

TECHNOLOGICAL COMPETENCE IN MAURITIUS

Final Report

May 1995

MAURITIUS RESEARCH COUNCIL

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Final Report to the Mauritius Research Council

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Preface

The rationale of this Project on Technological Competence in Mauritian organisations rests on the objective of providing substantial groundwork for the formulation of a national Science and Technology policy.

The project report is so structured as to enable the various economic operators concerned to have both an overall understanding of the prevailing technological competencies in the island, as well as in their individual sectors and industries. The main body of analysis is presented in Chapter Three of the report, followed in Chapter Four by a sector-wise analysis of the findings.

This study would not have been made possible without the judicious initiatives and dedicated contribution of the each and every person of the team, namely, Anita, Jaishree, Len, Dinesh, Paris, and our statistician Kala. To them all I extend my sincere appreciation.

I wish also to express my thanks to the Mauritius Research Council for having willingly funded this Research Project.

Paul Roland DUBOIS Project Co-ordinator May 1995

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TECHNOLOGICAL COI\IPETENCE IN i\L-\URITIUS

EXECUTIVE SUI\II\IAR\'

Aims of the study

The overall aims of the study are to assess the degree of technological competence in Mauritian industries. The outputs of the study include assessments of the current level of technology in the country, of the mechanisms of obtaining technology, of information channels for securing new technology, and of how technology assessment and forecasting are being carried out. The study also aims at detennining the strength of the Research and Development system in the country, and at identifying the technological gap between existing technology and that which is available on the world market.

Approach of the study

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lauritius is one of the few nations with a real average growth rate of 6% for the past twelve years. The island's major concern today is to find new ways of improving and sustaining the island's competitiveness in the global marketplace. The country's past economic success is attributable to the national strategy for industriali anon, aiming at an expansion of export-oriented industries as a means of creating jobs for the huge source of cheap labour available and earning foreign exchange. Preferential access to markets in Europe and USA was another contributor to this success. However, the face of the world market has now changed, and competition has become extremely and increasingly fierce with the emergence of new competitors in the traditional mauritian exports.

Conscious that the labour-intensive production no longer meets our competitive need, the mauritian authorities are striving to create the necessary environment wherein the strategy is to turn to higher-technology, capital-intensive methods as a means of offering better-quality, lower-priced goods and services to our customers. As such, various schemes have been introduced in the recent years to help spearhead this new industrial culture.

In parallel, a study has been carried out to attempt to integrate the various assessments - level of technology, mechanisms for obtaining technology, channels of information, technology assessment and forecasting, technology support systems and R & D levels - in order to recognise the constraints and gaps, and ascertain the possibility of adopting a Technology 'culture' and system in Mauritius which would respond to the new needs of the country.

Each of the separate assessments is based on a nation-wide population and on subsequent rigorous analysis.

The Level of Technology

There does not seem to be a large community of foreign investors in Mauritius. 77% of the organisations are 100% mauritian owned with only 8% owned by foreigners and some 14% owned jointly by mauritians and foreigners. If new and high-level technology is to fast permeate Mauritian industry, which is a necessity if it really wants to leapfrog stages of economic development, then increased and enhanced foreign investment is a must as experienced by Singapore, another small economy which Mauritius likes to emulate. However, this must operate within a framework which will allow the island to benefit from new and/or advanced technologies, and not merely allow foreign investors to maximise profit in the short/medium term, then run off to a cheaper land.

The bitter fact is that lately, all the large multinationals have been concentrating their direct foreign investments in the world's two largest populated countries, namely, China and India since their conversion to free market economies. In 1992 alone the government of China approved the establishment of 47 000 new enterprises based on foreign investment, more than the total of the past decade while in India total foreign investment flows rose to \$2 billion in the *first* months of 1994, up from \$150 million in 1990. What happens to small island economies like Mauritius?

Of the industries (both local and foreign-owned) currently operating in Mauritius, most operate using a mixed mode of both manual and automated processes. To date, the firms with the greatest degree of manual processes are within the Mauritius Export Processing Zone (MEPZ), the latter having been set up to absorb the then large numbers of unemployed, and therefore being highly labour• intensive. A handful of industries do significantly use fully-automated processes, namely a few operating with a Development Certificate, that is, import substitution industries and a few from the Dataprocessing, Printing, and Plastic industries.

It is not a simple matter to attempt a determination of the technological gap between Mauritian industry and worldwide levels. A gap does exist, however, as testified by the majority of respondents in this study and can be confirmed by foreigners visiting the local industrial set up as well as mauritians travelling abroad and the quality of our products.

All firms of the Sugar sector claim they do not possess the technology they would wish to have, and the same inclination is expressed generally elsewhere. In addition, a considerable proportion of Mauritian industries *do no/ know* whether they have the best technology for their operations or not. This is quite alarming for a country that badly needs to enhance its technological competitiveness.

Are firms aware of *how to* approach new and better technology, using the newly developing Information Highway?

It is clear that there is a need for a shift towards an infonnation-based economy in order to remain internationally competitive. As such, the adoption of l.nfonnation Technology in Mauritius would provide advantages, such as solutions to labour shortages in certain skill areas, and compensation for the island's physical remoteness from major markets.

Although most Mauritian finns do possess computers, it is not clear what the number and type of computers in use is. Utilisation appears *to* be mainly for Data Processing tasks and accounting exercises, and very mush less for lanagement Information Systems and Decision Support Systems, both important, powerful modem-management tools. Other Information Technology tools which are not popular include Networking. Computer Aided Design and Manufacturing, and the use of Electronic Data Interchange facilities. Only 7% of mauritian organisations have recourse to E-Mail at a time when we are zooming ahead to an all• information society.

Investment in the acquisition of new equipment and/or upgrading of existing equipment is a sine-qua-non condition for economic survival today, particularly in view of rising labour prices. While most companies have invested in the past five years, be it in new equipment or upgrading of present equipment, one cannot ignore those (18%) that have not invested at all in the last five years. And when it is realised that the life cycle of technology is roughly five to seven years, most of these would close down within the next three years.

The trend, however, is towards acquisitions of new and more sophisticated technology, although a good few still merely re-invest in the same technology.

Of those which have actually invested. over half employ a small staff (less than 50 persons). For those employing 200 persons and above, the inclination appears to be towards investing in more sophisticated equipment. Invariably, most companies, irrespective of size, have invested in new technology for reasons of quality improvement and production volume, followed by labour-cost reduction and as a solution to labour shortage problems. Generally, in fact, quality improvements have indeed been experienced, followed by increase in volwne of production.

An interesting by-product has also been claimed by many organisations, namely that employees have felt increased motivation to work since new technologies have been brought in.

Problems associated with Investment

As a result of investment in technology, some organisations have unfortunately suffered negative consequences of their decision, the two main problem areas being lack of qualified maintenance staff to take care of the equipment, and shortage of skilled labour to operate the equipment. Also emerging was a problem of availability of spare parts.

The maintenance of plant and equipment in good working order is essential to achieve total quality and reliability, as is the level of skill of the people operating the equipment.

The lack of qualified maintenance staff and spare parts was a critical issue that kept being raised during the study. Even manufacturing firms were found to be unable to take ca.re of their major maintenance in-house, and had to contract-out this job. Indeed, it seems to be generally a popular practice to contract maintenance and repairs - especially major- to other local firms.

A considerable number of firms even tum to foreign experts for their maintenance and repair problems, and this will become more acute as companies inevitably invest further in new technology, so that a mechanism of transfer of skills should be set up as soon as possible.

In fact, many firms prefer not to invest at all, and reasons put forward for this are : no access to credit, unaffordability, shortage of skilled labour, unreadiness (just started operating), declining market, to name but the ma.in reasons.

Small and Medium Enterprises seem to fare worst of all sectors and in all areas assessed, but mainly where investment is concerned.

Support to Technology

There is no proper technology assessment being done presently in Mauritius and still less of technology forecasting. The country needs a well-planned technology policy to continue in its positive economic trend. It may be convenient to place the responsibility upon some Organisation for the evaluation and regulation of the use of technology in the country according to its specific needs, and in harmony with economic, social, cultural and environmental aspects.

In Mauritius, it has been found, new technology comes through transfer, either by screening specialised magazines, or through direct contacts with the equipment manufacturer. For instance, the EPZ, which is a well-established sector in its own right, derives very little of its new technology from local Research and Development. Indeed there is practically no industrial R & D in the country. It is suggested that a research centre funded by the EPZ itself; will have to be established, as exemplified by the research centre of the Sugar sector. In addition, the quality and quantity of our manpower will have to be looked into very seriously, as training and education in science and technology will have a great role to play in ensuring that the country is able to use science and technology for its own development.

A strong pool of technical manpower would be in a better position to understand and negotiate the most appropriate type of technology. Wrong technology decisions can be extremely costly for a small state like Mauritius. As at present Mauritius has a ratio of only 0.7 engineers for every 1 000 inhabitants, compared with roughly 7 engineers for every 1 000 singaporeans.

It is not pure coincidence that companies that have invested in new technologies in the last five years have complained at not being able to make the most of these equipment due to maintenance, repairs.and skill problems.

