

**SMALL ENTERPRISE
DEVELOPMENT AND
THE INTERNATIONAL
DEVELOPMENT
RESEARCH CENTRE**

SUPPORT FOR RESEARCH

January 1993

**Small enterprise development
and the
International Development
Research Centre**

Support for research

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ISBN 0-88936-661-6



Printed on recycled paper

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FOREWORD

IDRC has supported a wide range of research projects focused on some aspect of small-scale enterprise. These tended to be designed and implemented in a typically independent fashion, reflecting the Centre's flexible and decentralized mode of operation. However, it gradually became apparent that there was considerable potential, if not actual, room for complementarity between the activities of different parts of the Centre, and an informal working group was established to help realize this potential.

Not long thereafter, the Centre undertook the most fundamental reorganisation of its program and operations since its inception in 1971. As part of the changes, it was decided that much more focus was needed across the Centre and through a multidisciplinary approach, in order to maximize the impact of our modest financial resources. Happily, small enterprise has survived as one of the priority themes to be pursued. Thus the first tentative steps of the informal working group now appear to have been headed in the right direction.

Other than information-sharing meetings, those first steps consisted of the creation of an inventory of all relevant projects funded by IDRC to date, the invitation of a Canadian specialist in the field to speak at IDRC, and the contracting of that same specialist to review and critique the broad lines of our activities in small enterprise. That specialist was Prof. Albert Berry of the Economics Department at the University of Toronto.

Now that the Centre has given the green light to build on our past experience in this thematic area, it seems appropriate to pull together some of these threads in this document. We draw heavily on the contributions of Prof. Berry, for whose assistance we are deeply indebted without in any way implicating him in the version of his ideas herewith presented.

The attempt to characterize past project activity is very much our own, as is the attached inventory. Neither is as complete as we would ideally have preferred. However, we are confident that this compilation will provide, for those both outside the Centre and within, a useful picture of what we have done to date. By combining it with some reflections on the role of small-scale enterprise, this document should also help guide us as we strive to build a more effective IDRC.

Philip English
Working Group on Small Enterprise

THE ROLE OF SMALL-SCALE ENTERPRISE IN DEVELOPING COUNTRIES: SOME GUIDING PRINCIPLES

Historical Patterns

The small farm is the locus of most employment during the early stages of a country's development. Such manufacturing activity as takes place is also for the most part undertaken in small establishments, some in rural and some in urban areas. It is only in the middle and later stages of development that a high share of all employed persons work in large establishments.

Looking just at the manufacturing sector, studies have confirmed that a typical sequence over the process of development is one in which what we will arbitrarily call "large" establishments (LE) with more than 100 employees account for only a very small share of sectoral employment in the beginning - 5% or so might be the average, though the figure varies from region to region and depends on size of country, colonial experience and a variety of other factors. Most workers (perhaps 80% or so) would be engaged in "household" enterprises (HH), which usually have just a few workers.

Between these two categories, are "small and medium" enterprises (SME), which we will define as having 5-99 workers, typically hiring non-family members and thus having a more formal sort of contract with the workers. One should not exaggerate the contrast between the HH sector and the smaller of these SME, but note that the latter category tends to operate rather differently both from the household establishments and the large-scale ones. The share of manufacturing employment in this size range is likely to be higher than in the large-scale category in the early stages of development.

We have chosen to steer clear of the term "informal sector" in order to avoid the debate over what constitutes being "informal". In some countries, even microenterprises are generally registered with a government agency, while in others medium and even large-scale companies may exhibit elements of "informality" to the extent that they operate outside official regulations. On the other hand, size as measured by the number of employees tends to be a reliable indicator of similarity in enterprise characteristics, and certainly more easily defined and measured.

As a country develops the usual pattern of manufacturing employment is that the share in HH establishments falls while that in the large firms rises. These are secular trends, usually with no breaks, unless the country's development is seriously interrupted. The trend in the employment share of the SME sector tends to rise up to a certain level of development and then fall. While it is rising it gains at the expense of the household sector; though, in fact, some household establishments grow into SMEs. By the middle stages of development, the employment share of the household sector has fallen considerably and subsequent trends involve mainly the competition between the SME sector and the LE sector, with the latter typically increasing its share, leading sooner or later to a decline in the SME share.

Why do matters normally unfold as just described, is it good that they do so, and is any form of government involvement appropriate to influence either the pattern of evolution or the performance of the different size categories? The answer to the last broad question is obviously "yes", and we return to it below.

No one has answered the first question in a definitive way, but there is an underlying economic logic. It is based on the initial scarcity of capital and hence dependence on labour-intensive technologies, which eventually give way to more capital-intensive ones as the supply of capital increases. Since capital-intensive technologies tend to be characterised by economies of scale, large firms become more important over time. It would clearly be inefficient if no large firms came into existence, since in some industries it is likely that economies of scale are unavoidable for technical reasons.

Probably the actual evolution of the size structure roughly approximates the optimal evolution, at least in very broad terms. But there is no general reason to believe that at any given point in time the market/institutional system will generate a distribution of firms by size which is "just right". Governments may (and almost always do) intervene in a variety of ways which affect the size distribution of firms, some apparently neutral but not so in fact, others clearly the result of vested interests reflecting themselves in policy. Generally, governments are more the creature and the servant of powerful interests than of weaker ones, and powerful interests are normally associated more with larger than with smaller firms. Thus it would not be hard to believe that the LE sector might be overdeveloped relative to its optimal level at a given point of time because of biases in public policy.

The nature of the competition among firms of different sizes may also push their relative roles away from what would be optimal. Large firms which acquire strong monopoly or oligopoly positions may be able to discourage competition from smaller ones not just through the already cited channel of public policy bias in their favour, but also through direct action to ward off the threat that these smaller potential or actual competitors pose. And to the extent that large firms in LDCs engage in research and development, they will of course search, *ceteris paribus*, for technologies which will lower their own costs more than they lower the costs of smaller (or any other) competitors; such firms would not be expected to search for the sort of "intermediate technology" which might allow smaller producers a foothold in the market.

The Role of Household and SME Productive Activities

Perhaps the first point deserving of emphasis with respect to the role of the small-scale sector (SSS, which includes both the HH sector and SME) is that there is no inconsistency between the idea that its role, especially that of HH, will diminish as a country becomes more developed, and the proposition that at the earlier stages of development it is economically efficient, a good place to invest resources from the national point of view, and a sector which deserves public support.

Some policy makers are inclined to think that if a branch of the economy is efficient, that means that it will be so permanently. This point of view reflects the failure to understand that efficiency or comparative advantage is not an absolute, and that the process of development involves a series of stages; countries which try to jump the intermediate stages (for example, by jumping directly from an essentially HH sector to one where LE plays the dominant role) tend to pay for it in lost efficiency, the resulting loss of growth, and greater income inequality. Different types of firms are most efficient at different stages of development, because of the changes in the relative scarcity of the different factors of production, among other things.

The most commonly stated rationale for the support of smaller production units (whether HH or SME) is their employment creating capacity. It is quite clear that this desirable feature does warrant our attention. Unfortunately it has too often been treated as if it were the only advantage of these producers; frequently support for them has been viewed as part of social welfare policy, a way to provide support to a needy group.

Some authors and many policy-makers have talked of the trade-off between the superior income distribution effects of support for small producers and the greater efficiency of resource-use achieved by the larger firms. This way of putting things is dangerous, since it tends to dismiss or downplay the fact that often the small producers are superior on the economic efficiency front as well. Where there is a trade-off between efficiency and distributional effects this must of course be confronted, but often there is no such trade-off. One key to good policy-making for the small-scale sector is to distinguish between those cases where no trade-off exists and all that matters is to find the most effective ways to support the sector, and those cases where the existence of a trade-off means that it is important to have as good a reading as is possible of the income distribution effects of any given program.

When, as is often the case, HH and SME are efficient from an economic point of view, the resources and efforts directed towards them should not be viewed as part of social welfare policy nor should the sector be thought of, as it sometimes is, as a "parking lot" where people can survive while they wait for the economy to evolve to a stage at which it can put them to work "at real jobs". A number of the earlier models of how development proceeds interpreted the small-scale sector this way; not only was it viewed as a low productivity sector in a static sense (i.e. at any given point of time) but also as scoring low on its contribution to the growth process because of its limited savings potential and its limited inclination or capacity to improve its technology and its productivity over time. Since those earlier days, considerable evidence has come to light to contradict both of these pessimistic presumptions, especially with respect to the SME sector as opposed to the HH sector. Indeed, it only stands to reason that this sector has a particularly high incentive to save out of profits because its access to credit is weaker than that of the LE sector.

The fact that there is not enough capital to go around in developing countries (i.e. not all workers can be given significant amounts of capital to work with) leaves a country with two alternatives. It can concentrate a high share of its capital on a few workers, leaving the rest with very little indeed, or it can distribute the capital more evenly across the workers. In the former case, one might, if one were talking about the transportation sector, have a few truck transports and the rest of the hauling done by human foot-power or mules, while in the latter one might have most of it done by

a range of "intermediate technologies" such as bicycle-vans, motorcycle-vans and so on.

