BRIDGING THE INNOVATOR-FIRM GAP FOR COMMERCIALISATION OF GRASSROOT INNOVATIONSD: Drawing Lessons from a Study of a Targetted Technology Financing Scheme in India

BY

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Abstract

While some grassroot innovators in India have been found to freely distribute their sustainable development innovations without seeking commercial gain, a major predicament for many not-so-altruistic innovators can be their inability to either commercialize their innovations for profit on their own, or to find the appropriate and interested industrial firms to do so. This inability of innovators can emerge either from a lack of appropriate industrial firm contacts and knowledge for initiating commercial activity or a lack of financial resources or both.

Information gaps in the process of commercialisation of grassroot innovations are sometimes met in an adhoc manner - either by accident or an extensive and expensive search process. Even when the information gap is met, the lack of financial resources and the inability of the innovator or the industrial firm to take up the entire financial and technical risk of the project can considerably reduce the innovation's chances of reaching the market.

Therefore, there is clearly a need for a new institution, or a programme implemented by an existing institution, that is targeted towards providing additional financial, technical and administrative resources to both the entrepreneurial firm and the innovator. Such an institution can also act as a bridge between the grassroots innovator and the firm. What should be the nature and role of such an institution? What resources should it have and how should it build these resources? How should it seek and select appropriate grassroot innovations to support? How should it select the appropriate firms to commercialise selected innovations? What roles should it play in the entire commercialisation process?

This paper seeks to propose tentative answers to these important questions by drawing lessons from an earlier study based on a successful innovative technology financing programme in India. This programme was initiated by an Indian developmental financial institution and targeted specifically towards supporting industrial firm - technology institution joint technology development projects with the overall objective of facilitating long term interaction between the two organisations. This programme and its implementation holds important lessons as it has strong parallels to the nature of the institution or programme required for supporting grassroot innovations as argued above.

Such initiatives are important in the developing country context as they can promote the emergence of indigenous knowledge from the grassroots, bridge the innovator-firm gap, reward grassroot innovators and facilitate entrepreneurship targeted at sustainable development.

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Introduction

While some grassroot innovators in India have been found to freely distribute their sustainable development innovations without seeking commercial gain (Pastakia, 1996), a major predicament for many not-so-altruistic innovators can be their inability to either commercialize their innovations for profit on their own, or to find the appropriate and interested firms to do so. This inability of innovators can emerge either from a lack of appropriate industrial firm contacts and knowledge for initiating commercial activity or a lack of financial resources or both.

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Therefore, there is clearly a need for a new institution or a programme implemented by an existing institution that is targeted towards providing additional financial, technical and administrative resources to both the entrepreneurial firm and the grassroots innovator. Such an institution can also act as a bridge between the innovator and the firm. What should be the nature and role of such an institution? What resources should it have and how should it build these resources? How should it seek and select appropriate grassroot innovations to support? How should it select the appropriate firms to commercialise selected innovations? What roles should it play in the entire commercialisation process?

This paper seeks to propose tentative answers to these important questions by drawing lessons from an earlier study (Prabhu, 1996a) based on a successful innovative technology financing programme in India. While the programme itself was not the focus of that study, it provided the research site for the study and was thus studied in detail. This programme, called the Sponsored Research and Development (SPREAD) programme was initiated by the Industrial Credit and Investment Corporation of India (ICICI), an Indian developmental financial institution[1] (DFI) and targeted specifically towards supporting industrial firm - technology institution[2] (TI) joint technology development projects with the overall objective of facilitating long term interaction

[1] a private or public institution which provides promotional services and medium and long term finance to public or private development oriented and bankable projects (Pandey, 1983).

[2] not-for-profit institutions, including universities, involved in technology research and development

between the two types of organisations. This programme and its implementation holds important lessons as it has strong parallels to the nature of the institution or programme required for supporting grassroot innovations for sustainable development as argued above. Such initiatives are important in the developing country context as they can promote the emergence of indigenous knowledge from the grassroots, bridge the innovator-firm gap, reward grassroot innovators and facilitate entrepreneurship targeted at sustainable development.

