (which have been treated as variables in PCA) of sustainability by dividing these into 6 categories according to their nature of relation with the enterprise and the entrepreneur. These indices include-Entrepreneurial **Quality Index** (EQI), Entrepreneurial **Ability Index** (EAI), Entrepreneurial **Power Index** (EPI), Entrepreneurial **Trait Index** (ETI), Enterprise **Capability Index** (ECPI) and Enterprise **Competency Index** (ECMI). Finally, in the second stage, **Composite Sustainability Index (CSI^*)** is determined on the basis of the value of the above six sub-indices.

The PCA in the present study has been performed by using the **Statistical Package for Social Sciences (SPSS)**. The procedures and steps of measurement of the level of composite sustainability index of microenterprises required for undertaking PCA have been performed by using the SPSS software version – 10.

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