Normally one can get more total output by using all of the workers together with intermediate technologies than by using a few with very advanced technologies while leaving the rest with so little capital that their productivity is very low (the usual outcome) or they are completely unemployed (less common). High labour productivity, which is usually achieved in large, capital-intensive production units, does not necessarily imply a high level of economic efficiency (or total factor productivity) - in fact, when capital is scarce and labour abundant, the opposite is more likely to be true. This basic economic truism has taken a rather long time to get across to policy-makers and many business people.

A good example of how an efficient dynamic small-scale sector can contribute to growth is provided by the Taiwanese experience in the post-war period. More than any other single economy, Taiwan has combined an exceedingly impressive growth performance with an equally impressive performance on the employment creation/equity front. And one striking characteristic of the economy has been the importance of relatively small firms. Taiwan's economic policies have not been significantly biased against the smaller producer, and some of the interventions in its support seem to have been effective. It provides an interesting contrast to Korea, which has done about as well on the growth front but has relied much more on large firms and has a considerably less egalitarian income distribution.

Possible Future Prospects

In discussing the future role of the small-scale sector in developing countries, one must be careful to distinguish between its two components (HH and SME), and differences across sectors, and countries. One must also be clear about the objectives pursued. Legitimate social welfare concerns can justify attention to a broad range of activities, down to the ubiquitous street hawkers. However, as our principal interest here is in the potential economic contribution, we must be more selective.

The general trend in the roles of various size categories as outlined above does reflect important economic forces and it would be unrealistic to expect, even with the most effective support policy one could imagine, that the share of the household sector would not fall sharply over the course of development. At the same time, it is evident that the precise trend need not be the same in all countries, and that the historical patterns may not have been close to optimal. If one believes, as seems plausible, that the impact of public policy biases has weighed most heavily against both the size and the productivity of the SME sector and against the productivity of the household sector, then the optimal pattern over time might differ significantly from the actual one in a given country. Where there is reason to believe that the full potential of any category of firms has not been drawn out or is not being drawn out, then effort should be directed towards improving that performance. It is patently obvious that this is the case with respect both to the household subsector and to SME. However, it is also true that we have very little information on what the limits to SSS growth may be. Thus, it is important not to oversell the potential of this sector, even while we are giving it full attention and support.

Some corners of the small-scale sector probably are weak in their capacity to generate savings or upgrade productivity, though it is never safe to assume so without the benefit of empirical evidence. We need a much better understanding both of this actual or latent capacity, and of the public policies which are conducive to strong performances in these dimensions. As the educational revolution sweeps across the Third World, one of the questions to be asked is how it may change and hopefully improve the capacities of small-scale establishments to deal with more complicated technical problems, to choose wisely from among available technologies and to adopt such technologies effectively.

The nature of the contribution which microenterprise can make should be distinguished from that of SME. The former creates much more employment in most countries, but at considerably lower income levels, and is less likely to grow into larger firms or to engage in significant technological improvement. It is also generally harder to reach through public support programs, financial institutions, etc. On the other hand it has been generally more studied than has SME. In general it is fair to say that the existence of much microenterprise is a reflection of weak employment opportunities in the economy as a whole; a large number of workers are "left aside" by the rest of the system with little or no capital to complement their labour. The size of this sector mainly reflects the weak state of the economy as a whole.

The evolution and the importance of the SME sector, on the other hand, is less a reflection of the lack of good jobs in the larger scale modern sector, than of public policy, the supply of entrepreneurial skills and the overall structure of the economy. As such, it should be amenable to encouragement and a fuller realisation of its economic potential. This is particularly true where the industrial structure has large firms and lots of small firms but not many in this intermediate size range - a phenomenon now referred to commonly as the "missing middle". Many African countries have such a bi-modal size structure.

The potential socio-economic contribution of small manufacturing enterprise is great and will remain so for some time in most parts of the Third World. The main exceptions, probably, are the more developed countries of East Asia like Korea and Taiwan which, although they have depended substantially on small enterprise in the past, show less such dependence now. In the poor countries around the world, it is clear that this sector must play an important role for the foreseeable future if development is to be successful, since these countries, in common with most others, have failed to solve the riddle of finding large enterprise which is not at the same time too capital intensive to generate enough jobs to assure a decent income distribution. The more developed countries of Latin America, like Argentina, Venezuela, Brazil and Mexico, may also have been moving towards a situation in which their need for SME would have been less; but the debt crisis and the resulting economic stagnation have revived the importance of job creation and of labour intensive firms which use few imports, so their importance has been pushed up once again by that crisis.

Public Policy Toward the Small-Scale Sector

In the past there is no doubt that many development specialists and LDC governments failed to understand the importance and potential of the SSS. This was not the only reason for their meagre support, but it was probably the main one. (Another, of course, was that in some situations where small firms compete with larger ones, the greater political clout of the latter would weigh in against support for the former.) Recognition of the possible importance of the SSS has increased together with the understanding of the nature and pervasiveness of employment and poverty problems. The international agencies, many policy makers in the Third World, and development specialists in general all now put considerable emphasis on it. It is now almost two decades since the ILO report on Kenya argued that the only way to achieve growth with reasonable distribution of the benefits thereof in that country would involve a flourishing small scale sector.

With a very few exceptions, LDC public policy towards and support for SME has in the past ranged from fair to poor. In the main it has been a matter of neglect, sometimes relatively benign and sometimes with a malignant twist, as where policy harasses some of the firms falling in this size range (bureaucratic red tape, etc). Even where there has been explicit and presumably well-meant support for some segments of the sector, as in India with its reservation of certain lines of activity for the small scale, such support seems frequently to have been based on a very questionable understanding of the sector and its interface with the rest of the economy and as a result has sometimes backfired. A major problem in all countries has been the very limited understanding of the sector both by experts and by policy makers, a problem which though gradually being alleviated remains very acute. As countries have become increasingly interested in providing support to microenterprise and to SME in the last couple of decades, it has been inevitable that a considerable portion of that effort be less effective than would have been hoped for because of the lack of understanding and of precedents on which to build a base of solid policy support.

Much is now known in a descriptive vein about the economic characteristics of both microenterprise and SME. There are now no doubts that these sectors remain important providers of employment, generators of entrepreneurial skills, and like most segments of an economy) frequently but not always efficient users of resources. Much too little analysis has been done on how these sectors have changed over time in terms of employment, labour productivity, capital intensity, etc. Even less, accordingly, is known about how economic policy, the state of the economy and other considerations affect the size and performance of these sectors. Yet such knowledge is very important as a complement to the more microeconomic evidence, since there is often a serious danger that policies which look as if they may be working, in the sense of contributing to the growth and performance of individual SSE firms, may not be contributing to the performance of SSE as a whole, but rather shuffling resources and performance around among the firms in that category or in a branch of it.

Understanding what policy levers can be pulled to assist in making microenterprise and SME contribute more fully to socio-economic development is, unfortunately, much harder than simply understanding the general character of these sectors and the sorts of contributions they normally make. Most governments have paid so little attention to these sectors that they have not built up a feel for what

works and what does not; those institutions set up especially to interface with the small scale sector tend to be low in prestige and clout, and sometimes to be weakly staffed. To a considerable extent the small scale sector has evolved a capacity to get along without government support, so it is a novel situation when governments actually do try to help significantly. It will not be easy for countries to quickly improve their performance in this area. The amount of high quality research on how various types of support have affected SSE performance is very limited. Further complicating the question of public policy for SSE is the fact that many governments are becoming less interventionist over time, with their involvement increasingly focused on macroeconomic policy, whose impacts on SSE are particularly ill understood.

It is not easy or in any sense automatic to design a good package of policies for the SSS or for any of the major components of it. The reversal of past biases against the SSS can be an important start, but beyond that one must be cautious about what governments can in fact achieve quickly by way of contributing to the effective performance of the sector. One must underline the importance of thinking things through as carefully as possible before embarking in major new directions.

A useful guideline to good policy in this context is that it complement the existing advantages and strengths of the SSS. This of course requires a decent feel for how the sector behaves and what its existing and potential strengths are; we do not, for example, need "support" policies built on the assumption that the sector does a lot of things "wrong" because of the low levels of training and education of the entrepreneurs. An early manifestation of this syndrome was the presumption that all small establishments should keep "decent" books. It seemed logical to the purveyors of such wisdom but it was a gross oversimplification of the needs of such establishments, demonstrating a lack of familiarity with the *modus operandi* and the needs of many small producers.

In the last few years, independently of any discussions of the role of the SSS, there has been something of a resurgence of conservative or free market economics (dismantling trade barriers, getting interest rates closer to equilibrium, privatizing parastatals, and so on). This trend offers some hope that SSS can get a better deal, since there is no doubt that most government interventions in the past have been designed to assist the LE sector; it has often been pointed out that if only capital markets worked more like the perfectly competitive model, the SSS sector would have better access because with the funds unsubsidized the LE sector would not have the incentive to monopolise them.