Technology and new production techniques have been found to significantly improve performance, productivity and profitability, but since they require use and application by human beings in order to be successful, this success can only be achieved through the involvement and participation of employees. The relatively high scores of training given in the major sectors indicates the growing awareness as to the necessity of upgrading and maintaining operators' skills, especially if and when machinery and equipment are upgraded or replaced by more recent technologies. Generally speaking, technical staff also seem to benefit from training , especially in-house. A small number of technicians are sent abroad for training, especially in the 'new' sectors, but additional training should be given to this level of staff, since they are the ones who are better placed to train operators as well as contribute directly to the exercise of technology assessment. AJso specialised training should be enhanced if competitive advantage is to be endured. Anagemen being t, e eauers wi/nin an orgamsanon. us continuous training and development should never be neglected, so that those which operate the system. the drivers of the system, look toward their leaders for an enlightened and modem approach to the production of goods and services. nfortunately. training at lanagement level has been very insignificant with the resulting obvious consequences.

What Needs to be Done

- I. The removal of trade barriers all over the world is supposedly opening up access for small companies and countries to markets that in the past were controlled by larger conglomerates. "The bigger the world economy, the more powerful are its smallest players" says John Naisbitt in his book entitled 'Global Paradox'. This is due to modem telecommunications systems which enable small organisations to have an edge over larger ones. But the hitch is that they have to be competitive and 'competitiveness today is a function of the capacity of companies to innovate and upgrade' as pointed out clearly by M. Porter in his book "The competitive advantage of nations". Large companies are conscious of the need to be small today to be competitive and are thus restructuring themselves and taking the lead the world as small and medium companies. We note that 50% of US exports are created by companies with 19 or fewer employees.
- 2. Ways and means have therefore to be devised in order to enhance direct foreign investment in the country. Knowledgeable migrant mauritians must also be motivated to come back with their expertise and invest both their knowledge, capital and know-how where possible.
- 3. At the same time, some more secure and successful companies should be encouraged to look into the possibility of following the general investment trend, that is, to invest in the two giant countries, China and India. two awakening dragons that will command the world economy for some time yet. laturally, there is a need to have an appropriate in-depth study carried out in these two countries to ascertain the areas of interest for prospective investors.
- 4. Enhanced information dissemination is necessary to create greater awareness amongst industrialists and entrepreneurs about how the global economy is

evolving. the new production techniques, the latest technology m their very processes, new management techniques, and so on.

- 5. The ultimate effect would be to assist them in innovation. Eventually, all companies would have to be networked by computers and could thus retrieve timely information required.
- 6. In such a context, it is desirable that there be some technically- and technologically-fluent media persons being trained who could contribute clear and concise articles in newspapers and on air, to convey the right message to industrialists and entrepreneurs.
- 7. In addition, existing financial and fiscal incentives must be given more publicity. Possibly open forum would have to be organised where entrepreneurs and would-be entrepreneurs are initiated to these incentives.
- 8. Telecommunications is the driving force that is simultaneously creating the huge global economy and making its parts smaller and more powerful. Ergo there should be tremendous improvement in our telecommunications infrastructure. This is being done at the moment but it is important to find the right mix and keep the systems open to future upgrading.
- 9. Along with telecommunications, nothing can contribute more to a developing country's competitiveness than a strong pool of trained resources. It has been observed that as far as operators are concerned, there is more or less satisfactory on-the-job training. However, it has been depicted clearly that there is a big vacuum in the area of maintenance technicians with highly specialised skills. This was also pointed out in an earlier study carried out by the Uni, ersity of Mauritius in 1994. The recommendation was to put up a central workshop where specialists from overseas would take care of certain specialised maintenance and repairs problems whilst simultaneously training local technicians who would be called upon to take over the workshop. The proposal is still valid today.
- 10.In addition, management must find time to undergo specialised trairung. At present, it does not appear to be a priority. This is reflected by the low figures of managers undergoing training. Training must be considered as an invest:Jnent rather than a cost, and as such a very essential commodity if companies are to survive, let alone be competitive. It is a never-ending process that stops only when one breathes one's last breath. Meanwhile, the globalisation of the economy is equal to world competition in which trained professionals are a key factor, and as such, more and more trained graduates should be employed in our industrial setting.

- I. There is practically no industrial research and development in the country, with the exception of the sugar research institute. It is not by chance that the mauritian sugar industry is so well developed. A similar research support should exist for the industrial park. In the first instance, a closer link between industry and the University of lauritius is necessary as the latter has various resources that could help out. Some companies are already working in close collaboration with the University.
- 2. eedless to say that organisations should try to play a more prominent role in the life of the University, since the more educated the mauritian people, the better it is for industry in general. This is where lies the source of productivity and competitiveness.

Finally, the following diagram shows a modified model for the enhancement of our industrialisation process. The model was developed by Mrs R. Mootanah as part of her M.Phil project at the University of Mauritius It is a dynamic integrated model which proposes to transform Mauritius into an information based economy with sustainable competitiveness as end result.

The model fits in nicely in the vision 2020 objectives and sununanses the necessary actions to be followed.

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5. Are the industries adopting the $O_{10} = m^{2}O_{1} - m^{2}$ involved approach?

Modelling of the Mauritian Industrialisation Process

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INTRODUCTION

Placing the study in context

In order to frame the technological competence of Mauritius within the context of international competitiveness, it is necessary to assess the island's developments in her process of Industrialisation, as follows :

Mauritius has been one of the few newly-industrialising nations having experienced an economic growth rate of around 8% during the last decade. However, new constraints have recently emerged - erosion of our previous vast supply of cheap labour, deteriorating international economic conditions, new competitors - all jeopardising our past competitiveness.

The picture does appear rather bleak, but it requires being put into proper perspective so as to understand the necessity for a change in the country's industrial strategy and policy. This requires in tum an explanation of how lauritius has arrived at such a strategic turning point in her history.

Historical perspective

The industrialisation process of Mauritius dates back to the last century with the Sugar Industry as the first industrial base and the backbone of the economy. Unfortunately, major parts of machinery and equipment have remained more or less urunodified to date.

In the 1960's the first serious attempts to encourage the creation of an Industrial base through the setting up of import-substitution industries was made. However, these industries, such as food processing, fertilizers, beverages, footwear, furniture and steel, did not lead to a real industrial take-off.

Between 1970 and 1984, then, a second phase, based on a 'Mixed Strategy' of Import Substitution plus export-oriented growth was launched. The Mauritius

Export Processing Zone $(J \mid EPZ)$ was set up, its aim being to encourage exports. using the abundant and cheap labour available.

As a result, in the mid-eighties, the importance of manufacturing increased, driven by the accelerating growth of a dynamic EPZ sector in particular,

The need for a diversified industrial base

Although the EPZ did achieve its aims, it becomes clear in the 1990's that this increasingly dominant sector (particularly textiles products) has left lauritius with a vulnerable duo-product economy: Textiles, and Sugar.

Textiles-and-garments production alone accounts for approximately 90% of employment and constitutes 57% of total laUiitian exports.

As a result, a third phase of industrial policy is now emerging, which continues to focus on export-oriented growth, at the same time encouraging a more diversified industrial base, especially through the use of more capital intensive and high• technology processes. Indeed, this is the logical step that follows the previous phase. That is to say, as we strive to compete along 'traditional' product categories in the same markets ends, we find that we have neither a cost advantage, nor a quality - in terms of product, design, delivery, service - advantage.

How has iliis happened?

As the full employment situation gives rise to a shortage of labour and subsequent rise in the cost of labour, our cost advantage rapidly erodes. As is now well• known, our past economic success was based upon a concentration on a narrow range of Jabour-intensive textile exports.

This is source of great concern because it makes our level of economic activity extremely vulnerable to changes in the macro-economic environment, viz. : the reform of the MFA within the GATT (all trade barriers coming down will mean that all countries of the world compete on equal footing, so that onJy those with competitive adva.ntage/s survive).

No longer are we able to produce low to middle market goods and market them to traditional markets, because a number of low-wage countries can easily sell off similar products several times cheaper. Who are these countries ? They are the New Competitors - Sri Lanka, South Korea, Bangladesh, Jamaica, and East• Europea.n nations who have a labour cost advantage.

Mauritius is in an even more precarious position because of the success of its South East Asian NIC competitors - Singapore., Taiwan and Hongkong, who have high levels of skill as well as technology.

The idea, then, is clearly to focus on all factors that could lead to increased international competitiveness and export potential.

Government has the responsibility for the management of the macro-economic environment, but micro and enterprise-level issues are just as important. The levels of technical efficiency. the organisation and management of firms, the attitudes and philosophies of managers and workers alike. are to some extent fashioned by the success or competitiveness of the economy as a whole. The issue of Productivity again and again arises : we simply cannot afford either technical inefficiencies, nor managerial slack, nor poor work habits. Advanced Manufacturing Technology (M1T) has the potential for reducing production costs, improving quality, and increasing flexibility. Advanced Manufacturing Technology refers to such process technologies as Computer Aided Design (CAD), Computer Aided Manufacturing (CM1), Computer Aided Engineering (CAE), Computer Aided Process Planning (CAPP), and the integration of these technologies in Computer Integrated Manufacturing (CIM).

In the Global Village - and the term appropriately describes the world we live in today - only the best organisations succeed. Within such an economic environment, the main issue is about how to maintain and enhance the competitiveness of our economy; about how to achieve export and industrial growth; about product diversification (i.e., towards less labour-intensive, but with higher value added); about innovation and creativity, through changes and improvements in technology and in a manner that we make optimum use of our human resources. Therefore, with a view to improving quality and productivity, we are forced to seek continually better methods of manufacturing and operating.

