III

Approach to the study

The study has resorted to the general framework of the methodology of evaluation of ICT projects as suggested by Bhatnagar (2004)\(^1\) and Rama Rao et. al. (2004)\(^2\), which includes survey among the stakeholders, particularly the users and preliminary discussions with a sample of different types of stakeholders to assess the perceived costs and benefits. It also includes development of indicators to measure different types of benefits, defining a sampling plan and procedure to conduct a structured survey to measure different kinds of attributes both qualitatively as well as quantitatively. This chapter explains the specific methodologies that have been used at various stages of this study.

3.1. Phases of the Study

The study has been carried out specifically by looking into the determinants of the sustainability of selected Akshaya Centres in Malappuram District in Kerala. This has been undertaken in three phases. In the first phase, a detailed survey has been carried out using a pre-tested questionnaire which has been designed on the basis of the Entrepreneurial Assessment Score (EAS) as explained by the Ministry of Information Technology.

Followed by this, in the second phase, an attempt has been made to analyse the sustainability of the Akshaya Centres studied. This has been made possible by the primary data on the capital investment covering computer systems, peripherals and working capital of Akshaya Centers. Profitability of the enterprise has been taken as a direct indicator of sustainability of the center. This has been measured in terms of the cost: benefit ratio, internal rate of returns and the net profit worth.

In the final phase of the study, correlation analysis has been carried out for inferring the extent of relationship between different performance aspects and the
identified determinants of sustainability. Besides, an econometric analysis has been done to delineate the extent of influences of different determinants of the sustainability of Akshaya Project (the dependant variable taken being net profit of the Akshaya Units).

3.2. Location of the Study

The study was conducted at Malappuram, the only district in Kerala where Akshaya Programme has been pioneered.

3.3. Sampling Procedure

Going by the objectives of the study, samples of Akshaya entrepreneurs and citizens who are the customers of the services rendered by the Akshaya Centres were selected randomly from among the respective population.

A sample of 52 Akshaya Centres was selected to draw inferences on the managerial determinants of the profitability and in turn the sustainability of Akshaya Programme. The entrepreneurs of these centres were interviewed to look into the entrepreneurial and socio economic characteristics that would possibly influence the performance of Akshaya Centres. Similarly a sample of 108 beneficiaries of the Akshaya Centres was selected for analyzing the perception of the customers on the effectiveness and utility of Akshaya Programme and the various personal traits that could influence their perception. The samples were selected randomly from among the whole population of 500-600 Akshaya Units in Malappuram District.

Variance of the responses has been enhanced by ensuring that the entrepreneurs belonged to various Akshaya centres with different kinds of activities. Likewise, the beneficiaries were also selected from different educational and socio-economic backgrounds to ensure representation of different categories in the socio-economic strata.
3.4. Selection of Managerial Determinants

Selection of variables that were included in the study was done on the basis of a thorough review of literature on the global, national and state level experiences on ICT- Society interface, dissemination of ICT, e-governance initiatives, and kiosk based public service points. A close examination of the organizational model of Akshaya Centres was also done to elicit the possible factors that might have a bearing on the performance of Akshaya enterprise. The series of discussions with experts on ICT-Society interface and e-governance had also been instrumental in finalizing the variables. The variables may be grouped under different categories as given below:

1. Organizational profile of the Akshaya centres that were selected for the study.
2. Demographic, socio-economic and psychological aspects of Akshaya Entrepreneurs.
3. Factors that would influence the profitability and sustainability of Akshaya Enterprises.
4. Demographic, socio-economic profile of the beneficiaries of Akshaya.
5. Perception of the entrepreneurs on different managerial aspects of Akshaya units that would influence profitability and sustainability.
6. Perception of the beneficiaries on the utility and performance of Akshaya Units

A brief outline of the variables that have been included under each category is given below (See Table 3.1).