This paper first presents the Indian context of the technology financing programme and the support structure that exists in India for TI-firm interaction, simultaneously drawing a parallel to the case of the commercialisation of grassroots innovations for sustainable development. It then presents the background and structure of the SPREAD programme, the ICICI's experience in the implementation of the programme including the project selection process at ICICI and the activities subsequent to the sanction, the benefits of the programme as seen from both the ICICI's and the firm's points of view and the potential contribution of the programme. These descriptions of the SPREAD programme are interspersed with comments on the relevant lessons that can be drawn from this programme for the establishment of a similar programme that is targeted towards providing additional financial, technical and administrative resources for bridging the gap between grassroots innovators and industrial firms for the commercialisation of grassroot innovations for sustainable development.

The Indian Context for the Programme

India has a large number of TIs catering to a variety of specialised areas of technology development and industrial research. However, though these TIs have developed a number of new products and processes, till recently their record of successfully transferring these technologies to the industry for commercial exploitation has been poor (Alam and Langrish, 1984; Lall, 1992). Before the liberalisation of the Indian economy in 1991, TIs that were supported financially by the government were under no pressure to sell their technology output or expertise to industry to earn revenue. On the other side, there was little incentive for Indian firms to use indigenously developed technology as they faced little or no competition from the latest technology and could produce and sell goods made through cheap and often outdated technology imports. However after liberalisation, the government supported TIs have to now meet at least half their costs through technological sales, industrial consultancy and sponsorships and this has forced them to seek more commercial outlets for their R&D output and expertise. Indian firms too are facing a higher cost for technological imports due to rapid currency devaluation and foreseeing that they are likely to face increasing technological competitive pressure from world-wide, are exploring indigenous R&D facilities for new and cheaper technology. This has resulted in increased pressure on both firms and TIs to seek each other to establish mutually beneficial linkages. While such pressures have resulted in various types of spontaneous technological and commercial arrangements between firms and TIs for mutual benefit (Prabhu, 1996b), the Indian government and DFIs have also taken an active role in promoting and supporting such arrangements as described in the next section.

In the case of the commercialisation of grassroot innovations for sustainable development, the grassroots innovators, like the TIs in the case above, seek commercial outlets for their innovation. The pressure on Indian firms to seek indigenous sources for new technology does

exist as in the case above. However there exists an information gap as the firm and the innovator often do not know each other, or enough about each other, to be able to jointly work towards the commercialisation of the grassroots innovation. Secondly there is often a need for suitably scaling up the grassroots innovation and diffusing it over a larger user population in order to make it commercially viable - an effort that needs both financial and technical resources as well as a high risk taking ability - which are often beyond the capability of either the firm or the innovator. Therefore there is a strong case for external support to aid this commercialisation process as has been done in supporting TI-firm arrangements as described in the next section.

Support Structure in India for TI-firm Interaction

The Indian government has supported mutually beneficial interaction between industrial firms and TIs by subsidising financing of TI-firm R&D contracts to make them more viable. The government gives firms a higher tax credit for R&D expenses paid to TIs for contracted R&D compared to in-house R&D expenses. A similar incentive structure from the government can go a long way in supporting the commercialisation of grassroot innovations.

The major DFIs in India have initiated schemes in which they give conditional grants or concessional loans to firms for technology development and enterprise creation activities with the help of Indian TIs. Under technology development, DFIs in India have introduced programmes which provide firms and TIs multiple and complementary types of support (Prabhu, 1994). Some of the types of support provided are: (a) educational support - eg. training of entrepreneurs and technical personnel in India and abroad, (b) technical support - eg. consultancy and development of project profiles, (c) informational support - eg. creating awareness of business opportunities, (d) infrastructural support - eg. providing expensive common testing facilities to groups of firms on a rental basis, (e) planning support - eg. assisting in the development of feasible and efficient project plans, (f) managerial support - eg. assisting in the administration of projects and turnarounds, (g) financial support - eg. in tax and portfolio investment planning, (h) purchasing support - eg. help in technology sourcing and purchase, (i) marketing support - eg. help in identifying markets in India and abroad, and (j) interactional support - eg. initiating and convening TI-firm interaction exercises (Prabhu, 1994). Apart from providing these specialised inputs, the DFI also adds value (Lam, 1991) by collaborating with the firm in implementing the venture by actively providing managerial and knowledge support throughout the product/process development and possibly the market launch period.