Many of the proponents of such "free market economics" believe that once these distorting interventions of the state are removed, the process of competition will select the more efficient types of firms, including the more efficient size categories. Special support systems will be superfluous and in fact distorting and counterproductive, just as they have been in the past. Where this trend of thinking holds sway, one cannot expect much in the way of institutions and policies designed specifically to help SSS.

The trend towards "getting the government out" of the business of producing and intervening heavily in the economy does suggest some gains for the SSS, and it has the beauty of not entailing the expense and risk of mounting new programs which may or may not work. There is at least one major danger in expecting too much

from this process alone, however. The theory that suggests the gains to the SSS from the removal of LE-favouring aspects of public policy tends to assume that in the absence of those interventions the markets in question will operate pretty much in accord with the perfectly competitive model. This is often a rather naive assumption, and especially so in the case of capital markets, which never have and probably never will work with nearly the efficiency and smoothness of the perfectly competitive model. Those favouring reform of the financial system in order to remove the "repressive" regulations with which governments have saddled it have worried too little about exactly how the system would work when closer to a "free enterprise" mode. In short, since the wholesale removal of existing government intervention is unlikely to provide a very adequate answer to what ails an economy, it is more a matter of using intervention wisely, a criterion on which many governments have admittedly scored rather poorly in the past.

The decline of protectionism in many developing countries brings with it both opportunities and dangers for SSE. Since, whatever the validity of the theoretical arguments in its favour, protectionism has often meant support for large-scale relatively capital intensive firms with high levels of market power, there is some reason to believe that smaller firms would have done and could now do better under less protectionist policy. The new emphasis on exports raises problems for the competitiveness of SME, however. In the first place, there are important economies of scale in various aspects of international marketing so unless the state takes the lead in providing effective marketing services, or private sector intermediaries evolve, SME will be at a disadvantage on this count. In addition, the increasingly free financial markets may become less accessible to SME, given the inherently oligopolistic character of those markets. And the urgency to improve export performance in many countries is likely to focus attention on the larger firms which are assumed to have more potential (the recent experience of Chile).

During the last few years development economists have focused increasingly on the importance of macroeconomic policy (trade policy, foreign exchange management, fiscal policy and so on) as opposed to sectoral policy. This refocus is probably warranted; certainly it behooves us to understand much better than we have in the past how these policies impact on the SSS. At the same time, our understanding of these matters is at present so partial as not to provide very good guidance for policy; too many of the hypotheses presently on the table are based purely on theory, as yet unconfirmed by empirical analysis. A reasonable guess is that good macro-trade policy, while obviously relevant and probably important, will not by itself be the answer to the legitimate needs of the SSS, i.e. in the absence of good sector-specific policy it will leave the contribution of the SSS well short of its true potential.

One respect in which the "neutrality" of non-intervention is inappropriate relates to the process of technological change in the SSS. Much of the technology used by the LE sector is borrowed from abroad (some brought directly by multinational corporations); another part is based on its own capacity at R & D. Size is pivotal both to give a firm the financial wherewithal to undertake such activities, and to make them profitable; it is important that the improvements not become quickly available to competitors if they are to be profitable for the initiator. Many large firms have enough monopoly or oligopoly power to fulfil this condition. Small firms have neither comparable R & D capacity nor comparable motivation to develop improved technologies, since they will not be able to monopolize the benefits.

In the comparable situation in agriculture, where no farmer is big enough nor enough of a monopoly to undertake R & D, the state has been the obviously responsible party and has often done a good job. In the case of the SSS, there is logic to state involvement, though the heterogeneity of the sector means that success cannot be expected to come as easily or as cheaply. Governments have tended in the past to give only passing attention to this function, and their achievements are correspondingly modest. But technological change is important to the SSS, if it is to fulfil its potential contribution to development. The SSS can be economically efficient and competitive during long phases of the growth process, if not permanently, especially if its capacity to adopt improved technology is supported by a supply of appropriate improvements. Here governments and other outside parties (like NGOs) can have a major positive role to play.

Another aspect of the situation of the SSS which suggests the need for intervention lies in the fact that it can be victimized by the LE sector when the two come into conflict (competition). Often, of course, they do not, and systems of collaboration like subcontracting warrant much attention when one is thinking of the positive role the SSS can play. Fortunately, when it is complementary to the LE, government policy is much less pivotal to a satisfactory performance by SSS. But when there is competition, the potential contribution of the SSS is almost certain to be curtailed by the inability in most developing countries of the legal and administrative system to defend the weak against the strong. Progress is needed in this direction; recognition by the government that some of the weak are making major contributions is sometimes a necessary condition for them to survive.

The broad categories into which sector-specific policy has traditionally been divided are credit and technical assistance (the latter including assistance on managerial as well as technological matters). On the former, empirical work has made it clear that household enterprise typically lacks access to credit from outside the family group and that SME achieves such access only after getting established and proving itself by doing some growing on its own resources. Public sector financial entities designed to provide credit to the SSS, usually to the SME component of it, have tended to be rather high-cost and low-coverage activities. As a result, opinion on the question of how best to get funding to SME has shifted somewhat towards the belief that the commercial banking system may be a more appropriate vehicle. Although this system seems to work reasonably well in a few countries, there is little evidence at this point to suggest that it will be more than partially successful, if that, in satisfying the needs of SME. Its potential must be pursued and improved, but one must also be realistic in terms of not expecting it to be the panacea for SME credit needs.

Our knowledge about the provision of suitable technical assistance is, if anything, even less advanced. The flow of information to the smaller firm constitutes a particular problem for that firm for a series of reasons. Often the firm is young and its entrepreneur still early in a number of learning processes; for that it is important that the flow of relevant information be a very efficient one, so as not to strain his/her capacity to process information. Technological decisions may be harder because the system of supply of machinery and equipment and related services tends to be less organized than for the more modern and larger scale sector. Finally the entrepreneur usually has to handle all the facets of firm management but does not have a lot of time to dedicate to any one part of it, including the technological aspect.

Meeting these needs is no less easy. First of all, there is often a shortage of appropriate information to be offered, particularly in terms of technology. Then, the technological problems will vary greatly from one sector to another, while the managerial shortcomings are likely to vary even between firms within the same sector. Appropriate assistance demands a degree of knowledge about the firm's operations which is not usually required in credit programs. Indeed, most credit schemes for small enterprise basically rely on an assessment of the reliability of the borrower, leaving it up to the borrower to determine how the loan should be best used.

Credit schemes also have a built-in evaluation mechanism in that if loans are not being repaid, one has an immediate indication that something may not be working. Technical assistance programs have often foundered because they tried to be all things to all sectors, eventually discovering that this was impossible. As these services have generally been offered free of charge, there has not been the same feedback mechanism either. Recent interventions of this type are now more likely to include some provision for fees. More attention is also being paid to the role that the private sector can play, but it is usually confined to the upper end of the SSS by the prices it charges.

The private sector has been singularly unhelpful in the area of technology development. On the other hand, while there are many national institutes dedicated, more or less, to this need, most appear to have had little impact on the process of technological improvement in SSE. This may be because they have been starved for financial and/or human resources, too political in the selection of personnel, or too low in the prestige hierarchy of public sector agencies. In any case, it is clear that there does not exist a "blueprint" for the how to organise an adequate flow of effective R & D for this sector.

As a result of these and other factors, the record on technical assistance is very poor. A recent evaluation of World Bank lending to SME found such discouraging results from the technical assistance component of projects that it recommended getting out of this aspect entirely. More generally, analysts have been impressed by the inability of civil servants to provide relevant advice to private businessmen and women. Inevitably, there is a tendency in some quarters to argue that the government should pull out of this activity altogether. While there is just cause for modesty, there is still a role for government support that is responsive to the needs of the SSS. Markets only work adequately where information is fairly widely available, and information is notoriously inadequate in the SSS.

IDRC and the SSS

Against this unreassuring background, the efforts of IDRC and other interested agencies has been useful and could be important. IDRC has contributed by supporting research on the SSS and its various components (especially through projects in the Social Sciences Division), and on the development of new technologies which have a chance to make the sector more efficient (especially through the Agriculture, Food and Nutrition Sciences Division and the Earth and Engineering Sciences Division, now combined in the Environment and Natural Resources Division). The Centre has

also helped develop systems for the dissemination of information for SME (through the Information Sciences and Systems Division). A few related projects have even been financed through the Health Sciences Division.

IDRC should be well-placed to make a significant contribution to small enterprise development generally, and particularly in the area of improved technology. But to make such a contribution the Centre will probably have to go beyond its current approach to emphasize more post-evaluation, multidisciplinary, and geographical focus.

Post-evaluation

There is a dearth of reliable data on the process of technological improvement in the SSS. IDRC experiences are and will increasingly be worth drawing upon in trying to get a broader picture of this process, what works and what does not, what types of intervention are likely to backfire for one or another reason, how the background, education and training of the entrepreneur matters in the process, and so on. The institution should expand its efforts to write up and interpret these experiences, and place them in the context of other work being carried out in this field as part of the general learning process.