**Table 3.1. Description of Variables Under Study**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Category</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Demographic, socio-economic and psychological profile of Akshaya entrepreneurs</td>
<td>Age, gender, Annual family income, Caste/Community, Educational qualification, Achievement motivation, Aptitude for learning and development orientation.</td>
</tr>
<tr>
<td>2</td>
<td>Entrepreneurial profile of Akshaya Entrepreneurs</td>
<td>Professional training, Previous IT related entrepreneurial experience, Previous entrepreneurial experience in other enterprise, participation in</td>
</tr>
<tr>
<td>Sl. No</td>
<td>Category</td>
<td>Variables</td>
</tr>
<tr>
<td>--------</td>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>training, information source utilization, perception on entrepreneurial</td>
</tr>
<tr>
<td></td>
<td></td>
<td>possibilities of Akshaya, participation in training programmes on Akshaya,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>perception on training programme, perception on e-Payment services-advantage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and limitation, perception of limitations.</td>
</tr>
<tr>
<td>3</td>
<td>Organizational profile of Akshaya Centres</td>
<td>Ownership, source of capital mobilization, loan repayment, infrastructure,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>staffing.</td>
</tr>
<tr>
<td>4</td>
<td>Factors influencing sustainability and</td>
<td>Turnover of beneficiaries, number of citizen services rendered, number of</td>
</tr>
<tr>
<td></td>
<td>profitability</td>
<td>training programmes conducted, positional advantage</td>
</tr>
<tr>
<td>5</td>
<td>Demographic, Social aspect of and Citizens</td>
<td>Age, gender, annual family income, community, occupation, educational</td>
</tr>
<tr>
<td></td>
<td>using Akshaya Centers.</td>
<td>qualification, prior acquaintance, dwelling place.</td>
</tr>
<tr>
<td>6</td>
<td>Impact of Akshaya on the Community</td>
<td>Perception of beneficiaries on the use of computers, perception of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>beneficiaries on usefulness of computer, perception on ease of use, reach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>of Akshaya, perception on intervention of the government in e-literacy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>programme, perception on Akshaya as a catalyst for socio-economic change,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>evaluation of e-literacy courses by beneficiaries, use of Akshaya Centres</td>
</tr>
<tr>
<td></td>
<td></td>
<td>by beneficiaries for information gathering and willingness to pay.</td>
</tr>
</tbody>
</table>

3.5. Quantification of Variables

Variables selected for the study included both qualitative as well as quantitative items. Those variables that could be expressed in definite interval or ratio terms such as age, number of years of experience, income etc were quantified as such. Ordinal variables such as attitude and perception of the respondents were measured using scales constructed by means of the methods of summated ratings described by Likert (1932)\(^3\). Arbitrary scales have been used for measuring the factors influencing sustainability and profitability. The variables included in the study of organizational profile have also been quantified using arbitrary scales, depending
on the nature of variables. Some variables have been quantified by using nominal rate.

3.5.1 Construction of Attitude Scales

Statements that form the basic units of attitude scales were drawn based on an exhaustive review of literature, discussion with experts and the informal criteria for the preparation of attitude statements as given by Edwards and Kilpatrick (1948). Subsequently a set of statements, which would reflect the attitude or perception of an individual regarding a given attribute through the degree of his/her agreement with the statement were drafted. These statements were given to the experts in the field of ICT and e-governance for advance rating of the importance of each statement, on the basis of which 30-40 statements were retained for item analysis.

For item analysis, the respondents were requested to respond to each statement in terms of their own agreement or disagreement with the statement as a five-point continuum namely ‘strongly agree’, ‘agree’, ‘undecided’, ‘disagree’ and ‘strongly disagree’.

The responses were assigned numerical weights as follows for positive statements. strongly agree - 5, agree- 4, undecided-3, disagree-2 and strongly disagree -1. The scoring pattern was reversed for negative statements. The respondents were arranged in rank order of the total scores. Twenty five percent of the respondents with highest scores and twenty five percent with lower scores were selected from among the respondents. These two groups formed the criterion group in terms of which evaluation of individual statement was done.

For evaluating the responses of the high and low groups to the individual statements, ‘t’ value was computed for each statement using the formula.
\[ t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{S_H^2}{n_H} + \frac{S_L^2}{n_L}}} \]

where, 
- \( \bar{X}_H \) - the mean score on a given statement for the higher group.
- \( \bar{X}_L \) - the mean score on a given statement for the low group.
- \( S_H^2 \) - the variance of the distribution of responses of the high group of statement.
- \( S_L^2 \) - the variance of the distribution of responses of the low group of statement.
- \( n_H \) - the number of subjects in the high group.
- \( n_L \) - the number of subjects in the low group.

From the statements with 't' values above 1.75, the set of statements for inclusion in the scale were selected.

3.5.2 Reliability of Scale

A scale is said to be reliable only when it will consistently produce the same or similar results when applied to the same sample. Here, the reliability was tested by means of split-half method as detailed below.