There obviously exists a strong parallel to the above in the types of support that are critically required in the case of the commercialisation of grassroots innovations for sustainable development. Indian DFIs should therefore explore the possibility of supporting, in a similar manner, both grassroots innovators and firms in the important process of commercialising grassroots innovations for sustainable development. The paper now focuses attention on one TI-firm interaction support programme, the SPREAD programme of the ICICI, whose structure and implementation process holds important lessons, as it has strong parallels to the nature of the institution or programme required for supporting commercialisation of grassroot innovations for sustainable development.

Background and Structure of the Programme[3]

The ICICI was selected by the Indian government and the World Bank as an agency to implement a large part of the US$ 200 million Industrial Technology Development Project (ITDP) being funded by the World Bank. The objectives of the ITDP are "to provide functional support for technology imports, to strengthen the science and technology infrastructure and make it relevant to industry and to promote innovation financing" (Najmabadi and Lall, 1995 p. 90). One of the programmes under ITDP is the US$ 15 million SPREAD programme, a pilot programme of the World Bank, which provides soft loans for TI-firm joint R&D projects. This programme was developed specifically to encourage the industry to go to research institutes. A similar programme targeted towards encouraging the industry to go to grassroots innovators for jointly developing and commercialising grassroots innovations, can go a long way in encouraging and supporting such innovators and their innovations.

The SPREAD programme is a unique programme and it is the first time that the World Bank has attempted this type of a scheme. A revolving fund has been created which is managed entirely by the ICICI. The stated objectives of the SPREAD programme (ICICI, undated) are: (a) to encourage industrial firms to substantially increase their R&D activities, (b) to foster closer links between industry and technology institutions, (c) to utilise the existing infrastructure in technology institutions to the fullest extent possible, (d) to assist industrial firms in improving the cost effectiveness in R&D projects and (e) to assist industrial firms in shortening the R&D project cycle. The objectives for a similar support programme for the commercialisation of grassroot innovations for sustainable development could probably be restated as follows: (a) to encourage industrial firms to substantially increase their R&D activities that are oriented towards developing and commercialising grassroot innovations, (b) to foster closer links between industry and grassroot innovators, (c) to utilise the existing knowledge base among grassroots innovators to the fullest extent possible, (d) to assist industrial firms in improving the cost effectiveness in sustainable development R&D projects and (e) to assist industrial firms and grassroot innovators in shortening the innovation to commercialisation project cycle.

Types of projects which are eligible for SPREAD support are (ICICI, undated): (a) development of new product or process, (b) significant improvements in an existing product or process and (c) scaling up of a technology developed by a TI. Activities eligible for funding are (ICICI, undated): (a) pre-feasibility studies, (b) laboratory trials and (c) prototype building and pilot plant operations. The ICICI requires that the projects should (a) have feasible and quantifiable objectives, (b) not take longer than 18 months to two years to complete and (c) envisage division of major activities between the industrial firm and the TI. The firm contributes atleast 50% of the investment, while the ICICI contributes the remaining as a conditional loan to the firm which may be written off at the discretion of the ICICI if the project fails. The maximum

[3] This description of the SPREAD programme and the experience of the ICICI in its implementation presented subsequently in this paper, draws extensively from interviews with ICICI officers implementing the SPREAD programme and interviews with project participants conducted for the study (Prabhu, 1996a). The ICICI brochure on the SPREAD programme, the SPREAD programme appraisal and documentation formats and a World Bank assessment report (Najmabadi and Lal, 1995) are also used. Line by line references to these multiple sources are avoided, except where essential, in order to aid readability.

assistance for a firm is Rs. 15 million on condition that it does not exceed the net annual increase of the average R&D outlay of the firm for the preceding two years. The loan cannot be used to finance ongoing R&D projects. It is charged at the rate of 6% per annum during the project implementation and at 15% per annum on conclusion of the project - to be repaid over upto ten years after commercialisation. Disbursement of funds is closely co-ordinated with the successful achievement of bench marks given in the proposal and agreement (ICICI, undated). This basic structure can be adapted without any major change in the case of a similar support programme for the commercialisation of grassroot innovations for sustainable development.

Experience in Programme Implementation

The ICICI initiated the SPREAD Programme in 1991. It sanctioned low cost loans to over eighty five firms in its first four years. As these loans are returnable conditional to project success, the ICICI takes part of the project risk and acts as a catalyst for the joint activity. The ICICI also adds value to such R&D projects through managerial support using expertise developed over multiple projects and specialised training (Prabhu, 1996a). The SPREAD programme has met with some success in the task of reducing the gap between the potential existing in the TIs and their exploitation by firms (Business India, 1993).