Past evaluations have tended to focus on intermediate goals (developing a new technology, getting the information system in place) rather than on the ultimate payoff in socioeconomic terms. The latter is of course more difficult and requires a greater lapse of time after project completion, but the Centre would now appear to be at a stage in its evolution where such analysis is warranted and indeed necessary. Many early initiatives were begun far enough back to allow a good perspective on what happened to the technology and what the process of dissemination was. The sorghum de-huller is one example that is presently being considered for just such a review.

If our understanding of what really works is so limited, one of the reasons is the lack of easy methods of follow-up. Too often, all we know is that there was some initial adoption of a new technology, but we do not know much about what happened in the usually more decisive period some years later, by which time the technology may have been altered, dropped, or rendered irrelevant for reasons not easy to predict in advance. One way to get a fuller history of outcomes is to have the initial team identify the sort of evidence they themselves would hope to have a few years hence if they were charged with an ex-post review at that time. If this information is left in project documentation, it is much easier for a different person or team to come in and do an effective ex-post assessment.

Multidisciplinary

A good program for technological improvement requires important technical (obviously) and economic (perhaps less obviously) inputs, as well as an information system for the dissemination of the output. IDRC has capabilities in all three areas, in contrast to some specialised agencies which, at least until recently, tended to focus exclusively on the technical or credit components. At the same time, it is small enough that it should be possible for these types of expertise to be effectively melded

without running into the very serious bureaucratic and administrative complications which often weaken such collaboration in larger institutions.

High-quality and appropriately-timed assistance from the other groups can raise the productivity of each one substantially. For example, one of the concerns of the economists working in this area should be to provide some general guidelines as to which branches of manufacturing appear to offer a lot of scope for expanded SSS production (e.g. because there appears to be export capacity, or because the domestic demand is income and price elastic). The technical/engineering specialists can then take these economic predictions into account as they decide where to focus their efforts.

In this connection, it is worth noting the historical and contemporary importance of the textile/clothing sectors in the employment and output of the SSS. What happens in that sector affects a tremendous number of people; this fact alone would, in most developing countries, suggest that the technical experts have their antennae up for potential contributions here. One can easily imagine that one breakthrough - say a loom improvement which would raise the productivity of a technology to which either the HH or the SME sector has access - could have total benefits which would be a large multiple of those from many other types of products. In many countries (e.g. Indonesia) there has been large-scale labour displacement in the textile sector; whether it should have happened, given the set of technologies currently available, is unclear; in any case, if the intermediate technologies had been modestly more efficient than those which were in common use, the outcome might have been substantially different.

The general point here is that the economist, studying patterns of labour displacement and of elasticities of demand, should be able to provide some useful information to help in the prioritizing of the research effort among different types of industries. What has already transpired in middle-level developing countries often provides a good window into what may be about to happen, in the absence of some new technological option, in the lower-income countries.

Alternatively, the technicians/engineers may be able to single out a group of product lines where they think technological progress would be possible with a reasonable input of effort, and suggest that the economists delve more deeply into the analysis of which of these may have serious economic potential. In this way, the efforts of each group should not be wasted on branches or products where there is *either* a too limited likelihood of technological advance or a too restricted potential for economic payoff even if the technological advance can be achieved. One suspects that one of the reasons why many national agencies in the business of providing improved technologies to the SSS have not had greater success lies in the fact that they have either not tried or not succeeded in getting a strong complementarity between these two types of expertise.

Recently, there has been a growing recognition that the fate of the SSS is often more dependent on the overall policy environment than on specific programs designed exclusively for small enterprise. Similarly, otherwise good technologies may amount to nothing because of policy distortions or perfectly legitimate forces that were ignored during the R & D process. Thus the above-mentioned microeconomic considerations must be supplemented with research into the macroeconomic policy framework. Previous and on-going support from the Social Sciences Division in the

latter field should help build a complete picture, if it can be properly coordinated with the interests of the other divisions.

The creation of an informal working group at the Centre's headquarters is a good beginning as it brings together individuals of different backgrounds from the various program divisions concerned. Recent consolidation within the Centre should also facilitate coordination. Responsibility for technology development is now located in the new Environment and Natural Resources Division, while the Economic and Technology Policy Program has become the focus for social science interests in technology policy, small enterprise and economic policy. Nonetheless, as there is no single program for small enterprise development, coordination could still slip between the cracks without a concerted effort to the contrary.

Geographical Focus

Collaboration between the different units and disciplines of IDRC will probably be most effective if certain countries or regions are selected for a special focus on small enterprise development. This will permit support to go beyond the traditional one-off project, to produce the critical minimum effort required to study the relationship between the overall support system for the sector and its success.

This process has begun on a limited scale in the cases of Colombia and the Philippines. In Latin America, the former Agriculture, Food and Nutrition Sciences Division began to put together the various pieces surrounding the development, dissemination and adoption of improved technologies for agricultural processing in a number of countries. In the Philippines, all the different divisions of IDRC are supporting research to trace the micro effects of macroeconomic policies. Although this goes well beyond the SSS, it builds on and continues previous research which was focused specifically on this 'micro' sector.

Very recently, the Centre has decided to place more emphasis on regional planning and to encourage more focus in the process. Small-scale industrialists as agents of change have been identified as a key element in the strategy for West Africa. In North Africa and the Middle East, industrialisation is one of two principle themes selected, and the emphasis there is to be on SME as well. A similar interest is emerging in Eastern and Southern Africa, this time as a reflection of concern for the lack of productive employment off of the farm.

Thus, in various different ways, momentum is building for a concerted focus on small enterprise development. But the first step must be a stocktaking of the Centre's achievements to date. What follows, therefore, is a very modest attempt to bring together in one place a description of what the Centre has supported in the past along with a fairly complete project list. It is hoped that this will both facilitate internal reflection and coordination, and assist those outside the Centre to take better advantage of our work.

DIVISIONAL OVERVIEWS

Social Sciences Division

Many different programs in the Social Sciences Division have supported research dealing with various aspects of small-scale enterprise:

Economic and Technology Policy Program (ETPP) and its predecessors
Social Policy Program (SPP) and its predecessors
Urban Development Program, now merged with the above two
Science and Technology Policy Program, now merged with ETPP

Given the evolution in the program structure and the overlap across programs, the projects are categorised here by topic rather than by program.

Urban Informal Manufacturing Sector

This is the largest single category, and it represented the principal theme of the Urban Development Program in this field. From 1981 to 1991, that program funded some 25 projects which included at least some manufacturing enterprises in their sample (and this does not include the handicrafts network mentioned below). The majority of these have been in Latin America, with five in Peru. Many of the studies have focused on microenterprises, and have often covered services and commerce, as well as manufacturing. One other EPP project, with the unlikely title of Social Accounting Matrix (Swaziland) also did considerable work on the urban informal sector.

Projects in the early 1980s were mainly concerned with assessing the nature and extent of informal activities, but more recently emphasis has been placed on the impact of government policies, and the design of better ones. For the most part, projects have consisted of one or two case studies (activities or cities), with considerable variety across projects. Most have emphasized the description of the types of activities, the nature of production facilities, and the characteristics of entrepreneurs. Many have gone on to look at the obstacles to development in this sector, including credit needs, management problems, and the regulatory environment. Urban planning implications, the relationship between the formal and informal sectors, and obstacles to formalisation have sometimes been treated.

Several other projects, not included in this report, have dealt only with commerce or services. Most dealt with urban food markets, but one in Nigeria looked at urban passenger transport in Lagos (89-0129):

Handicrafts

Another set of ten projects, all started in the mid-1980s, dealt with handicrafts and artisanal production. Although they could be lumped together with the previous

group, it seems worthwhile to separate them out due to the large number and their homogeneity. These were jointly funded by the Urban Development Program and ETPP, and six of the ten were in Asia. The issues covered included employment and foreign exchange generation, the socio-economic conditions of artisans, and particularly the constraints faced by this sub-sector.

Rural Industry

There is a small group of projects which have looked specifically at activities based in the rural areas, mostly funded by ETPP. A variety of economic issues have been addressed, ranging from employment implications to growth potential to regional development.

At least one recent AFNS project also belongs in this category - Rural Diversification (Sri Lanka): 90-0117. Its emphasis is only slightly different in that it concentrated on the linkages between small-scale enterprise and agriculture. Also worth mentioning is another ETPP project, included in the following section, which looked exclusively at agricultural machinery producers, urban and rural (Small-Scale Industries, Pakistan: 81-0055). Some of the projects in the Technology Policy category would also fit in here.

Small and Medium-Scale Industry

In the late 1970s, under the old Development Management Program, three projects were devoted to small-scale industry. In addition to describing their characteristics, all three analyzed the policies designed to promote these enterprises, such as financial and technical support, supply and marketing assistance, and training. The first project was actually a network of eight country studies in Asia (Small Manufacturing Enterprises: 76-0096). These were followed by one similar ETPP project in Pakistan in 1981 (see above).