The scale was administered to 30 non-sample respondents. The summation of scores obtained by odd numbered items and the summation of scores obtained by even numbered items of the scale for each respondent were correlated by using the Pearson’s product-moment correlation coefficient. The coefficient of internal consistency 'r_{oe}' was worked out using the formula.

\[ r_{oe} = \frac{P_{xy}}{\sigma_x \sigma_y} \]

where,
- \( r_{oe} \) - correlation between odd and even numbered item scores.
- \( P_{xy} \) - product moment of odd and even numbered item scores.
- \( \sigma_x \) - standard deviation of the distribution of odd numbered item scores.
$\sigma_y$ - standard deviation of the distribution of even numbered item scores.

The $r_{oe}$ value obtained will give half test reliability. Therefore, it was corrected using the Spearman Brown prophecy formula and thus obtained the reliability $r_{tt}$ for the total length of the scale.

The formula was:

$$r_{tt} = \frac{2r_{oe}}{1 + r_{oe}}$$

The obtained $r_{tt}$ value was highly significant, thus establishing reliability.

3.5.3 Validity of the Scale

It is the fidelity with which the scale measures what it intends to measure. The scale was tested for content validity as well as construct validity.

3.5.3.1 Content Validity

The main criterion for content validity is how well the content of the scale represents the subject matter under consideration. As the items for the scale were selected from the universe of contents and were verified by experts on the concerned subject, it was ensured that the items covered represent the variables selected for study.

3.5.3.2 Construct Validity

It could be defined as the degree to which a measurement of a given concept when employed in research is able to yield the entire set of relationship that makes a convincing theoretical sense to the researcher.

Here construct validity has been tested by calculating the coefficient of correlation between attitude and achievement motivation. The attitude and achievement motivation of the respondents were found to have significant correlation between them, on the basis of which it was concluded that the scale has construct validity as well.
3.6. Ranking

The study has adopted ranking of the response of the respondents of the study to find out the order of preference of various options in respect of some of the variables under study.

For this, the frequency of different ranks assigned to each of these options are multiplied with the rank scores on an ordinal scale and added to find out the composite preference score for each option. The options would then be ranked based on the aggregate scores. This weighted rank order will give an overall picture of the preferences of the respondents regarding a set of options before them.

3.7. Measurement of Positional Advantage

Positional or location related advantage of the Akshaya Centre has been conceived as the measure of the advantage of an Akshaya centre in terms of the importance of institutions and places of public gathering and the distance of the Centre from these locations. It was measured as an index score, calculated as sum of the product of distance and the score on the relative importance of all public institutions near Akshaya Centre.

3.8. Financial Parameters

The profitability of the enterprise has been identified as a measure of the sustainability and has been measured in terms of Benefit Cost Ratio, Net Present Worth and the Internal Rate of Returns, at specified discount rates. Profitability of the enterprise for a given period was measured to project benefit in terms of the year wise pre and post developmental gross benefit from each activity / enterprise has been estimated. From the projected cost and benefits, the cash flow after taking into account the year wise recurring cost to be incurred in various enterprise components, net benefit and net present worth at the rate of 15% discount factor have been computed.

A project to become viable, Net Present Worth must be positive and BCR must be greater than 1 and 15% discount factor in fulfilling this condition, the IRR has been worked out by using the discounted cash flow technique. IRR for an
enterprise is the measurement at what rate the project will give return to the capital. Different financial parameters used to work out the financial viability of a project are calculated are given below.

**NPW** - Sum of (Present worth of benefit - Present worth of cost) for all years

**BCR** - Present value (worth) of benefits / present value of costs

**IRR** - It is calculated by discounting the cost and benefit of a project at a progressively higher discount rate till the NPW becomes negative.

Thereafter discount factor at which NPW becomes “0” is calculated by mathematical computation which is the IRR of the project.

\[
\text{IRR} = \text{sum total for all } t \text{ of } \frac{(B_t - C_t)}{(1+r)^t} = 0
\]

### 3.8.1 Internal Rate of Returns

The Internal Rate of Return (IRR) is defined as the discount rate that makes the project have a zero Net Present Value (NPV). IRR is an alternative method of evaluating software investments without estimating the discount rate. IRR takes into account the time value of money by considering the cash flows over the lifetime of a project. The IRR and NPV concepts are related but they are not equivalent.

The IRR uses the NPV equation as its starting point:

\[
\text{NPV} = 0 = \text{initial investment} + \text{Cash flow Year 1} + \ldots \text{Cash flow Year } n
\]

\[
\frac{1}{(1+\text{IRR})^1} \quad \frac{1}{(1+\text{IRR})^n}
\]

Whereas, Initial investment - Investment at the beginning of the project,
Cash Flow - Measure of the actual cash generated by a company or the amount of cash earned after paying all expenses and taxes.
IRR - Internal Rate of Return.

n- Last year of the lifetime of the project.