For initial publicity, ICICI organised a seminar in which industry CEOs were invited. The programme was launched in their presence. Large scale seminars were organised through ICICI's zonal offices in a number of cities all over the country. The ICICI team also participated in several seminars organised by the industry including general management seminars, technical seminars and specific industry seminars and made presentations on the TI programme and the SPREAD programme. They prepared brochures on these programmes and sent them to all major industrial clients of ICICI which were doing R&D, industries which had the Department of Scientific and Industrial Research (DSIR) recognised R&D units, and industry associations. To update their list for sending brochures on a continuous basis they check which companies are recruiting R&D professionals and follow up on companies through magazines and industry association publications. Also each TI sends them an activity report where they also mention the list of firms involved in consulting projects. The ICICI is actively promoting the scheme to firms and TIs (Business India, 1993). The larger firms are usually in regular contact with the ICICI and visit it frequently as the ICICI and other financial institutions are their institutional investors and have also provided various kinds of loans to them. ICICI representatives are also on the board of such firms. So apart from the brochure and industry conferences, these firms informally come to know about the SPREAD programme through this frequent contact. Other firms, which have had no previous contact with the ICICI, come to know about the SPREAD programme through articles in industry journals or through announcements in industry association circulars. Since the programme was new to the country and was evolving, the ICICI was typically not faced with a wide choice of proposals in the initial years of the programme (Prabhu, 1996a). The publicity mechanism required for a similar support programme for the commercialisation of grassroot innovations for sustainable development can be different. The implementing organisation would probably have to seek the help of several regional and national level networking organisations such as NGOs which have developed linkages and communication with grassroots innovators spread across the country, specially in rural areas.

The SPREAD programme is implemented by a programme implementation team headed by a general manager of the technology group at ICICI Mumbai. The technology group administers the SPREAD programme along with other technology development programmes of the ICICI. As head of the technology group, the general manager is responsible for monitoring the evaluation of SPREAD financing project proposals from firms, their being placed before the ICICI approvals committee of which he is also a member, monitoring the project progress and controlling funds disbursement. He is assisted by four people who act as project co-ordinators from ICICI each of whom are allotted roughly a quarter of the projects according to their interest and technology competence areas. They all have different basic engineering qualifications and between four to five years industrial experience in areas like new product development, engineering, production, quality control and technology transfer. Projects from fields other than those of their basic technical qualification or experience are usually distributed in such a way that the workload is evened out. The co-ordinators usually seek the help of each other and other technically qualified and experienced people within and outside ICICI for clarification on technical matters. Their responsibilities include helping the firm develop the project proposal as required, preparing an evaluation report with recommendations, placing the report before the approvals committee and once approved monitoring the project progress and controlling funds disbursement according to the norms of the SPREAD programme (Prabhu, 1996a). In the case of a similar support programme for the commercialisation of grassroot innovations for sustainable development, it would be essential for the programme implementation team to also have, apart from the basic technical and managerial qualifications and experience, some experience and exposure to the work of grassroots organisations working on sustainable development. This may help them in developing a deeper and more contextual understanding of the social and ethical dimensions of the grassroots innovation process (Pastakia, 1996).

Project Selection Process

Under the SPREAD programme, the firm usually has a preliminary discussion with the ICICI co-ordinators to assess the prima faci eligibility of the project before preparing a preliminary proposal (Prabhu, 1996a). The SPREAD programme brochure given to the firm (ICICI, undated) includes a performa for preparing the preliminary proposal. The information sought by ICICI in its preliminary proposal for financing under the SPREAD programme are given in the Box below. The ICICI team assesses the preliminary proposal primarily on its developmental content and commercialisation potential. They normally reject a proposal if: (a) the development content is low (eg. only a small change in the product is attempted - the development must be a significant improvement and not a minor change), (b) material availability is likely to be a problem, (c) it is a repetitive type of product (eg. it has been done before by another TI - in such cases the ICICI advises the firm to go to that TI so that there is no duplication of effort), (d) there is no clear division of work responsibility between TI and firm, (e) the gestation period is very long (five to six years) - they look for a two to three year total developmental cycle, and (f) the market is limited, not established yet or major efforts are required to build the market (unless there is financial backing of a large business house which can invest in commercialisation). Some projects are rejected if the promoter background is poor - eg. promoter has been found to be a financial defaulter or has siphoned cash or is doing financial manipulation (Prabhu, 1996a).