An economy, a firm, is competitive if it can produce products and services of superior quality and lower cost than its competitors. And technological competence is an essential factor for this success.

Of course, this does not mean that we have to do away with our available labour; Indeed, how could we ? Instead, as our activities become geared towards modernisation., fast response, short lead tirnes, better quality, our workforce will perforce need to learn to be more flexible and productive. Yet again, Productivity cannot be seen to mean paying people better wages and expecting them to work more, but rather in the sense of tapping employees' potentials, skills, talents and capabilities in such a way as to enhance their motivation for greater flexibility and productivity.

The fact is, wherever you position your product, high end or low end of market, your customers are getting increasingly sophisticated and knowledgeable, regardless of the product category. They are now asking for better prices and better quality.

The myth of being able to sell any old dump provided the price is right (i.e., rock• bottom) does not hold, unless the product is a reject. But who can survive producing rejects ?

As increasingly, international ISO 9000 standards become a pre-condition for a sales deal, all export-oriented countries need to set up procedures and processes which ensure ISO 9000-certified products. And this applies to the entire chain of business : from the products of your supplier, through your own processes, to the various essential services such as banking, transportation, government and administrative support systems (e.g. customs), information-based services (do we know our market? do we know what technology is out there ?)

\l/e cannot overlook the fact that we have lost custom not only on price, but because our quality is not reliable; and the only means of ensuring this reliability is through certification to international quality standards. However, this spells much difficulty especially if we continue to depend on labour-intensive activities. A number of processes must therefore be mechanised, others automated, yet other robotised. And strategies for New Technology and new Production techniques be adopted, with enoml0us efforts put in to invest financially, but also in training and development of management and employees in order to gain optimum return.

As more and more organisations are making great investments in technology, their experiences have shown ¹ that organisations win greater benefits from these investments if, during the change process, managers give primary consideration to the role of people ; because, although the technology itself quite easily crosses boundaries between countries and industries, the appropriate human resource practices necessary for its implementation and operation are not so easily transferred. This is important information for Mauritian firms contemplating (quite correctly) the implementation of more advanced technology in their processes, because they Will find themselves rurming into a wall unless the decision at policy level is diffused throughout the organisation in all actions, at all levels, and at all times, so that the proper organisational culture emerges to create synergy with the technologies being implemented and operated.

Naturally the financial implications are substantial; state subsidy to alleviate the cost is to be considered (although over-capitalisation must be avoided); companies could also form strategic alliances to share the cost of investing in new technologies.

In addition, continuous improvements to whatever technology exists are also very important. This approach implies unending improvements, and the setting and achieving of ever-higher standards.

¹ The AMT principles are adapted from a report published in 1986 by the Manufacturing Studies Board, 2101 Constitution Ave., Washington, D.C 20418, USA

The idea, coined and adopted by the Japanese, suggests that wherever and whenever improvements are made, these will eventually lead to improvements in such areas as quality and productivity. Ve note the word 'eventually'. Indeed, technology improvements, whether through innovation or continuous improvement, is a long-term process. Ve must not seek the transition too quickly, that is, we must approach it in a way that provides a sound foundation for new industrial activities (Diversification), and reinforce the competitiveness of existing industry (Consolidation).

Finally, if we do not want to be wiped out of the highly competitive international scene, it is also important to build up the necessary managerial and labour skills and competencies to complement any technological upgrading that is induced by new policy and strategy decisions.

It is not incidentally that the country has expressed its willingness to adopt Science and Technology as vehicles for economic development.

However, in order to define a Science and Technology policy for the country, it is pertinent to gauge the level, competence and competitiveness of our various technologies in use in the country in various industrial sectors. Hence the objectives of the study have been defined as follows:

- to define the current technology levels in the country ;
- to understand the mechanisms of obtaining existing technologies ;
- to identify the technological gaps between the existing local technologies and whatever exists on the world market ;
- to find out the information channels of securing new technologies ;
- to determine how technological assessment and forecasting are being done ;
- to ascertain the possibility of solving technical problems within the country ;
- to determine the strength of the Research and Development (R & D) system in the country.

2

METHODOLOGY

The methodology adopted for this study is the classical one using survey techniques.

Documentary search

The first step of this study was to achieve a documentary search in order to identify and list the major issues covering the proposed objectives. These 'issues' were then classified into the following broad groups:

- I. Production, Equipment & Other Aspects ;
- 2. Use of IT;
- 3. Human Resources;
- 4. Capital, Investment & Legal Framework ;
- 5. Business Plans & Markets;
- 6. Technology Sourcing ;
- 7. Technological Assessment & Forecasting ;
- 8. Technological Gaps & obstacles ;
- 9. Research & Development, Innovations.

In addition to the documentary search, information was also collected through the interview of key informants.

Interview of key informants

Twenty (20) key informants were selected, from the different economic sectors of the country, on the basis of their active involvement, position and level of know• how and competence in the area of technology and its related fields. A list of these key informants is attached as per Appendix I (p132).

They were all interviewed around the List of Issues, in order to have their first hand opinion on the exercise and to ensure that the design of the questionnaire be as complete as possible by incorporating their views therein. An intermediate report was drafted, containing a summary of findings from the interviews and is attached as per Appendix II (p133).

Design of questionnaire

On the basis of this information, the questionnaire was designed to be as comprehensive as possible, widely covering the different issues related to the status of technology in Mauritius and the objectives of this survey, while being at the same time simple to answer.

Right at the outset, it was realised that there are many surveys being carried out and that professionals do not have much time to spare to fill in questionnaires. The questionnaire is divided into two parts, the first part dedicated to general information about the organisation and the second part composed of fourteen (14) questions. An sample of the questionnaire is attached as per Appendix III(p 145). The questionnaire consists of a mix of closed and open-ended questions. For nearly all questions, several possible answers are proposed and ilie right one needs only to be ticked. This closed nature allow questionnaires to be filled in and analysed in a simple and rapid way. If the proposed answers are not convenient, then any oilier answer can be specified so that a maximum atl10UJ1t of qualitative information can be collected. Also, some questions are dichotomous, others allow multiple responses and others are in matrix forms.

Sample design

No comprehensive list of enterprises and organisations in Mauritius could be obtained from a single source. A database containing nearly 3000 organisations was created with lists obtained from different sources available as listed in Appendix IV (p148). \Vhile it is not claimed that this is an exhaustive list of all enterprises and organisations in Mauritius, it is one of the most substantial and significant lists covering all the various sectors of the economy. Among other items, this database contains names and addresses of these organisations, products manufactured and services offered, !SIC code (International Standard Industrial Code). They were also classified by:

(a) Broad categories of organisations (EPZ, SME, DC, Pioneer, Government and Others, Others being a sector containing organisations which do not benefit from any manufacturing classification and which are non governmental)

(b) by sector (Textiles, Metal products for example).

The sample adopted is the entire database, that is the whole population. It is to be noted that some sources, while having substantial data could not be accessed, being governed by the Secrecy Act.

Survey method

Questionnaires were mailed to all organisations in the sample. From the returned mail, it seems that some of the enterprises of the sample had already closed down whereas some others had changed address. It is presumed that 2836 enterprises received the questionnaire. In order to increase the response rate, they were sent 2 or 3 reminders by mail and also some phone calls were made. The support of the MEPZA and the SMIDO must be acknowledged here as they provided a covering letter to their members.

To further improve the response rate, in the questionnaire itself, the organisations were asked whether they were interested in having a resume of the major findings of this study.

Response rate

After tremendous efforts from the part of the work team, the overall response rate reached 32%, corresponding to 900 questionnaires returned. This can be considered as a fairly good rate of response. A detailed breakdown of sectors and corresponding response rates is attached as per Appendix V(p149). The table is divided into three parts where response rates are given for 'All Sectors', 'Broad Categories' and 'Major Sectors'. Regarding Rodrigues, some 210 enterprises were contacted by mail and only seven returned their questionnaires. Hence, analysis does not reflect on Rodrigues industry. It can be noted that a first draft report was issued with an overall response rate of 24%. As far as the non response is concerned, it has not been possible to assess its influence on the results of this survey. There are not enough characteristic data in the database (size, year started for example) about organisations which have not sent back the questionnaire as this questionnaire was the sole means of obtaining such information.

However, the response rates per sector can be looked into.

It is clear that the response rates vary from sector to sector. Also, out of the 900 returned questionnaires, some sectors are more represented than others. For example, the EPZ sector accounts for 22% of the returned questionnaires and the S 1E for 18% as shown in Appendix Vl(p 150). It can be said that sectors having greater percentages are of more influence on the overall results.

However, these percentages are closely linked to the fact that in the sample, some sectors are more represented than others. For example, the EPZ sector accounts for 16% and the SME for 23% of the total number of organisations.that is, 2823. It is to be noted that according to these figures, the EPZ sector would be more concerned about this survey than the SME. When these percentages are compared, it is found that they are comparable. The same analysis stands for all categories and sectors. Therefore, it can be said that, as far as response rates are concerned, results obtained out of the 900 questionnaires returned are representative of the sample.