Many ETPP projects have examined industrial policy, which inevitably relates to small and medium enterprise in some way. However, three recent projects have focused explicitly on the effect of macroeconomic, trade and sectoral policy on small businesses. These reflect the current importance of structural adjustment programs. The Network on Industrial Policies and Sectoral Incentives, in West Africa (88-1025) funds a large number of projects, many of which look at the policy environment for medium and large-scale industry, with the expectation that future research will also focus on small-scale more specifically.

Technology Policy

The former Science and Technology Policy Program (and since 1988 ETPP) has funded many projects dealing with issues of technology choice and technological capability in small-scale industries. They have touched on the following issues: the characteristics of technologies used in small-scale industries (SSIs); the factors affecting firms' choice among competing technologies; the channels by which SSIs have access to new technologies and technical information; the effects of the introduction of improved technologies on firms' technical and economic performance;

the extent of process and product innovation by SSIs themselves; the degree to which technical and managerial skills necessary to assimilate or develop new technical solutions have been built up within SSIs; and, the effect of various government policies on the technological behaviour of SSIs.

These projects are distinct from other SSD projects in their focus on the **technological** aspects of SSI behaviour; they are distinct from EES or PPS projects in that they focus less on the evaluation of particular technologies, and more on the effects of the introduction of such technologies, and the factors (particularly government policy) affecting SSI decisions with regard to technology. Note that some of the projects deal with rural and/or agro-industrial activities, and therefore complement those in category C above.

A number of sub-projects approved within the context of the East and West African Technology Policy Studies networks (EATPS and WATPS) should be mentioned explicitly.

82-0032-04 Technological Content and Behaviour of Artisans' Cooperatives and Small-Scale Industries in Ethiopia

82-0032-13 Sources of Funds and Choice of Technology in Zambia's Small-Scale Industries

84-0164-04 Technology Choice in the Informal Sector: The Case of Salt Production in Sierra Leone

84-0164-05 Government Policy in the Development of Technological Capacity in the Metal-Working Cottage Sector in Benue State (Nigeria)

84-0164-12 Small-Scale Foundries in Nigeria

84-0164-15 Technological Adaptation in Traditional Soap-Making in Ghana

84-0164-16 Technological Capability in the Informal Food-Processing Industry in Sierra Leone

85-0277-04 Technological Study of Workshops and Foundries in Ethiopia

85-0277-11 Impact of Technology Transfer Projects on Management Capabilities: Experience from Small-Scale Business in Tanzania

85-0277-14 The Role of Small Industrial Enterprises in Zimbabwe's Industrialization Future

89-0103-02 Technological Capability in Informal Sector Auto Repair in Sierra Leone

If the definition of SSI is relaxed somewhat (to include, for example, small and medium firms with 20-50 employees) the list would expand somewhat, picking up two groups of projects: i) studies of technological behaviour in a given industry or sector, which while not specifically focused on SSI, nevertheless include some 'small'

firms in their sample; and ii) studies of the conditions for the successful introduction of small-scale, labour-intensive techniques, in which the scale of the adopting firm is not the primary concern. Without pretending to be exhaustive, this would probably include the following projects:

82-0032-02 Transfer of Technology in the Zimbabwean Metals and Metal Goods Sector

82-0032-03 Transfer of Technology in the Textile Industry: The Case of Uganda

82-0032-05 Science and Technology Policy Issues in the Brewing Industry in Kenya

82-0032-09 Choosing Technology in Tanzania: A Case Study of Grain Milling

82-0032-11 Technological Adaptation in Bakery Manufacturing in Kenya

84-0164-06 The Burnt Brick Industry in Ghana: A Case Study

In a new phase of these networks to start in 1992, small-scale enterprise will be highlighted as one of the focal points for future comparative research across sub-Saharan Africa.

Social Context

This is a more heterogeneous collection of projects from various programs, but in particular the predecessors of the Social Policy Program. The common theme is perhaps the conditions of employment. Three focus on the need for training, or its effectiveness; three others, on the specific situation faced by women. One even produced a video, on auto-mechanics! Finally, one project looked at the role of informal employment in urban survival strategies.

Environment and Natural Resources Division

In 1992, this new division was created through a merger of two old divisions and one program: the Agriculture, Food and Nutrition Sciences Division, the Earth and Engineering Sciences Division, and the Environment Policy Program from the old Social Sciences Division. This merger has confirmed that small enterprise will continue to be a major theme in future programming, building on lengthy past experience in the area, but expanding to include the contribution that can be made to environmental sustainability. As our main interest here is to review the past record of IDRC support, this overview is organised along the old divisional lines.

Earth and Engineering Sciences

The Earth and Engineering Sciences Division (EESD) consisted of two programs: the Technology for Local Enterprises Program (TLEP) and the Earth Sciences Program (ES). All of the projects supported by TLEP were designed to benefit small and medium-scale enterprise, so this description represents all TLEP projects, as well as selected projects from the old "Building Industry Materials and Technology Program which was cancelled in 1989. The relevant activities of the old ES program are briefly summarised at the end.

Utilization of Local Resources

i. Industrial Chemicals

TLEP activities in industrial chemicals began in Latin America (Activated Carbon/Columbia, 84-1032) and have become the largest category; we now have industrial chemicals projects in all IDRC regions, and a research network in Latin America.

Projects funded under this category involve research to develop processes to transform locally-available raw materials into chemicals used by industry. Most projects have been aimed at developing fine or specialty chemicals¹ such as flavours, fragrances, and dyes, because these chemical products generally fetch high unit prices and cater to small, specialty markets. When suitable raw materials are found locally, and the knowledge and expertise is developed locally to add value to the raw materials, these developing country producers often can become one of the few suppliers to a niche market because they have an advantage over other producers (usually in industrialized countries) who must import the much bulkier raw material.

Projects to research the production of lower-priced chemical products have been developed when they are geared towards substitution of more expensive imported chemical products. For example, a project in Tanzania to produce wood adhesives and another in Mozambique to produce fuel use base ingredients derived from cashew nut shell liquid, which replaces imported phenol and hydrocarbon. The Division did not fund projects which aimed to transform an edible product into an industrial chemical, unless the product was so plentiful that farmer were never able to sell all they produced.

Industrial Chemicals projects typically involved both the SME sector and the informal sector. For example, in "Turpentine Derivatives / Honduras (86-1037), turpentine was to be transformed into iso-borneol in a small chemical plant, but

¹ Chemicals are classified according to the ease of extraction or production and the degree of refinement required to obtain them. Moving from low priced, easily extracted chemicals to high unit priced and very refined, the categories are: Commodity chemicals, pseudo chemicals, fine chemicals, specialties, and ultra fine / high tech chemicals.

extracted in the field, close to where the trees are cut.

ii. Industrial Minerals

This area was similar to the previous activity, except that the projects aimed to process and transform local minerals into commercial products such as ceramics and building materials, complementing activities of the old Earth Sciences program. Many of the projects approved under the former Building Industry Materials and Technology Program could also be classified within this area.

iii. Recovery and Use of Waste

TLEP activities in this area dealt with using municipal, industrial, or agricultural waste as a raw material for other industries. For example, a project in the Philippines conducted research to develop a system to allow different industries to advertise to purchase or exchange wastes from each other. Some projects involved the recycling of wastes within the same industry, such as two projects in the Middle East to recycle polyethylene film used in agriculture.

Upgrading of Local Production Methods

i. Textiles and Leather Industries

Activities in the textile industry have been somewhat limited because in many countries, the industry is dominated by large, capital-intensive installations. Most of the present activities in this sector are in India, Bangladesh, and Pakistan and involve the processing of fibres, which is presently performed by the informal sector. Projects have researched silk, cotton and polyester-cotton, and low grade jute fibres. A major effort in this area has been directed towards the development of a dobby, which would allow old looms used by the informal weaving sector in Pakistan, and hopefully also in India and China, to produce designs in the weave.

TLEP funded only one project in leather. This project was dedicated to the development of procedures to recover and recycle valuable (but toxic) chemicals from the wastewaters of the tanning industry in Uruguay.

ii. Foundry and Metals Technology

This activity was initiated soon after the beginning of the TLEP program, and was focused primarily on foundry processes for different cast metals, such as the elaboration of ductile cast iron, the design of a furnace for the casting of aluminum-based alloys, or the adaptation of investment casting to local conditions. One project in northern Thailand aimed to improve the casting of brass objects by the lost wax method. South-south collaboration has been initiated through the "Latin America Foundry R & D Network", which funds courses and expert visits between countries of the region, and an initiative has been started in Africa with the project Foundry Technology / Kenya (90-0327), which features Kenyan-Turkish collaboration.

iii. Microprocessor Applications

TLEP funded four projects in this area. The first one, "Microprocessor-Based Instrumentation/Singapore (85-1024)", resulted in the formation of a small enterprise which is now fabricating and selling hardware and software for real-time process control, using artificial intelligence software. This product is being used in another project in Sri Lanka to control the tea drying process. The other two projects are also in Asia.

Diffusion of Technologies

Four projects have been funded in Southeast Asia to study the process of gaining access to and adopting new technologies among small and medium-sized firms in selected industries. Researchers surveyed firms to determine what their technology and management needs were, and how they attempt to access technological solutions to their business problems. The project in Malaysia recommended the creation of a national network of "Local Technology Centres". In a second phase, the feasibility of providing such a centre in Johore State was studied.