Box: List of Preliminary Proposal Details (ICICI, undated)

Name and address of firm, brief particulars of the firm, latest audited annual report, research and development done by firm including major areas of R&D, brief description of R&D facilities, current R&D budget, number of persons engaged in full time R&D activities, major R&D achievements, brief particulars of R&D projects sponsored in the past by the firm with technology institutions, project title, uses of project process, innovative content, name and designation of person in charge of R&D programme in firm, name and address of TI, key persons in the TI who will be involved in the project, major steps involved in the R&D project, break-up of major activities to be undertaken by the firm and the TI, aim of the project in quantitative terms, economic justification for undertaking the project, cost-benefit analysis, brief particulars of work already carried out on the project, outlay on project at firm, outlay on project at TI, schedule of implementation of R&D project, cost of commercialisation of R&D project, time required for commercialisation, and expected sale from the commercial venture.

In the case of smaller firms, the firm is also required to identify the customer(s), have a dialogue with them and get their support. The firm has to establish user commitment or the link with users. The ICICI checks whether the basic guidelines are being followed - eg. that the TI plays a complementary role and is actually being utilised, that the firm is only listing equipment specific to the project and not other equipment. The project is screened on these programme guidelines. Based on their experience, the ICICI team also assesses the technical feasibility of the project - eg. if the scale up factor is very high from laboratory scale to pilot scale there are likely to be problems in some industries. They advise the firm to reassess the project - possibly with external expert help. Some projects are restructured so as to require the firm to do it in stages and financing for each stage depends on the results of the previous stage. Some R&D activities are also broken up and the firm asked to contact TIs and see if each activity is possible. These suggestions are often given more as guidelines rather than as stipulations for sanctioning the loan (Prabhu, 1996a).

Based on the detailed discussions and the preliminary proposal a customised detailed proposal format is created for the firm by the ICICI team. Initially ICICI had developed a common detailed proposal format. During the first few projects under the SPREAD programme, they realised that there were difficulties in using a common format due to industry and technology differences which either made the format inadequate or rendered parts of it redundant. So instead of expanding the common format, customised formats were then developed for subsequent projects, based either on the technology or project requirements. While the detailed proposal formats are customised to each firm and project, the customisation is largely with regard to the project technology. The other details are largely common across all formats (Prabhu, 1996a).

Before the appraisal report is prepared, the ICICI project co-ordinators visit the firm, examine the facilities at the firm and meet the project participants. They look into what the firm is currently doing, the quality rejection levels, capability, R&D structure, organisation etc. They

also talk to the customer if needed. They then visit the TI jointly with the firm personnel, meet the TI scientists and examine the TI's facilities. They look into the track record of the TI and the scientist - background; record of projects completed or left incomplete, the composition of the project team - member's qualifications, experience and multi-disciplinarity of the team, the time available with the scientists for such work, their experience in relation with industry and with the firm personnel, and their interaction with industry (Prabhu, 1996a).

On the basis of their filled in detailed proposal, the visit and discussions the ICICI project co-ordinator and the general manager prepare the project appraisal report with their recommendations. This report is circulated among the sanctioning board members - consisting of directors of technology industries and ICICI directors who receive it about ten to fifteen days in advance of the board meeting. The project is then discussed in the board meeting. If required the firm and/or TI representative is asked to make a presentation to the board. The board questions the project appraisal team or the industry representative who attends the meeting to try and get the entire picture. The questioning is more on the management aspects and background of the project and firm. The board meeting is only at the final stage of project selection. The TI or firm people are called only if needed. The ICICI team seeks clarifications from the firm or TI after the meeting if required. Separate meetings are also held later with some board committee members, if necessary (Prabhu, 1996a).

Apart from their feasibility and viability, the ICICI evaluates projects on their potential contribution to technological development. On developmental and encouragement grounds (to promote activity in areas of technology neglect and to promote desirable co-operation between TIs and firms), projects which are expected to yield adequate rather than high returns may also be financed. "In selection we look at a large number of variables such as promoter, company, scientist, product, market, background and given this high complexity there is no clear model to guide us about which project to approve," said one of the programme co-ordinators (Prabhu, 1996a). Apart from the selection norms of the SPREAD programme, unique features that support a project are considered positively and are considered important build confidence within the ICICI in financing the project (Prabhu, 1996a).