Data entry and analysis

All data obtained from the returned questionnaires were entered and analysed through SPSS, a statistical software package. The analysis, mainly frequency analysis and some amount of crosstabbings, was conducted question wise and sector wise. A distinction has been made between 'Major Sectors' and 'Broad Categories'. Results of this analysis are displayed in tables and histograms throughout this report.

Report drafting

Data obtained from statistical analysis has been interpreted and commented upon. The main core of this report consists of these comments. Some figures issued from the analysis are easy to comment and can speak by themselves. Others are more abstruse and may sometimes express personal opinions of the authors.

Constraints

Concerning the survey method, the method of the mailed questionnaire was preferred to the method of direct interviews where more information and response rates could have been obtained because it is less costly. Also, the results of this survey could have been improved by some elaboration of case studies but unfortunately time and financial constraints prevented this.

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ANALYSIS OF FINDINGS

3.1 PERCEPTION OF THE LEVEL OF TECHNOLOGY

3.1.1 Ownership structure

As it was presumed that the ownership (foreign or local) structure of a business may influence the type and level of technology utilised, it was probe into the profile of decided to the ownership. It must be acknowledged that, most particularly, in the early 80s the Hong Kongese have played a very significant role into the introduction and development of Textile Technology in Mauritius. The level of technology imported though was rather customary as it was meant to be highly labour intensive to resolve the high unemployment plague hitting the country at that time. However, it appears that they have come to Mauritius only to exploit the then vast availability of cheap labour and other comparative advantages to eventually pack up and go elsewhere or back home. They have not been investing further in their equipment and have inevitably closed down. Typical examples are Oceana, Beta industries, Leasure garments etc. On the other hand certain success companies which have been regularly updating their technologies and are the flagcarriers of the country are owned entirely by mauritians, (See Fig 3.1.1)

But these comparative advantages no longer exist in Mauritius which must consequently compete at higher level of operating that it was previously. And it is interesting to note that, lately certain investors from Western Europe have been introducing the latest technology (example in printing industry) and modem management techniques (example m lew Island Clothing company Ltd) into the mauritian industrial arena.

From the survey it was found that 78% of the mauritian organisations are exclusively owned by mauritians with only 7% of the responding organisations entirely foreign owned and some 13% jointly owned by local and foreign investors.

Not surprisingly, the EPZ (48%), a sector where a myriad of incentives were offered to foreign investors, coupled by a subsequent series of missions abroad in the early 1970s to attract them to come over and invest in Mauritius with their technology and capital, and the recently established pioneer sector (52%), in which investment in high technology is a criterion, are those with the biggest foreign capital shares.

On the other hand, most of the organisations in the other major sectors such as the sugar industry and the DC companies (operating with a Development Certificate) are, with some exceptions, exclusively owned by mauritians.

The Small and Medium Enterprises is another sector which is being given more and more importance nowadays since the introduction of the Industrial Expansion Act of 1993. However, given shortage of statistics on these enterprises, the survey covered only those that are registered with the SMIDO and it has been confirmed that practically all of them are solely owned by mauritians.

It could be seen there is not enough of foreign investment in Mauritius at the moment. Unlike India where total foreign investment flows rose to US\$2 billion in the first six months of 1994, up from US\$150 million in 1990 following 1991 economic reforms. So if new and high technology is to permeate the mauritian industry at an accelerated rate, which should be the case now, enhanced foreign investment is a must. But a word of caution. The investments should be well framed by legal parameters so that they benefit not only to the investors but *also* to the country and help build up the local indigenous technological capability.

The questions that need to be asked are why is it that international companies are not investing in Mauritius?

Yet, the MEDIA has got offices/representatives in quite a number of countries in Europe, Africa and India. Recently, an Indian delegation visiting Mauritius was complaining about the rigidity of the local banking system. The ex-president of the MEPZA at the last general assembly of the

association talked about the administrative red tape and how painful it is to set up a manufacturing concern in Mauritius. He suggested that the one stop shop at the linistity of Industry should be given executive authority instead of being only a liaison office. There could be an urgent need to look again into the companies law as well as the Banking Act.

But over and above these administrative considerations which are not minor impediments against foreign investment. there are other considerations that need to be heeded to such as the creation of a strong science and technology resource base.

Here adequate education and training is vital, that is. the mauritian people must have been brought to a level of education and training that reduce their learning curve at all level, in a manufacturing environment where traditional mass production concept is being threatened by agile manufacturing.

It must, however be mentioned that the country through the University of Mauritius, is currently producing many graduates ill different disciplines such as engineering, accountancy, economics, management etc. who are ready and waiting to take up challenging opportunities that perhaps only international companies could present.



Eliteration.

FIG 3.1.1 OWNERSHIP STRUCTURE (ALL SECTORS)

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3.1.2 Mode of operations

In an attempt to have an idea of the level of technology in different sectors of the economy, enterprises were questioned about the nature of their operations, that is, whether they were essentially manual, automated, or a mix of manual and automated operations. The breakdown results are as per Fig 3.1.2 for all sectors at the end of this section and Appendix VJ! (p151) for individual sectors.

Most of the enterprises surveyed at an average of 69% responded that they operate with a mixed mode of manual and automated process. This can be interpreted in several ways; it could be one single process having a mix of some manual operations together with some automated ones or it could be that the enterprise is making use of some completely automated processes in parallel with some completely manual ones.

Others have mainly manual processes (25%) and only 2% claim to be fully automated. The low percentage of fully automated processes certainly reflects the prevailing situation in the country. However, this question is highly subjective and the term 'automated' may have been understood in different ways. For example, use of computers and machine assisted processes may have been taken for 'automated' processes.

EPZ (35%) and Pioneer (33%) industries hit higher scores for manual operated processes than SME's (19%) and DC (9%) and thus lower scores for processes having a mixture of manual and automated operations. It is not surprising that the EPZ sector obtains such a high score of manual processes because it was set up mainly to resolve the severe unemployment problem affecting Mauritius at that time. Also, the most important industry of the EPZ is the very labour-intensive garment-making industry.

On the other hand, the score of the Pioneer sector is abnormally high for manual processes since it was set up to promote investment in, and use of, more advanced technologies. Indeed, one must note that some of the Pioneer enterprises while operating in new *areas of activity* but not necessarily with the latest or more advanced manufacturing processes.

Sub-sectors having a high score for manual processes are: Flowers (81%), Handicraft (46%), Hotels & Restaurants (58%).

The governmental sector at an average of 70% have processes necessitating a mix of manual and automated operations.

This could be explained by the increasing use of office automation (60%) in the governmental sector. On the other hand, the Sugar Industry has indicated a figure of 100%, sugar processing being a continuous unmanned process within the factory, while manual operations reside mainly in the field activities.

At the same time, however, all of them claim that they do not have the best equipment:

87 % of them may be using process control but this industry is a very old one and equipment may not have been replaced by more performing ones.

In fact, only 10% of the Sugar Industry, through investment in technology during the past 5 years, have replaced their equipment by more sophisticated ones.

Other sectors indicating heavy use of the mix mode. that is, above the global average of 69% are: Agro. Industry (93%), Bakery (89%), Stationery (91%), Printing(82%) and Jewellery (82%). It must however be pointed out that Printing and Jewellery are emerging sectors where heavy investments have been made lately.

As for enterprises having fully automated processes. the DC category sector (operating with a Development Certificate) stands out with a score of 6 % over the EPZ and SME's. This percentage represents *four* (4) industries of the Plastic sector.

DC comprises mainly Import Substitution Industries (!Sis) and emerged in the late 1960's to reduce imports of essential goods such as oil, flour, fertilizers, and beverages. This sector has now the best overall profile because it is composed of important enterprises and probably the best who survived.

Of the fifteen companies operating with a Pioneer certificate, only one claimed to be fully automated.

Sub-sectors having scores for full automation well above the average of 2% are: Dataprocessing (11%), Plastic products (14%) and Printing (18%). As already mentioned, high investment has been made recently in the printing sector. The Plastic Industry's score could be explained by the use of injection moulding machines which are completely automated.



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FIG 3.1.2 MODE OF OPERATIONS (ALL SECTORS)
3.1.3 Satisfaction with Current Level of Equipment

Respondents were asked what their perception of their own technology was and whether they believed better technology was available elsewhere.

As shown by Fig. 3.1.3, only 16% of all enterprises answering the questionnaire claim to have the best technology.

62% of respondents admit that they know there exists a better technology than they have in terms of quality of products and labour consumption. This question is highly subjective because for some people, the best technology does not necessarily mean 'state of the art' technology, but a technology related to their own their level of production and operation as well as the market targeted. Another 16% say that they do not know if there exists better technology than their own. As such, it is very difficult to accurately assess the technology gap between Mauritian Industries and whatever technology exists on the world market. However, it can be said that a gap does exist as testified by at least 62 % of the respondents from lauritian enterprises who are not satisfied with their current technology level.

As already developed in the previous section, 100% of companies of the Sugar Industry adm.it to not possessing the best technology.

This same inclination is expressed in Education & Research (71%), Transport (70%), Furn.iture & Wood (70%) and Agriculture & Fisheries (70%) (Appendix VITI p152). Considering that the agricultural sector has stated its processes to be manual at 35% and that traditional methods are being slowly replaced by more modem techn.iques and technologies, the level of application of these techniques and technologies is still very low, especially when one th.inks of the inevitable mechan.isation of cane cutting.

As for the sector of Education & Research composed of research institutes and training centers mainly, it seems that they do not have all equipment they need to operate at their best.