Energy

One project was funded under this category (Circulating Fluidized Bed/India, 85-1020) but it was decided to discontinue the funding of this type of project, as these projects are in general expensive to finance and usually ultimately benefit large enterprises.

Earth Sciences

i. Small-scale mining

Several projects funded under this category, and especially those developed since 1990, involve researchers working directly with groups of small-scale miners to improve their technology for prospecting and/or recovery of minerals.

ii. Agrogeology

Projects included in this category, such as "Small scale partial acidulation of Phosphate Rock/East Africa" (91-1020), involve research to develop a process which would enable small-scale enterprises to manufacture fertilizer from locally-available minerals.

Agriculture, Food and Nutrition Sciences

The Post Production Systems Program within the old Division of Agriculture, Food and Nutrition Sciences supported, from its inception in the early 1970s, research related to problems beyond the farmers field: drying and storage, primary and secondary processing and consumer acceptability and utilization of agricultural and

fishery products. This work focused on the problems affecting small-scale farmers and fishermen and their communities, an essential requirement set by the Division for funding support. Initial work focused strongly on development of equipment, improved processing methods and alternative uses for raw materials from a technological point of view.

However it became clear with time that, in order for real benefits to accrue from such research, it was also necessary to consider marketing requirements and constraints, costs of production and market prices in the development of new enterprises and improvement of traditional enterprises in rural communities as a framework for project design and technological research. In most current projects this is now implicit.

As these ideas evolved several activities have been funded to support the selection and design of projects (market research surveys, workshops) and the dissemination of experiences (networks, publications, training courses).

A review of the PPS projects with specific small scale enterprise characteristics covers the period from 1979 to the present. The projects can be categorized according to their orientation as follows:

Equipment Development and Testing

This group of projects was supported early on in the Program and related mainly to the development of appropriate machinery for the dehulling of grains in rural Africa, the extraction of oil in Africa and South Asia and stripping and shelling of peanuts in Asia.

Upgrading Traditional Technology

This group of projects covers aspects of product development, process improvement and handling improvements in existing enterprises or where artisanal activities are practised.

An important group of projects were carried out in Asia and Latin America within existing small-scale food enterprises, in order to involve entrepreneurs and operators in problem definition and technological research. Others related to improvement in post-harvest grain technology, fish handling and processing, oilseed and cassava processing developments targeted at rural communities.

New Enterprise Development

This group of projects focuses on the development of new food and agroindustry enterprises in communities in all regions, many originating from earlier equipment or process development projects. Projects consider aspects of identification of market opportunities, appropriate technology selection, market testing, financial and operational feasibility.

Major efforts were made on development of interdisciplinary and integrated methodology for research and action to maximise the probability of successful enterprise development.

Support Areas

This group of projects involves preliminary diagnostic and market studies as precursors to funding of more comprehensive projects. Also included are network, training activities, workshops to stimulate dissemination of research results and experience and to improve the design of projects by researchers who have had limited exposure to enterprise development issues. Policy issues have recently begun to be included in some projects, particularly in the group of national agroindustry networks supported in Latin America.

Information Sciences and Systems Division

The Information Sciences and Systems Division has a program activity specifically related to the support of information services for industry. The program mission is to assist industrial enterprises to apply science and technology knowledge to the production of goods and services that will enhance the quality of life of populations in developing countries through the processing of food, the production of building materials, management of energy resources, etc. and, in the process, to help generate employment.

The goals and objectives of this program are to bring information to the level of small and medium industries (SMIs) so that this knowledge can be applied to increase their technological capacity, resulting in better quality products, and to increase the ability to use local raw materials and local technologies to provide better opportunities for developing countries to become more competitive in a world of rapid technological development and fierce competition in international trade.

The program, therefore, focuses on direct support to small and medium-size manufacturing industries, in the formal and informal sectors, with information services that will assist them in dealing with day-to-day technical production problems and with information that will help them improve the level of technology used to manufacture goods.

The information needs of SMIs are very broad; thus, before establishing any industrial information service, the specific needs of the target group of industries must be prioritized to ensure appropriate services. They can include technological information, information on products, raw materials, and specifications, and information related to marketing and sales. The type of information delivered to the client is of a practical nature; project staff should preferably consist of a multi-disciplinary team of engineers, technicians and documentalists.

The beneficiaries and users of industry and technology information systems and services are the managers, engineers and technicians working at the small and medium scale manufacturing industries; priority is given to projects that offer

information services directly to the users through extension visits and consultancy services. Therefore, the recipient institution must have a mandate to assist SMIs and be in close contact with small industries. Such a task will be better performed by associations of industries, industrial research institutes or NGOs directly involved with SMIs and to a great extent by Ministries of Industry or their equivalent.

The subject scope of the program is also very wide and covers virtually all industrial sectors. Priority, however, has been given to cottage industries, agro-industries and food processing, building materials, leather, and woodworking.

Industry and Technology Information

Up to 1985, the Division's involvement in the field of Industry and Technology information was dominated by a single activity: Technonet Asia. This activity, which was composed of a series of projects, has had a major impact in the Asian region and has given the Division an experience upon which to measure the needs of users of industrial technical information. One of the other few projects of this period, with the Hong Kong Productivity Council, was also connected to Technonet activities. However, a major project was approved in 1984 to enable the Caribbean Development Bank (CDB) to apply Technonet experience in Asia to the Caribbean region with the development of the Caribbean Technological Consultancy Service (CTCS).

It was only in 1985 that work in this field was systematically initiated. Since then, about forty projects were developed under the industry and technology information program. Although the program definition includes all industrial sectors, the initial approach has been to look at projects that are multi-sectoral and provide industrial and technological information services to small and medium enterprises. Information systems on patents and standards were also included in the program.

In the initial period of program development, regional information projects were the priority. These included, among others:

- 86-0017 Technological Information (ARCT) (Africa)
- 87-0012 Information and Documentation Service of the Central African Chambers of Commerce
- 88-0338 Documentation and Information System (ARCEDEM) (Africa)
- 88-0339 Ferrocement Information Network Activities for Rural Development (Asia)

There were also three global projects, with Satis, an international information system on appropriate technology, and the Information Commission of the World Federation of Engineering Organizations (WFEO).

Because these projects were regional in nature, and mostly subject-specific, we cannot claim that the direct beneficiaries were necessarily small industries. However,

SIMs are generally the ultimate beneficiaries served through the national institutions of the information networks. Since 1986/87, the priority has switched to national industrial information projects that serve SIMs or promoters more directly.

In Africa, we have targeted a number of countries, often with more than one phase of support. Given the poor information and institutional infrastructure of some countries, it has sometimes been necessary to start building information infrastructure before embarking on industrial extension services. In Somalia, Mauritania and Guinea-Bissau, the development of these extension services will occur only during a second phase. Projects in Africa included, among others:

- 88-0035 Industrial Information System: KIRDI (Kenya)
- 88-0127 Development of an Industrial Information Service (Mali)
- 88-0235 Strengthening the Industrial Information Service of SONEPI (Senegal)
- 91-0102 TIRDO Extension Service (Tanzania)
- 91-1004 Industrial and Technological Information System (Zambia)

In Asia, after major support to Technonet Asia, our support has been basically limited to three projects in Sri Lanka, Indonesia, and India. The project in Indonesia is with an NGO that serves rural industries; that in Sri Lanka with an industrial research institute. However limited support continues to Technonet Asia to enable the poorest countries of the region to work within the Technonet framework and benefit from the experience of their more industrialized neighbours.

In Latin America, where the industrial information program only became involved in 1988, three national projects have been developed so far, all including a type of extension service. In Uruguay and Ecuador, the recipient are NGO. In Peru, there are two recipients, one national and one provincial government organisation. The recipient in Colombia is an association of manufacturers. In the last two cases, the provision of direct services to small enterprises has resulted in the decentralization of the information service to regional offices.

In the Caribbean, there has only been one national project, in Trinidad, along with three regional ones. These have included the Caribbean Energy Information System and another devoted to patents.

Trade Information

A trade information sub-program is housed under the Socio-economic Information Program of IS. Three projects have so far been developed in this field, two in the Caribbean and one in Latin America. Four or five more were planned for the end of 1991-92 in East Africa. The target recipient institutions are Chambers of Commerce and Industry or other similar institutions.

Patent and Standards Information

Patents are often a unique source of information on the latest technological developments which very often has not been published in conventional literature. Although patents are well known for their legal aspects their importance as a source of technological information is not generally recognized. Therefore, the program focuses on information from patent literature but does not stress the legal aspects which are adequately covered by other organisations.

From 1985/86, three projects have been supported. One, with Organisation Africaine de la Propriété Intellectuelle (OAPI), helped establish a computerized patent information system at the Head Office, to reinforce national liaison structures in all its member States, and to initiate a program of patent information which would disseminate technical information contained in patent documents to industrial research institute and industrial enterprises in the region.