As observed in the description of the SPREAD programme project selection process given above, the ICICI comprehensively examines the proposed project, the promoting firm and the collaborating TI, both individually as well as jointly, in order to determine whether to support the project or not. A similar approach is essential in the case of a support programme for the commercialisation of grassroot innovations for sustainable development. The programme implementing organisation needs to comprehensively examine the proposed commercialisation project, the grassroot innovator and the promoting firm, both individually as well as jointly, in order to determine whether to support the project or not. In doing so it may need to take the help of several grassroot organisations for additional information.

An important difference from the SPREAD programme process described above is that while the firm normally approaches the ICICI after it has contacted the TI and finalised the project, in the latter case the programme implementing organisation would normally be approached directly and independently by the grassroots innovator or his or her representative grassroots organisation and the programme implementation organisation would have to take an active role in identifying the potential firm for commercialising the innovation. Thus, the programme

implementing organisation would normally be expected to have a greater say in the choice of the collaborating firm. It would also have to maintain a strong database and network with both potential firms and potential grassroots innovators to be effective in taking this bridging role upon itself. While the ICICI does take up the bridging role occasionally, it has not had to take up this role very actively in the SPREAD programme (Prabhu, 1996a).

Activities Subsequent to Sanction

Once the project is sanctioned under the SPREAD programme, the firm has to open a separate "no lien" bank account for the loan and has to bring in its own balance of contribution. It also receives a format for the preparation of quarterly progress reports. This format lists the technology and feasibility report based milestones and also lists issues that are peculiar to the project. It also covers the site monitoring of the project, frequency of meetings and the concurrent transfer of technology. The project is monitored by the ICICI co-ordinator through visits to the company and the institute once in six months to see the project progress and initiate action in case of delay. Tripartite meetings are usually held. The firms also take the initiative to come over to the ICICI to discuss their project progress and to keep the ICICI informed about problems, successes and plans. Sometimes initial reminders from ICICI are needed regarding reporting, specially for firms which are not familiar with such requirements. Disbursement is linked to progress reports and auditor's certificate for payments made. At the end of the project a visit is made to the project site for evaluation and the loan repayment schedule is decided in case of success. In case of project failure the firm has to give a convincing representation requesting for the loan being written off and the ICICI board then considers the case. Delays can be due to negligence or genuine problems. In case of delay, the ICICI person goes over and assesses the reasons carefully. If the delay is for technical reasons inspite of best efforts, the cause of the delay is analysed and the firm is then asked to draw out a fresh plan to prevent further delay (Prabhu, 1996a).

The ICICI helps in the formulation and structuring of the project both for capital and operating costs. They help in the formulation of the project team and setting up of the monitoring structure in an advisory capacity. They can also set conditions for future disbursement. In case the firm is contracting a TI for the first time, they set guidelines on the scope and type of the memorandum of understanding they should build in terms of what should be covered - time, financing, responsibility etc. In one case the ICICI even identified the customer for a firm. In another case they found a buyer firm to take up the product for commercialisation when the firm which built it could not do so. Some firms have difficulty in selling the product and doing third party inspections. Other activities in which they assist are legal documentation, consulting fees and disbursements. However in all these cases, the ICICI avoids taking a lead or larger role in the project. They believe in letting the firm take the "ownership" of the project. This helps the firm and TI retain a greater interest in the project as they take all the major decisions. This also prevents the firm from possibly blaming failure on the ICICI's interference if it took a larger role in the project (Prabhu, 1996a). The basic structure of activities and roles taken by the ICICI subsequent to sanction can be adapted without any major change in the case of a similar support programme for the commercialisation of grassroot innovations for sustainable development.