Calculating the IRR is done through a trial-and-error process that looks for the Discount Rate that yields an NPV equal to zero.
3.8.2. Payback Period

In order to assess the viability of Akshaya Units over a period of time, the Payback Period has been estimated for each Akshaya Unit. Pay back period is defined as the length of time required to recover an initial investment through cash flows generated by the investment. The Payback Period lets us see the level of profitability of an investment in relation to time. The shorter the time period the better the investment opportunity.

Pay back period has been estimated using the following formula:

\[ \text{Pay back period} = \frac{\text{Investment}}{\text{Cash Flow (Year)}} \]

3.8.3 Return on Investment (ROI)

It is a straightforward financial tool that measures the economic return of a project or investment. ROI measures the effectiveness of the investment by calculating the number of times the net benefits (benefits minus costs) recover the original investment. ROI has become one of the most popular metrics used to understand, evaluate, and compare the value of different investment options.

Many variations of the ROI equations have emerged over the years, tailored to individual company or industry needs. The standard ROI equation is presented below along with the definitions of the equation’s terms.

Return on Investment is calculated using the following equation:

\[ \text{ROI} = \left( \frac{\text{Net benefits}}{\text{Costs}} \right) \times 100 \]

Net benefits are the difference between the benefits of the project and the associated costs used to generate those benefits.

\[ \text{Net benefits} = [\text{Benefits} - \text{Costs}] \]

In the ROI equation, Net Benefits can be calculated with or without taxes and depreciation. If taxes and depreciation are factored into the equation, the resulting ROI will be a lower value. One could argue that including the depreciation and taxes in the ROI equation would yield a more accurate number; however, this
may not be necessarily the case, since the results can vary according to which tax rates and depreciation schedules are used.

Net Benefits can also be defined as the profit for the first year or as the weighted average profit during the lifetime of the project.

Whereas costs captures all costs incurred to obtain the Net Benefits of the project or investment. The costs term in the ROI equation can be subject to the same considerations as the net benefits term in the numerator.

3.9 Techniques of Data Collection Employed

Separate structured draft interview schedules were prepared for entrepreneurs and beneficiaries. The interview schedules were pre-tested, suitable modification made and finalized. The final forms of the interview schedule are given as Appendix I & II.

The respondents were contacted either at the Akshaya Centre or their houses to establish rapport with them and then to collect data. Questions were put to them in a natural conversational manner and responses were recorded in the schedule itself.

3.10 Statistical Techniques Employed

The data collected from entrepreneurs and customers were coded, tabulated and analyzed using the following statistical techniques.

3.10.1 Percentage  Percentage analysis was used for finding out the distribution of respondents on the basis of the variables identified for study.

3.10.2 Mean Respondents were categorized into low, median and high groups in respect of different variables by means of the following method.

Low - Mean ± Standard deviation
Medium - Mean + Standard deviation
High - Mean ± Standard deviation
3.10.3. Simple Correlation

The nature and degree of relationship between two variables \((x\) and \(y\)) was determined by simple linear correlation. The measure of simple correlation is the coefficient \((r)\)

\[
r_{xy} = \frac{C_{xy}}{S_x S_y}
\]

- \(r_{xy}\) — correlation between \(x\) and \(y\).
- \(C_{xy}\) — product moment of \(x\) and \(y\).
- \(S_x S_y\) — standard deviation of the distribution of \(x\) and \(y\).

3.10.4. Econometric Analysis

To capture the extent of influences of different determinants on the performance of Akshaya on a relative basis, an econometric analysis had been carried out by taking net profit of the Akshaya units as the dependent variable and selected attributes as independent variables. The Econometric Model\(^6\)\(^7\) is represented as \(Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k + U\) where \(Y\) is the dependant variable. \(X\), independent variable, \(U\) the uncertainty factors and \(\beta\)'s constant coefficients.

3.11 Summing up

The study makes use of both micro level as well as macro level analytical tools. Methods like simple correlation has been used at the micro level and it has been subjected to statistical analysis for inferring the level of significance. Also the aggregate level modeling using the econometric analysis helped to make explicit the relative significance of different determinants as the one hand and the context of explaining the phenomenon with significance as a whole and on the average.
References:

6. Forcasting methods for Management (1989), Spyros Makridakis Steven C Wheel Wright, Published by John Wiley & Sons.