For those claim.ing to possess the best technology, one of the highest scores is obtained in the Pioneer sector (38%) due to investment in the latest technology.

At the same time, as many as 52% say that they do not possess the best technology. Again, it is probable that they operate in new areas of activity but not with the most advanced manufacturing processes.

DC (22%) has a better score than EPZ (18%) and S IE's (10%). However, with the Industrial Expansion Act of last year. S:\!E's members are now entitled to certain advantageous financial and fiscal incentives to invest into equipment of up to a CIF value of Rs 5 million. and with this amount, latest technologies can be purchased.

Sectors having rates well above the average of |6% are for example: Bakery (40%), Plastic products (32%), Jewellery (22%). Other sectors follow the general trend, having low scores of around |60%.

However, we note that there has been important investment in the emerging Jewellery sector recently, and this is reflected in the score of only 15% for manual processes.

Also, it seems that there is no significant relationship between enterprises satisfied with their technology and the year they started their operations. If the overall average is 16%, the average answering \cdot 'O' for enterprises which started their operations in the last five years is not more than 18%.

The remaining 16% answered that they do not know whether they have or do not have the best technology showing either a lack of awareness or interest. This is a significantly high proportion for a country that needs to enhance its technological competitiveness. It raises some fundamental issues as to whether there is sufficient dissemination of information in the country, or whether the method of approach itself, if any, is the correct one. This could be a severe drawback at a time when information power is getting more and more determinant in the international battle for competitiveness.

Some of these companies may be quite satisfied with whatever technology they possess and a.re not inclined to expand.

Yet others which a.re running to breakdown would probably not be interested in investing for the future.

These enterprises do not have long term growth or profitability plans and their short-term objective is maximisation of harvest in the short term only.

This may also be the case of small enterprises subcontracting for more important ones and which show little interest in technology sourcing as their future is most uncertain and their survival is linked to the orders they receive from the larger firms. This figure is as high as 23% for the EPZ, 17% for S 1E's, 24% for the Textile Industry, 18% for the Printing Industry, 23% for Agro. Industry and 30% for Jewellery.

Analysis shows that this state of affairs is not related to the ownership structure, the number of employees, the year started. the nature of the business (i.e. manufacturing or services) nor to the mechanism by which technology was acquired, but rather that it is related to modes of information sourcing. It seems therefore quite obvious that this lack of awareness and interest comes partly from poor sourcing of technology, itself related to poor awareness about sources of information about technology sourcing.



FIG 3.1.3 LEVEL OF SATISFACTION WITH CURRENT EQUIPMENT (ALL SECTORS)

3.1.4 se of Information Technology (IT)

It is now clear that there is a shift towards information-based economies by both industrialized and developing countries to remain competitive on the world market. As such, adoption of Information Technology by lauritius will provide advantages such as solutions to labour shortages, compensation for the island's physical distance from international markets and hence maintenance and enhancement of its competitive edge.

According to the survey, 82% of die respondents do possess computers. This seems to be a good percentage but it is not known what is the number and type of computers which are ill use.

However, 38% of the Small and Medium Enterprises do not have computers; this may due to lack of capital, or skills or awareness of the benefits to be derived from such technology.

The use which is made of the computers the companies own is also vital; the current IT usage in the companies seem to be mainly in traditional data processing tasks such as payroll and accounting. The following information was gathered about the standard data processing and administrative activities: 78% of the respondents have computerized accounts, some 70% have computerized payroll, 49% costing, and 32% have computerized order processing (see Figure 3.1.4). This is a positive trend. as Infonnation processing becomes faster and much drudgery and duplication of work is removed . While 56% of all the enterprises have computerized stock control the Government sector which has a large quantity of varied materials in stock in its ministries and departments shows a low figure of 19%.

It is also noted that Management Information Systems/ Decision Support Systems (MIS/DSS), both important modem-management tools, is very minimally used (9%). If Information Technology is to be utilized to its maximum capacity, then it is both the responsibility and prerogative of Management to be committed to the idea and use of Information Technology. It must be pointed out that very often. Management of firms impose the installation and use of computers for other uses within their organisations, while they themselves are practically computer-illiterate. Therefore, not only must the example be set by Management, but the latter ought also to benefit and make their organisations benefit, from their own use of such useful and powerful organisational tools as Decision Support Systems and Management Information Systems. If the management itself is not committed to getting involved in IT then it is not possible to utilize IT to its maximum capacity.

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It is imperative that management grasps the whole concept of IT, gets committed to this technology to make the most of what the latter has to offer.

Computerized work study too does not seem to be popular on the whole (13%). Computerized Quality Assurance bas a lot to offer to industries but its usage is quite low generally (6%) and among the individual sectors as well.

Another area which has not been implemented to an appreciable extent presently is electronic mail (7%) and networking (15%). Out of those using e-mail 83% are large enterprises employing more than 200 people. Most of the companies have stand-alone computers. It would be advantageous to all sectors of our economy if they could benefit from electronic data exchange facilities. As expected, sectors such as Data Processing, Transport, Business and Financial services have already started making use of networks (61%, 42%, 21%, and 32% respectively) and e-mail (39%, 22%, 16%, and 16% respectively) (see Appendix IX p153). It has to be pointed out here that in the Hotel/Restaurant sector the use of networks (0%) and e-mailing (6%) is virtually inexistent. One plausible explanation is that only 19% of the total enterprises responded and these were mostly restaurants. It is crucial for the tourism sector to acquire market information and diffuse travel, accommodation, promotions and other related information.

The EPZ is also lagging behind in the use of computer networks(10%) and electronic data interchange facilities (4%). It would be useful here for uninformed companies to know that the EPZDA provides access to commercial international databases through the Worldnet Gateway.

This is a powerful tool for Export-Oriented Industries in particular, as it can surely help to sharp their competitive edge by acquiring on line information from all over the world to keep up with the latest technologies, market information and the research being carried out elsewhere. As of today, unfortunately, only a few industries know about the potentials of the Gateway and how to have access to it.

The industrial processes which control material and ensure high quality production is moving slowly, as far as computerization is concerned.

Applications of IT are not used to any considerable extent in areas such as design (CAD: 10%, CAM: 3%), real time control ($6^{\circ} \cdot 0$), quality assurance (6%) and process control (11%).

CAD is used by 22% of the respondents of the Textile Industry. by 29 % of the construction sector, 38% of darketing and Advertising and by 80% of the draughtmanship sector,

CAM is even less common, viz., 13% of the textile sector, 5% of the construction sector and 9.1% of the Draughtmanship sector use this system. It should be known that the use of CAD/CAM systems reduce the cost of production, reduces tulle lag in producing new designs and is an essential tool for increasing productivity. As yet, the penetration of CAD/CAM in sectors such as Textile, Metal and Plastic seem very low. and the main reasons generally put forward for this are the relatively high initial investment and long payback period for CAD/CA!\! systems.

Computerised Production Control is comparatively more common (24%). It is noted that bar coding is being used nowadays by $6^{\circ} \circ 0$ of the respondents. This is a low figure but it is an emerging IT application and its importance in inventory control or stock control has to be grasped. \\'hile the use of Process Control scores a general low of 11%, the Sugar Industry uses it to an appreciable extent (87%).

While it is promising to note that 82% of the respondents do use computers it nevertheless seems that IT is perceived by most of the respondents as some sort of automation which eliminates or reduces manual tasks and performs accounting tasks faster and with more accuracy.

Although quite correct, this is the narrower view of the capacity of IT application, reflected in limited investment in IT applications in many of the critical areas such as design, production, automated product identification. Some of the major constraints to the use of IT are lack of awareness, inadequate telecommunications services, lack of IT skills and difficult access to credit.

The penetration of IT varies considerably by size of firm and by sector but on the whole there is a need to invest further in IT to improve effectiveness, efficiency and competitiveness of Mauritian industries, Information Technology is the tool to arrive and stay at the forefront of technological advancement. It is hoped that in the future computer systems will play an important role in integrating Management decision-making, planning. processing, production, delivery, and all types of service in industry.

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FIG 3.1.4 USE OF INFORMATION TECHNOLOGY (ALL SECTORS)

3.1.5 Investment in the past five years

Figures from the annual report of the lauritius Chamber of Commerce and Industry of 1993 indicate that although the overall rate of investment is on a downward trend, decreasing from 5.3% in 1992 to 2.8% in 1993, investment in the manufacturing sector has grown by 24.5% in 1993 following a drop of 19.5% in J992.

Investment in acquisition of new equipment or upgrading of existing ones is a sine qua non condition for survival in the today's world envirorunent, most particularly since labour costs are constantly increasing.

Respondent enterprises were asked whether they have invested at all in the past five years, be it in new equipment and machinery or in upgrading of existing equipment directly related to their business activities. 71% answered positively, 18% answered that they have not invested at all within the last five years (Fig. 3.1.5A). Bearing in mind that an average technology life cycle of an equipment is of seven to eight years, the latter figure is not negligible. 24% of the EPZ companies are in this category and 15% of these have more than 100 employees. If these enterprises were brought to close down in the near future, a rise in the unemployment rate is foreseeable. Furthermore, since the textile industry makes up 80% of the EPZ, this analysis also holds for this industry.(Appendix X p154 clearly shows figures for all sectors of the survey). 29% of the Pioneer sector did not invest in technology during the last five years. This could be attributed to the relative newness of this sector, with all the usual teething problems of capital and credit availability.