The second project is with the Economic Commission for Latin America and the Caribbean in Trinidad in collaboration with the Canadian Patent Office. The third project supports the African Regional Industrial Property Organization (ARIPO), in Harare, Zimbabwe. In both cases, the target group is small and medium-scale industries in member states.

It is not our intention to develop many more projects devoted exclusively to patent information. We consider patents as one of several sources of information and prefer to integrate patent information activities within the more general context of industrial information for small scale industries. This was the approach taken in a project in Sri Lanka with its Industrial Development Board.

Standards are another source of industrial information. As there is a standard bureau in almost every country and our limited resources would not enable us to support the potential demand for national projects in this field, our plan is to support only regional projects in Africa and possibly the Caribbean. Our support so far has been limited to the African Regional Organization for Standardization (ARSO) based in Nairobi.

PROJECT LISTS

Social Sciences Division

1971

71-0074 Technological Change in Thai Industry (Thailand) - Phase I

1973

73-0019 Technological Change in Thai Industry (Thailand) - Phase II

1976

76-0096 Small Manufacturing Enterprises (Asia)

1977

77-0091 Socioeconomic Study of Small-Scale Fisheries Development (Asia)
77-0123 Small Industries (Mauritius)

1979

79-0025 Small Enterprises (Turkey)
79-0131 Technical Change, Productivity, and Small-Scale Industry, Sao Paulo
(Brazil)

1980

80-0015 Analysis of Local Technological Capabilities in Agro-Processing (Ghana)
80-0016 Plumbers and Electricians (Chile)
80-0100 Technical Change - Small-Scale Industry - Medellin (Colombia)
80-0153 Training and the Informal Sector (Chile)
80-0156 Dissemination of Research on the Informal Sector (Chile)

1981

81-0018 Rural Non-Farm Employment (Nicaragua)
81-0055 Small Scale Industries (Pakistan)
81-0172 Social Accounting Matrix (Swaziland)
81-0221 Technology and Female Employment in Leather Goods Industry
(Uruguay)
81-0236 Informal Employment in Lome (Togo)

1982

82-0003 Choice of Technique in Spinning and Weaving (Bangladesh)
82-0032 Technology Policy Studies (East Africa) - Phase I

82-0103 Employment and Foreign Exchange (India)
82-0127 Informal and Formal Sector Employment (Bogota)
82-0148 Informal Sector Enterprises (Peru) - Phase I
82-0166 Mobility within the Informal Sector (Ecuador)
82-0236 Informal Sector Technological Capability (Sierra Leone)

1983

83-0033 Economic Crisis and Urban Survival Strategies (Central America)
83-0065 Women's Participation in the Informal Sector (Chile)
83-0260 Handicrafts Studies I (Sri Lanka)
83-0264 Handicrafts Studies II (Nepal)
83-0265 Handicrafts Studies III (Thailand)
83-0266 Handicrafts Studies IV (Philippines)

1984

84-0090 Handicrafts Studies V (Malaysia)
84-0096 Handicrafts Studies VI (Indonesia)
84-0164 Technology Policy Studies Network (West Africa) - Phase I
84-0248 Rural Industry (Burkina Faso)
84-0327 Urban Self-Employed Workers (Bolivia)
84-0335 Artisanal Fisheries (Kenya) - Phase I

1985

85-0047 Informal Sector Enterprises (Peru) - Phase II
85-0277 Technology Policy Studies (East Africa) - Phase II
85-0310 Informal-Sector Enterprises in the Apparel Industry (Uruguay)
85-0337 Small Urban Industries (Morocco)

1986

86-0061 Handicrafts (Bolivia)
86-0062 Handicraft Development (Kenya)
86-0063 Handicrafts Development (Malawi)
86-0207 Informal-Sector Enterprises with Export Potential (Costa Rica)
86-0331 Artisans in Urban Centres (Togo)

1987

87-0008 Adjustment and Technological Change in the Metalworking Industry (Nicaragua)
87-0054 Informal Sector Assistance Policies (Kenya) - Phase I
87-0210 Small-Scale Aluminium Enterprises (Ghana)
87-0283 Micro and Small Enterprise Sector (Costa Rica)

1988

88-0005 Technology in the Vegetable Oils Industry (Nigeria)
88-0089 Small Industrial Development (Thailand)
88-0095 Regional Industrialization (Malaysia)

- 88-0153 Labour Market Participation (Paraguay)
- 88-0163 Small Associative Businesses (Peru)
- 88-0332 Artisanal Fisheries (Kenya) - Phase II
- 88-0336 Micro-Enterprise Promotion in Secondary Schools (Thailand)
- 88-0345 Small-Scale Enterprise Sector (Uganda)
- 88-1025 Network on Industrial Policies and Sectoral Incentives (West Africa)

1989

- 89-0102 Technology Policy Research Network (East and South Africa) - Phase III
- 89-0103 Technology Policy Research Network (West Africa) - Phase II
- 89-0127 Informal Sector (Sri Lanka)
- 89-0130 Traditional Credit Associations (Cameroon)
- 89-0183 A Macro Policy Study on Small Enterprise Development (Philippines)
- 89-0199 Managing the Urban Informal Sector (Thailand)
- 89-0322 Structural Adjustment and Manufacturing (Guyana)

1990

- 90-0005 Rural Informal Sector (Tanzania)
- 90-0065 Small Business Credit Evaluation (Peru)
- 90-0066 Management and Organization Informal Sector Enterprises (Peru)
- 90-0084 Informal Sector in an Urban Economy (India)
- 90-0154 Gender in the Urban Informal Sector (Honduras)
- 90-0240 Small-scale Industries in the Azuay Region (Ecuador)
- 90-0273 Macro Policy and the Popular Classes (Ecuador)
- 90-0289 Entrepreneurial Decentralisation (Cuba)
- 90-0354 Micro Impacts of Macro Economic Policies (Philippines)

1991

- 91-0036 Industrial Strategy (South Africa)
- 91-0081 Informal Sector: Development Models and Assistance Programs (Kenya)
- 91-0251 Urban Management and the Informal Sector (Tanzania)

Environment and Natural Resources Division

Former Earth and Engineering Sciences Projects

1982

- 82-0213 Process Improvement Workshop (Global)

1983

- 83-1016 Industrial Productivity (Jamaica)

1984

- 84-1030 Fly-Ash Concrete (Argentina)
- 84-1032 Activated Carbon (Colombia)
- 84-1034 Foundry Technology (Argentina)
- 84-1048 Technology Adoption SMEs (Malaysia)

1985

- 85-1019 Aluminum Alloys Foundry (Venezuela)
- 85-1024 Microcomputer Based Instrumentation (Singapore)
- 85-1033 Technology Adoption SMEs (Malaysia) - Phase II
- 85-1034 Pozzolan Cement (Guatemala)
- 85-1035 Copper Base Alloys (Peru)

1986

- 86-1003 Sebacic Acid (India) - Phase I
- 86-1029 Microprocessor Modules for Machine Tool and Process Control Applications (India)
- 86-1037 Turpentine Derivatives (Honduras)
- 86-1038 Ceramic Whiteware (Ecuador)
- 86-1040 Industrial Waste Exchange (Philippines)

1987

- 87-1005 Asphalt Roofing Sheets (Costa Rica)
- 87-1021 Carmine Production From Cochineal (Peru) Phase II
- 87-1032 Ductile Iron Foundry (Peru)
- 87-1033 Volcanic Ash Cement (Bolivia)
- 87-1034 Technology Adoption SMEs (Thailand)
- 87-1036 Pine Tannins as Anticorrosives (Chile)
- 87-1052 Technology Adoption by SMEs (Singapore)

1988

- 88-0079 Process Improvement Brass and Bronzeware Foundries (Thailand)
- 88-0152 Laterite Housing (Ghana)
- 88-0196 Biomass Roofing (India)
- 88-0316 Foundry Capacity Utilization (Turkey)
- 88-0400 Manual Silk Reeling (India)
- 88-1022 Microprocessor-based Process Control - Tea Drying (Sri Lanka)
- 88-1045 Shale Brick Production (Egypt)
- 88-1058 Cast Iron Production From Sponge Iron (Egypt)
- 88-1062 Tara Processing (Peru)
- 88-1065 Feasibility Study for the Implementation of the Johore State Technology Center (Malaysia)

1989

- 89-0075 Inedible Vegetable Oils (Burkina Faso)
- 89-0280 Control of Manual Lathes With Microprocessor (Thailand)

- 89-0293 Mangrove Salt (Guinea)
- 89-1007 Baked Bricks (Rwanda)
- 89-1019 Improved Processing Techniques For Low-Grade Jute and Cuttings (Bangladesh)
- 89-1032 Underground Mine Support (Zimbabwe)
- 89-1035 Electroplating Effluents (Philippines)
- 89-1039 Processing of Cashew Nut Shell Liquid (Mozambique)
- 89-1043 Foundry Sand (Latin America)