Benefits of the Programme

The ICICI sees the benefits of the SPREAD programme to the industry as (ICICI, undated): (a) support for projects at all stages of the R&D cycle starting from laboratory and pre-feasibility studies to proto-typing and pilot plant operations, (b) facilitating access to the large pool of scientific talent and the extensive laboratory facilities of the technology institutions in the country, (c) help in obtaining greater mileage out of the company's R&D budget through substantial savings in capital investments in major facilities and employment of personnel, (d) encouraging small scale industries to undertake R&D programmes which they would not be in a position to do on their own, and (e) help in establishing a continuing relationship with technology institutions which can significantly expand the scope of the company's R&D activities. Similar benefits may be seen in the case of a similar support programme for the commercialisation of grassroot innovations for sustainable development such as: (a) support for innovative sustainable development projects at all stages of the project cycle starting from laboratory and pre-feasibility studies to proto-typing and pilot plant operations, (b) facilitating access to the large pool of indigenous knowledge and innovative talent among the grassroots in the country, (c) help in obtaining greater mileage out of the company's R&D budget through substantial savings in capital investments in major facilities and employment of personnel, (d) encouraging small scale industries to undertake sustainable development commercialisation programmes which they would not be in a position to do on their own, and (e) help in establishing a continuing relationship between grassroot innovators and industrial firms.

ICICI's expectations from the SPREAD programme projects are not only in terms of technical and commercial success. They see it more as a starting point for a process of TI-firm interaction and not only at commercial end results (Prabhu, 1996a). Nevertheless many SPREAD projects have had good commercial success also (Business Today, 1993). The TI-firm link continues in many cases with the firm retaining the TI for consultancy projects later. However the link is not of a continuous link (the TI "membership" concept) but is more project specific. Other benefit include know-how updation for the TI and knowledge upgradation for the firm. The TI also gets exposure to the current industrial situation (Prabhu, 1996a).

The SPREAD financing benefits seen by firms are varied. Prior to the SPREAD programme (and other technology development programmes of the ICICI which were initiated at about the same time), there have been no schemes in India for specifically financing R&D projects by firms. Therefore firms and TIs in general were not familiar with the special requirements of project proposal preparation and reporting for R&D projects. Firms could avail of venture capital financing and other types of project financing in which one of the components of the project cost was for R&D, but it did not require any different treatment. In this study (Prabhu, 1996a), it was found that the firms which had relatively low risk - high investment projects or a portfolio of projects saw the primary benefit as getting a loan at a low interest rate which enabled them to expand the scope of their project or enlarge their new product development portfolio. The firms which had relatively high risk - high investment projects saw the primary benefit as risk reduction by the 50% funding and the "if/then" clause of non payment in case of failure. They were unable to make the substantial investment required on their own, more so due to the high perceived risk associated with it. Firms with relatively low risk projects but having low investment capacity saw the major advantages in taking SPREAD financing as: (a) low interest rates, (b) repayment over a longer period and (c) the loan being free of the need to

hypothecate their assets. The last gave the firm an additional line of credit and increased their borrowing capacity as they could hypothecate their assets for other loans. Financing under the SPREAD programme could combine with the greater tax credit available for R&D projects subcontracted out to TIs to make a potential project more financially viable for the firm (Prabhu, 1996a). Similar benefits may be seen in the case of a similar support programme for the commercialisation of grassroot innovations for sustainable development.

Potential Contribution of the Programme

By financing TI based R&D projects for industrial application, development financing through DFIs fill an important gap (Jequier and Hu, 1989; Bhatt, 1993) for both firms and TIs as one of the components of the infrastructure supporting technological entrepreneurship (Van de Ven, 1993). A DFI can also act as an intermediate organisation (Shin, 1993) in implementing promotional industrial development policies of the government. External financial aid can encourage R&D work in some high growth - high risk areas, where both firms and TIs find it difficult to either single handedly, or jointly, take the entire investment risk. The entry of technology financing through DFIs may reduce the risk and investment for low internal resource firms till they are willing to take up the high risk - high return R&D project jointly with TIs. Also such financing can be channelled consciously by the DFI into priority sector research and can therefore complement venture capital financing by supporting priority projects which may not be easily acceptable under usual venture capital financing norms. This DFI initiative is important as it helps combine institutions to increase the utilisation of available resources and facilitates the emergence of new commercialisable products or processes. It therefore corrects a situation of partial market failure and has potential for stimulating growth through technological development (Prabhu, 1996a). This indicates the potential contribution of a similar support programme for the commercialisation of grassroot innovations for sustainable development. External financial aid can encourage grassroot innovators and firms to develop and commercialise sustainable development innovations in high risk areas, where both firms and innovators find it difficult to either single handedly, or jointly, take the entire investment risk. Such initiatives are also important in the developing country context as they can promote the emergence of indigenous knowledge from the grassroots, bridge the innovator-firm gap, reward grassroot innovators and facilitate entrepreneurship targeted at sustainable development.

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