The majority of companies (71%) have invested in some form or other of technology in the last five years. This trend cuts across all sectors in general.

It is to be noted that there has been less investment than average in the SME's and EPZ sectors, 59% and 64% respectively as well as in the following:

Flowers (44%), Hotels & Restaurants (58%), and Leather products (55%). On the other hand, there are certain sectors where investment bas been quite substantial, viz.

Education & Research (96%) Construction (91%) Printing (82%) Sugar Industry (93%), Draughtmanship (88%) Business services (85%) Data Processing (84%) Transport (89%)

It must, however, be pointed out that 51% of SME's have been replacing their technologies by more sophisticated ones whereas only 10% of the sugar industries claimed to have done so.

Fig 3.1.5B shows a breakdown of the nature of new investment in the mauritian industries.

It is encouraging to note that more than 50% of the industries surveyed have been investing in either the addition of or the replacement of existing equipment by more sophisticated ones. The trend is therefore seen to be a shift towards the acquisition of new and more sophisticated technologies even if too many enterprises (43%) still have merely re-invested in the same technology.

Hence, 57% of the industries surveyed have chosen to add more sophisticated equipment to their existing operations. Among these are the following sub-sectors: Pioneer industries (67%, although this is understandable since enterprises within this sector obtain their Pioneer Status license under their assertion that the technology and skills they will utilise are above those currently existing in Mauritius);

Plastic products (67%), Draughtrnanship (75%), Data processing (78%) and Financial services (79%), Business services (72%) as well as the two major sectors, Sugar (67%) and the EPZ (57%).

As for as the actual replacement of existing equipment by more sophisticated equipment, the same trend as above is noted with an average figure of 55% of the organisations surveyed. Note that replacement is not done only to get rid of scrap equipment but is guided by other factors like quality, costs, productivity, etc. so as not to be outdated. The exception to the trend is the sugar sector with a very low figure of 10%.

If 67% of the Sugai Industry is merely adding more sophisticated equipment, it seems that the old technology is not being replaced. The breakdown for the other sectors is as shown in Appendix XI (p155).

It must be pointed out that about 55% of organizations "hich have invested in more sophisticated equipment. either for replacement or for addition, have rather a low labour force of under 50.

Also 23% of those which replaced their equipment by more sophisticated ones have more than 200 employees.

On the other hand, some 43% of enterprises surveyed have invested in the addition of sinular equipment. Sectors which have chosen this mode of are: Jewellery (75%), Textile Industry (68%),investment and Electric/Electronic equipment Industry (53%). Interestingly, some organizations have been investing in both the addition of similar technology as well as more sophisticated technology. This applies to sectors such as textile and jewellery. Note that in making additions of similar technology, hardly any additional training is needed and maintenance problems are more controllable, especially when we consider the general lack of skilled labour (both operative and maintenance) in Mauritius.

As regards the replacement of existing equipment, it is encouraging to note that only 19% of organizations surveyed have indicated that they have replaced their existing equipment by similar equipment. It is to be noted that out of these 19%, 63% invested also in the replacement of their equipment by more sophisticated ones and 44% in the addition of more sophisticated technology. *Also*, 50% of these organizations have less than 50 employees whereas 10% have more than 1000 employees.

When the analysis of the nature of investment is based on organizations having between 200 and 1000 employees corresponding to about 11% of organizations participating in this survey, it is found that 71% of these replaced their equipment by more sophisticated ones whereas 25% replaced their equipment by similar ones, 46% increasing the number of similar equipment and 58% adding more sophisticated equipment to existing ones.

An analysis of organizations having more than 1000 employees corresponding to about 4% of organizations participating in this survey, shows that 77% of these replaced their equipment by more sophisticated ones whereas as much as 37% replaced their equipment by similar ones.

Also, 67% increased the number of similar equipment and 74% added more sophisticated equipment to existing ones.



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FIG 3.1.SA INVESTMENT IN THE PAST 5 YEARS (ALL SECTORS)



FIG 3.1.58 NATURE OF NEW INVESTMENT (ALL SECTORS)

3.1.6 Reasons for investment

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As shown in Fig. 3. 1.6, the two main reasons for investment by far are for quality improvement (87%) and increase in scale of production - 54% followed by the reduction of labor costs (33%), overcome shortage of labor (26%), reduction of non labor costs (23%), reduction of waste (22%) and availability of incentives (12%).

As for the two main reasons for which lauritian organizations invested in new technologies, it is evident that they are increasingly quality conscious and that globally, all sectors have expanded. It can be also deduced that, although not mentioned in the questionnaire, investment in technology has been carried out also to improve productivity and about 25 - 30% invested to overcome shortage of labor, reduction of waste and reduction of costs.

Those organizations which invested for quality improvement did so at 60% through addition and replacement of their equipment by more sophisticated ones 'c/l/d at 44°/0 t'nrougb the increase in number of similar equipment. The last figure is explained by the fact that $54^{\circ}/_{0}$ of those companies invested also to increase their scale of production.

All sectors follow more or less the same trend but for the following exceptions (see Appendix XII p156):

The main reason for which the sugar industry invested in new technologies is to reduce labor costs (73%) and not quality improvement (67%) like most sectors did. This investment was done mainly through addition of more sophisticated equipment (67%) and through increase in the number of similar equipment. Only 10% replaced their old equipment by more sophisticated ones.

Stationery, Printing, Other services and Business services sectors were 100% for quality improvement.

Sectors investing above the average in order to overcome labor shortage are: SME's(37%), Sugar Industry(40%), Agriculture & Fisheries(39%), Plastic products(53%), Textile Industry(36%), Jewellery(42%) & Bakery(46%). This problem is more the concern of manufacturing sectors than service sectors and shows that mechanization and automation will inadvertently be an option in the future. Although the trend for the nature of investment in technology 1, towards the acquisition of more sophisticated equipment to overcome labor shortages, it is noted with concern that some sectors, namely the Textile Industry and the Construction sector, are having recourse to foreign labor. Such piecemeal efforts to boost the volume of the workforce may boomerang, as their exists the real possibility of creating resentment within our indigenous. permanent supply of labour, instead of developing a medium- and long-term workforce consolidation and development strategy.

Sectors investing above average in the reduction of non labor costs are: Sugar Industry (53%), Stationery (44%), Agro. Industry (46° \circ) & Pioneer (33%). Unlike other sectors, Pioneer firms pay more arteruion to non labor costs than to labor costs. This is probably due to the fact that the latest technologies which have been introduced in this sector are capital intensive and that labor costs are not as critical as in the other sectors.

Sectors investing above average in the reduction of labor costs are: Sugar Industry (73%), Agro. Industry (51%) and Textile industry (47%), the global objective for the sugar and textile industry being to remain competitive on the international market.

Sectors investing above average in the reduction of wastes are: Agro. Industry (40%), Textile (35%), Stationery (44%) and Plastic products(33%).

Sectors investing in the increase of their scale of production are rather manufacturing sectors and among these sectors, the average is no longer 57%, but around 70%.

Sectors having invested heavily are: Textile Industry $(79^{\circ} 0)$. Jewellery (88%) and Leather products (87%). The average for the service sectors is around 40%. Government, unlike EPZ, SME, and so on, obtains a score of only 33% probably attributable to the service nature of its operations.

20% of Pioneer industries have invested due to incentives and only 5% of EPZ industries have done so for the same reason.

Sugar Industry (47%) and Printing & Stationery (20%) have relatively high scores whereas the Textile Industry (6%) bas a poor score.

It would seem that the incentives offered to textile industries and 10 the EPZ sector to promote investment in new technologies have not been very successful to date.



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FIG 3.1.6 REASONS FOR INVESTMENT (ALL SECTORS)

3.1.7 Positive effects of investment

Fig 3. I. 7 shows a breakdown of the positive impact of new investment in Mauritian industry. Some of the answers proposed for this question in the questionnaire are closely linked to the previous question, i.e. reasons of investment, for example:

REASONS	EFFECT
Quality improvement (87 %)	Quality improvement (83%)
Increase in scale of production (54%)	Increase UI scale of production (56%)
Reduction in labour costs (33%)	Reduction in labour costs (32%)
Reduction in non-labour costs (23%)	Reduction in non-labour costs (27%)

There are close relationships between reasons of investment and effects of these investments as shown in the above table. However, to deduce that those who have invested have actually reaped returns on those investments would be unrealistic, given the subjective character of the questions. The answers reflect the perception of the person who fills in the questionnaire and some amount of distortion may be due to the fact that the impact of the investment observed induced the answers to the question pertaining to reasons of investment. The reasons for investment may have also induced the answers to the question concerning impact of investment.

The close relationships between reasons and impact of investment can also be observed as a general trend for each sector. Sectors which have obtained quality improvement less than average are chemicals & allied products (69%), Handicraft (61%) & Electric & Electronic equipment (63%) as indicated in Appendix XIII (p157).

The main positive impact for Chemicals & allied products is an increase in volume of production (81%). Business services (100%), Data processing (94%), Construction (91%) and Printing (90%) are some sectors which have obtained higher scores than average.