1990

- 90-0001 Foundry Sands (Jordan)
- 90-0002 International Small Scale Mining Information Centre (Global)
- 90-0163 Leather Industry (Uruguay)
- 90-0327 Foundry Technology (Kenya)
- 90-1001 Aromatic Plants (Morocco)
- 90-1005 Recycled Polyethylene Waste Film Application (Egypt)
- 90-1019 Wood Adhesives (Tanzania)
- 90-1020 Small scale partial acidulation of phosphate rock (East Africa)
- 90-1021 Gold in laterites (Mali)
- 90-1024 Red Algae Valorization (Senegal)
- 90-1025 Tabersonine (Cameroon)
- 90-1031 Multilayer Polyethylene Film (Jordan) - Phase II
- 90-1045 Dobby Commercialization (India)

1991

- 91-0038 Refractory Gold (Colombia)
- 91-0077 School Chalk (Tanzania)
- 91-1001 Traditional Dyes (Guinea)
- 91-1002 Aromatic Extracts (Guinea)
- 91-1005 Sebacic Acid - Phase II (India)
- 91-1010 Essential Oils (Bolivia) - Phase II
- 91-1015 Use of Fly Ash in Cement (India)
- 91-1026 Technology Adoption SMEs (Thailand) - Phase II

Former Agriculture, Food and Nutrition Projects

1979

- 79-0024 Process Improvement (Singapore)
- 79-0066 Postharvest Technology (Senegal) - Phase II

1981

- 81-0061 Process Improvement (Thailand)
- 81-0118 Process Improvement Bakeries (Chile) - Phase I

1982

- 82-0002 Fish Processing (Chile)
- 82-0081 Isabela Postharvest Systems (Philippines) Phase II
- 82-0174 Groundnut Shellers/Strippers (Thailand) - Phase II
- 82-0206 Cassava Processing (Colombia) - Phase I

1983

- 83-0105 Palm Oil Processing (Sierra Leone)
- 83-0200 Mariculture (Chile)
- 83-0209 Andean Crop Processing (Peru)
- 83-0210 Rural Fruit Processing (Colombia) - Phase I
- 83-0263 Potato Processing Systems (Peru)
- 83-0284 Process Improvement Bakeries (Chile) - Phase II

1984

- 84-0016 Dehuller Development (Senegal) - Phase I
- 84-0081 Banana Processing (Honduras)
- 84-0122 Coffee Processing (Guatemala)
- 84-0212 Shellfish Products (Chile)
- 84-0328 Smallholder Livestock Development (Thailand) - Phase I

1985

- 85-0207 Dairy Systems Improvement (Ecuador)
- 85-0223 Grain Dehulling (Malawi) - Phase I

1986

- 86-0035 Food Enterprises (India)
- 86-0036 Fruit and Vegetable Processing (Sri Lanka)
- 86-0100 Rural Food Processing (Colombia) - Phase II
- 86-0116 Fisheries Development (Chile) - Phase I
- 86-0179 Oilseed Processing (Pakistan)
- 86-0190 Grain Dehulling (Zambia)
- 86-0262 Oilseed Processing Network (India)
- 86-0263 Root Crop Utilization (Philippines)

1987

- 87-0019 Dehuller Testing (Niger) - Phase I
- 87-0027 Groundnut Industry (Philippines)
- 87-0041 Groundnut Mechanization (Thailand) - Phase III
- 87-0115 Mini-Dehullers (The Gambia) - Phase II
- 87-0149 Mariculture Systems (Chile)
- 87-0229 Faba Beans Processing (Egypt) - Phase II
- 87-0275 Sorghum Processing Pilot (Kenya)
- 87-0328 Artisanal Fisheries Development (Colombia)

1988

- 88-0023 Andean Food Processing (Peru)
- 88-0056 Fish Processing Enterprises (Chile)
- 88-0098 Rattan (Papua New Guinea)
- 88-0119 Fisheries Technology Transfer in Latin America
- 88-0236 Artisanal Fisheries (Colombia)
- 88-0240 Integrated Root Crop Program (Philippines)
- 88-0254 Cassava Technology (Paraguay) - Phase II

1989

- 89-0003 Bakery Improvements Dissemination (Chile)
- 89-0016 Cassava Processing (Colombia) - Phase II
- 89-0057 Rural Enterprises (Latin America)
- 89-0058 Vegetable Oil / Protein System (Kenya) - Phase III
- 89-0119 Rural Food Processing (Colombia) - Phase III
- 89-0139 Tree Crop Processing (Peru)
- 89-0140 Fisheries Training Seminar (Latin America)
- 89-0141 Fisheries Development (Chile) - Phase II
- 89-0166 Small Scale Fish Systems (Kenya)
- 89-0223 Groundnut Shellers (Senegal)
- 89-0228 Bamboo Mat Board (India)
- 89-0231 Oilseed Processing (Kenya)
- 89-0271 Soybean Utilization (IITA) - Phase II

1990

- 90-0107 Garlic Industry (Philippines)
- 90-0112 Agroindustry Networks (Latin America)
- 90-0126 Sorghum and Millet Sub-sector (Tanzania)
- 90-0129 Privatization of the Sea and Artisanal Fishing in Chile and Peru
- 90-0166 Fisheries Review (Uruguay)
- 90-0168 Integrated Coastal Development Network (Latin America) - Phase II
- 90-0169 Fisheries Communications (Chile)
- 90-0215 Solar Timber Dryer (Brazil) - Phase II
- 90-0244 NGOs in Agricultural Research (Colombia)
- 90-0246 Meat Preservation (Philippines)
- 90-0247 Dehuller Testing (Niger) - Phase II
- 90-0267 Grain Dehulling (Malawi) - Phase II
- 90-1036 Fruit Processing Industry (RPC / CARIRI)

1991

- 91-0113 Agroindustry Network (Colombia)

Information Sciences and Systems Division

1972

72-0050 Industrial Extension Service (TECHNONET) - Phase I (Singapore and Canada)

1974

74-0137 Industrial Technical Information Service (SITI) (Bolivia)

1976

76-0082 TECHNONET Asia - Phase II (Singapore)

1979

79-0151 TECHNONET Asia - Phase III (Singapore)

1983

83-0048 Industrial Extension Manual - Asia (Singapore)

83-0165 Training Materials for Plant Efficiency Improvement (Hong Kong)

1984

84-0063 Latin American Trade Information Network (RELIC) (Latin America)

84-0142 Caribbean Technological Consultancy Services Network (CTCS)
(Barbados)

84-0232 Documentation and Information Centre on Post-Harvest Activities
(CDIAP) (Ivory Coast)

1985

85-0098 OAPI and Patent Information (Cameroun)

85-0226 CARICOM Trade Information System: A Pilot Project (Guyana)

1986

86-0056 Manual for Investors in Tanzania (Tanzania)

86-0161 Technology Information Dissemination (Botswana)

86-0168 African Standards Documentation Network - Phase I (Kenya)

1987

87-0117 Information Services - Industrial Development Board (Sri Lanka)

1988

88-0009 Technonet Manual - Translation into Bengali (Singapore/Bangladesh)

88-0035 Industrial Information System (KIRDI) - Preliminary Phase (Kenya)

- 88-0127 Development of an Industrial Information Service (Mali)
- 88-0235 Strengthening the Industrial Information Service of SONEPI (Senegal)
- 88-0242 Rural Technology Information Service (India)
- 88-0304 Industrial Development Information Service (Somalia)
- 88-0339 Ferrocement Information Network Activities for Rural Development (Thailand)
- 88-0354 Documentation and Information System on Transportation (Senegal)
- 88-1021 Latin American Foundry R & D Network (South America)
- 88-1038 Industrial Information and Communication (CARIRI) (Trinidad & Tobago and Canada)
- 88-1047 Latin American Chemical Technology Network (Brazil and Canada)

1989

- 89-0025 African Standards Documentation Network - Phase II (Kenya)
- 89-0078 Information Service on Innovation (Uruguay)
- 89-0097 Information Service for Industry (ACOPI) (Colombia)
- 89-0112 Information Service for Small-Scale Industries (Indonesia)
- 89-0155 Documentation and Information Centre for Small and Medium Industries (CEDOIN) (Ecuador)

1990

- 90-0008 Patent Technological Information (ARIPO) (Zimbabwe)
- 90-0019 Decentralization of Industrial Information Services (ITINTEC/PROIND) (Peru)
- 90-1002 International Small-Scale Mining Information System (India and Canada)
- 90-1028 Industrial Information and Documentation (Mauritania and Canada)

1991

- 91-0064 Act Regional Market and Trade Information (Eastern Caribbean) - Phase III
- 91-0092 National Industrial Information System (KIRDI) - Phase II (Kenya)
- 91-0166 Development of the Industrial Information Service - Phase II (Mali)
- 91-1004 Industrial and Technological Information System (Zambia and Canada)

Health Sciences Division

1982

82-0221 Occupational Health in Small-Scale Industries (S.E. Asia)

1986

86-0081 Occupational Health Profiles (Egypt)

1989

89-0326 Evaluation of Occupational Health Service Systems (Korea)

1990

90-1008 Anthocyanic Pigments (Burkina Faso) - Phase II

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ISBN 0-88936-661-6