Sectors obtaining low results for an increase in scale of production are Sugar Industry (20%) and some service sectors such as Transport (35%), Business services (22%), Financial services (36%), Hotels & Restaurants (20%) and Education & Research (30%). In fact, these service sectors' results were quite similar for the increase in production. The SME's scored 78% whereas Government scored only 35%. Some sectors where expansion occurred are Bakery (77%), Textiles (77%), Leather products (87%), Furniture & Wood (80%), Printing (85%), Jewellery (83%) and Plastic products (80%).

Sectors where reduction in labor costs have been the most successful are Leather products (48%), Agro Industry (46%), Construction (57%) and Sugar Industry (53%). Note that 73% of the Sugar Industry invested in technology in order to obtain a reduction of labor costs but effective reduction of labor costs was observed for 53% of the sector.

In addition, positive results for reduction of non-labor costs has been achieved by the Sugar Industry (60%), Jewellery (46%), Stationery (67%), Printing (45%), Agro. Industry (51%) and Hotels & Restaurants (40%).

An average of 50% of organizations answeri.ng the questionnai.re clai.med that they observed increased motivation on the part of their employees after investment in technology. This figure is not very high because the average employee does not usually take an active part in the investment decision and choice of new technology, at least not for the present. Sectors scori.ng less than average are: Leather products (17%), Flowers (22%), Plastic products (27%), Handicraft (26%), and Electric/electronic equipment (26%). It is worthwhile noting that these sectors obtained higher scores than average for degree of use of 'manual processes'.

Sectors scoriing more than average are mostly service sectors like Business services (83%), Dataprocessing (72%), Draughtmanship (75%), Government (65%) with the exception of the Sugar Industry (67%).



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FIG 3.1.7 POSITIVE EFFECTS OF INVESTMENT (ALL SECTORS)

3.2 PROBLEMS ASSOCIATED WITH INVESTJ\1ENT

3.2.1 Post-investment problems

As a result of investment in technology. some organizations suffered from negative consequences from their choices. The two main problems related to investment are lack of qualified maintenance people (27%) and shortage of skilled labor (25%) to implement and operate the acquired equipment and/or rnachrnery as shown by Fig.3.2.1. Also, 16% of them say that there is a lack of spare parts. $14^{\circ}/_{0}$ admit that they do not use their equipment to its full capacity and only 2% actually made the wrong choice of technology.

Two of the major sectors of our economy the Sugar Industry and the Textile Industry are affected by the problem of shortage of skilled labor and qualified maintenance people. Indeed, 27% for the Sugar Industry and 34% for the Textile Industry claim that there is exists a shortage of skilled labor. Other sectors suffering from the same problem are: Leather products (52%), Printing (55%), Jewellery (46%), S 1E's (41%) and sectors having scores less than average are: Pioneer (0%), Chemicals & allied products (12%), Hotel & Restaurants (JO %), Education & Research (10%) and Flowers (10%). The same sectors are affected by the lack of qualified maintenance people, namely, Printing (40%), Leather products (39%), Jewellery (58%), Textile Industry (40%), Sugar Industry (33%), Construction (43%). These figures reflect a lack of awareness and an improper forecasting of the level of skills required for new equipment. For some sectors like SME's having financial problems, skilled labor may be available but not necessarily affordable. Also, a substantial number people emerging from training centers prefer to start up a business of their own rather than joining other enterprises. This may be the case of the Jewellery, Handicraft and Metal products sectors. As for the Printing sector scoring 55%, there may be insufficient external training available as yet. According to these figures, it seems that training provided locally is not up to the new level of technology being invested in.

When looking at the problem of shortage of spare parts, the following sectors: Printing (25%), Textile Industry (21%), Leather products (22%) are again above average.

Also, 28% of the sector of Agriculture & Fisheries and 29% of the Construction sector are affected and only 6% of the sugar Industry have this problem.

From these figures, it is clear that the Textile Industry which is a major sector as well as the emerging sectors of Printing and Jewellery which should expand rapidly have serious maintenance & repairs problems and labor shortage problems.

15% of enterprises face the problem of not utilising their technology to its full capacity and potential. This figure is as high as 21% in the Government sector, 20% for Printing, 28% for Business services, 31% for Draughtmanship and 22% for Agriculture & Fisheries. It is to be noted that 16% of the Textile Industry have this problem but that the Sugar Industry scores 0%.



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FIG 3.2.1 POST INVESTMENT PROBLEMS (ALL SECTORS)

3.2.2 Reasons for non-investment

Results are presented here for each sector as percentages of the number of organizations having not invested in technology. As this number is quite small for a most sectors albeit some exceptions, it would be useless to state percentages. For example, 100% may mean I out of 1. The sectors where percentages could be relevant, where the number of enterprises is over ten are: EPZ, SME, DC, Government, Others, Agro. Industry, Textile Industry, Leather products, Furniture & Wood, Chemicals & allied products, Metal products, Handicraft and Wholesale & Retail trade.

The major reasons for enterprises not to invest in technology are (see Fig.3.2.2):

- lo access to credit 28%.
- Too expensive 32%. followed by:
- Just started 20%
- Shortage of skilled labor 20%
- Declining market 11 %.
- High custom duties 10%.
- Scale of production 8%.
- Lack of support from employees 8%.
- Insufficient incentives 8%
- Lack of awareness 5%
- Investing elsewhere 4%
- cheap labour 3%.

The main problem of SME's are of financial nature because 45% of those which have not invested say that they have no access to credit and 43% say that investing in technology is too expensive. These SME's are mainly of the Furniture & Wood and of the Metal products sectors scoring around 40% at the same questions. Also, 12% of the SME's which have not invested find that incentives for investment are not sufficient at all.

If 22% of the EPZ sector and 29% of the Textile Industry which have not invested in technology have also financial problems, their main problem, however, is a shortage of trained and skilled labour affecting 32% of EPZ enterprises and as much as 44% of Textile industries which have not invested.

The governmental sector seems to face these problems as 33% of organizations which did not invest stated that they had done so because they had no access to credit and 25% because of a lack of trained labor and of a lack of awareness. (See Appendix XIV p158). Only 12% of enterprises which invested in technology say that they did it due to incentives obtained, a rather small figure, considering the efforts put in by the government for encouraging investment in the economy at large. In fact, 8% of enterprises which did not invest claimed that incentives are insufficient and so it would seem that incentives proposed by the legal framework are not determining factors in the process of investing in technology and that there is a lack of awareness. For ease of reference a table indicating the schemes on the incentives available in Mauritius referenced from the Industrial Expansion Act is included in Appendix XV (p159).

Considering the sectors which have higher rates than average for non investment the survey showed the following: Flowers (38%), Plastic products (32%), Chemicals & allied products (30%) & Handicraft (29%). Those sectors which have lower rates than average for investment are: Leather products (55%) and Hotels & Restaurants (58%).

Only 44% of the Flower industry has invested in technology in the past five years so as to improve quality standards and to increase the scale of production. However, there are no clear and outstanding reasons for those which have not invested. The main reason for which 32% of the Plastic sector has not invested, according to this survey, is that about half of the enterprises concemed have just started their operations. In the case of the Handicraft sector, the main reason for non investment is a Jack of skilled labor. 47% of those who did not invest in technology stated that there was no need for it, either the present technology being sufficient or the process being essentially manual. Furthermore, about one quarter of enterprises of the Metal products sector which have not invested suffer from a shortage of skilled labor but it seems that 40% of them have just started and are still looking for financial aid for investment.

Concerning the Hotels & Restaurant sector, a response rate of only 19% has been obtained and answers came mainly from restaurants rather than from hotels and so the answers obtained are not representative of the sector, but if only restaurants are taken into consideration, it seems that reasons for non investment are that equipment are too expensive and that customs duties are too high.

Other reasons for non investment may be either a lack of know-how in the assessment of their own technology currently in use or it is perceived that the technology in use is adequate to fulfill their requirements in terms of

Sector	Percentage Non- Investment	Reasons for on-Investment (⁰ 0)	
		Unawareness	Adequate Technology
All Sectors	18	21	28
EPZ	24	26	28
SME	20	24	15
DC	16	9	36
Metal	26	7	27
Textile	21	39	19

quality and labour consumption as indicated by the table below for some sectors.

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FIG 3.2.2 REASONS FOR NON INVESTMENT (ALL SECTORS)

3.3 TECHNOLOGY SUPPORT

3.3.1 Technology Assessment and Forecasting

Technology assessment and forecasting play an important role in policy making. They have developed into numerous forms, according to varying and developing policy needs, for which a wealth of research methods are being made available. To give some examples: they play a role in the development of long term business and economic scenarios, in strategic technology planning, in environmental impact assessment, in the development of environmental technology policy.

Certain terms have to be defined before proceeding any further to avoid ambiguity. Technology assessment are policy studies which examine the fullest range of impact of the introduction of a new technology or the expansion of a present technology in new ways. Assessors anticipate and weigh the probable effects of diverse technologies on society, economy and environment.

Technology forecasting is often unfortunately termed technology assessment. It is a probabilistic evaluation on a high confidence level, of future technological transfer/innovation. Technology forecasting is a difficult task as it involves the judicious use of parametric representation of the most important and least well understood variables.

The description of the technology and the description of society, then, have to be taken into consideration. The forecasting of technology in a future state of society especially in a developing country is a real challenge.

Technology transfer is the movement of resources in the form of machines, men, techniques and ideas across boundaries in order that there ω_n , ny be symtematic application of scientific """d oth sl ("rc,n,"i.;c-d knowle-de,e

It has emerged from the survey and from the key informants that there is no proper technology assessment being done presently in Mauritius and even less of technology forecasting. The application of technology in many developing countries has been risky and haphazard. Therefore Mauritius needs a well planned technology policy to continue in its economic success. There is an urgent need for resources that will allow the development of activities related to technology assessment. It may be convenient to make some organization or body responsible for evaluating and regulating the use of technology in the country according to its particular needs, and in harmony with economic, social, cultural and environmental conditions.

Specialized centers of scientific and technological information dedicated to the collection, selection, storage and diffusion of information have a significant role to play. These would provide organizations and specialists with access to appropriate information from sources inside and outside their own country for the development and assessment of technology. Taking advantage of this existing knowledge would enable the selection of the best technological alternatives for development. It is therefore important to train multidisciplinary personnel to develop activities within these institutions related to the evaluation of technologies and directed to monitor their introduction into the country and to encourage the development of appropriate technologies. The mission of the Mauritius Research Council is crucial in the above mentioned endeavour.

As far as technology transfer is concerned quite interesting results have been obtained from the survey carried out and these are interpreted in the following section.

3.3.2 Technology Sourcing

STEEDING.

No country or enterprise would be able to 'make' all technology nor buy all technology. A suitable mix has to be put together by the recipient country and by enterprises alike.

In Mauritius, according to this survey, new technology comes through transfer, specially from non-negotiated transfers such as :

- screening of foreign technical or specialized magazines (54%) (see Figure 3.3.2).
- contact with equipment manufacturer when purchasing individual machines, materials or components embodying the desired technology (51 %).

New technology from negotiated transfers in the form of consultancies, visits to other industries, trade fairs is less than non-negotiated ones (25% to 35%).

With the exception of the Bakery sector (22%) (see Appendix XVJ p162) the screening of specialized magazines seems already to be an established culture in the majority of the sectors. 66% of the respondents from the Bakery sector seem to have acquired their technology from international Trade Fairs (66%). While on the whole only 24% of the respondents have derived their technology from conferences and seminars, the Government Sector has a score of 58%. The Technology sourcing therefore depends to some extent on the nature of the enterprise.

Generally, joint ventures, main contractors and benchmarking are not favoured sources for new technology acquisition by most of the enterprises (approximately 5%). In the Pioneer sector where 38% of the respondents claim joint local/foreign ownership, 24% do source their new technology from joint ventures. As far as benchmarking is concerned there seems that there is no notion of its potentials by all the sectors.

It is interesting to note that sources of new technology from Research and Development (R&D) locally amounts to only 7%.

Like any other developing country we rely heavily on foreign technology transfer.

Autonomous research and development approach is considered not feasible for the majority of developing countries. But Mauritius which is presently in a crucial phase of its industrialization process cannot afford to continue in this trend. Technological Progress is the engine of economic growth, and Transfer of technology will not be sufficient to sustain durable development of the economy unless it is backed by sufficient Research and Development of its own. The Agricultural sector and the Educational sector do seem to be benefiting most from R&D locally (approximately 26%) (see Appendix XVI p162). This is not surprising because of the long established agricultural research centers and also because the University which had started as the college of agriculture. The Agricultural sector has been the driving force of the Mauritian economy until quite recently. Heavy reliance our mono-crop sugar cane being considered dangerous has led to on diversification. But to be competent on the market, optimum technologies have to be utilized

As one of the key informants for the Agricultural sector pointed out, there has not been sufficient investment in R&D- either for innovations or in terms of further adaptations. It is high time that a proper budget be allocated to R&D.

The EPZ has an even lower percentage of technology sourcing from R&D locally (less than 7%). Incentives to boost this R&D culture have to be looked into. Even if some facilities do exist, they may be under-utilized. Management of technology will require clear relationships between the productive sector and R&D, and skills formation. This is not required only to efficiently utilize, assimilate, maintain and service imported technology but also in order to make necessary modifications or incremental innovations. The Textile sector is now established in its own rights and is the important industry in the EPZ, but only 3% of the respondents derive their new technology from R&D locally. Sugar Industry has been in the past our prominent industry and has been well supported with a research center funded from the proceeds of sugar to keep up with international competition. Contributions from the EPZ could be used to set up a similar research center and as Textile sector seems to have established itself as the prominent industry it could play a major role in this endeavour.

It is a fact that research in technology is very expensive as it calls for a combination of factors, equipment, laboratories and specialized skills which are all rather scarce resources. As developing countries do not possess all the required factors for R&D individually, international cooperation is called for.

Mauritius, too, is not yet ready in certain fields to set up R&D centers on its own and it would be advantageous if international frameworks could be set up to promote joint R&D in this region, for instance through strategic alliances. A country's ability to use science and technology for its own development depends to a large extent on the quality and quantity of the trained manpower it makes available for research and new technology. Training and education in Science & Technology will no doubt play a great role in the future of R&D in Mauritius.

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FIG 3.3.2 TECHNOLOGY SOURCING (ALL SECTORS)

3.3.3 Maintenance and Repairs

The maintenance of plant and equipment in working order is essential to achieve total quality, reliability and efficient working. The lack of qualified maintenance people and spare parts were found to be one of the critical issues expressed by companies having invested in new equipment in the last five years. The high scores observed for companies under EPZ and SME for instance, in sectors like the Sugar Industry, Agriculture, Bakery, Textile, Leather products, Printing and Jewellery are clearly a matter of concern, which should be taken up with training institutions in Mauritius. Such training should aim at maintenance of equipment used in the above mentioned industries, which will without doubt contribute as a motivating factor for these industries to go for new investment in the future. In order to quantify the above problem, the survey was used to enquire over, who is responsible to carry out maintenance and repairs in the various companies in Mauritius.

Routine Maintenance

Most firms (69% of those surveyed) claim having their Routine Maintenance (Maintenance carried on a regular basis to maintain availability of machines) done by in-house staff (see Appendix XVII p!63). However, in the services sectors, in contrast to manufacturing sectors, like Goverment, Draughtrnanship, Transport, Dataprocessing, Business Services, Financial Services, Marketing and Advertising, Hotels and Restaurants, and Educational and Research Institutions, the score is relatively lower. These organisations depend heavily on local firms for their Routine Maintenance. Lack of qualified maintenance personnel within the organisation could be the main reason behind subcontracting. Also, some of these companies could be taking advantage of such maintenance being inclusive in their equipment sale package deal. The undertaking of Routine maintenance by Local firms for manufacturing industries is not alarmingly high. However, ideally, such maintenance being done on a regular basis, not necessarily needing skillful labour, could be taken care of by in-house staff, once properly trained. Recourse to local firms is likely to prove costly in the Jong run.

Surprisingly, though being well established, in the Sugar Industry, 27% of those surveyed, claimed using local firms for their Routine Maintenance.
The score is even higher for sectors like Agriculture and Fisheries, Bakery. Stone,Clay,Glass,Concrete, and Construction with regards to manufacturing sectors. Thus, there is a clear need for training of in-house crews to carry out Routine Maintenance work. The above mentioned service sectors depending mainly on local firms should work over the economic advantage of having such maintenance done in-house by own personnel through training programmes or by employing qualified maintenance people for the purpose.

Very few sectors were seen to bring in foreign expertise for their Routine Maintenance (2% on average). *This* behaviour is seen mostly in emerging sectors like Printing and Leather products. Pioneer industries, which have supposedly invested in more sophisticated equipment, have higher scores (10%). Unavailability of local expertise for specific Routine Maintenance on dedicated equipment may justify use of foreign expertise. However, a proper mechanism should be developed either to train in-house crews for such maintenance or local firms be made involved in servicing such equipment.

Negligible Routine Maintenance was seen to be carried out overseas, which is a good sign, in terms of the costs it involves.

Major Maintenance

Around 34% of sectors on average claim carrying out their Major Maintenance (Major preventive maintenance work) by in-house staff (Fig 3.3.3A). It is clear that the services sectors mentioned above, prefer such maintenance to be taken care of by local firms. However, it was observed that a considerable percentage of even manufacturing industries do not undertake Major Maintenance work by in-house personnel.

The average score for EPZ, SME and Pioneer companies being only around 36% ,calls for some possible reasons to be put forward , as follows :

- unavailability of qualified manpower and servicing equipment for undertaking Major Maintenance work
- maintenance crew being more oriented towards Routine and Breakdown maintenance
- few people being involved in the Maintenance Department
- poor maintenance planning
- inadequate 'status' allocated to the role of Maintenance in the organisation.

This evidently results in excessive downtime. Companies should thus give due consideration for a repairs and maintenance policy before acquiring equipment.

In some of the Pioneer and services sectors such as Printing, Jewellery, Transport, Business Services, and Dataprocessing, utilisation of foreign experts locally has been observed even for Minor Repairs. Very little is done overseas except in the Jewellery sector which has a score of 7%.

Major Repairs

The scores observed are slightly higher than that of Major Maintenance, the lieuo tuatio filute tuwe...t.t., filovivene:fil. vi fo...t. fullti, filoscitoff capoette, filled overseas repairs. On the whole, 27% of firms confirm carrying out their Major Repair by in-house personnel and 64% of them have recourse to local firms. Very little Major Repair is canied out by in-house personnel in the services sectors mentioned above. The Government sector has a score of only 22%. The lower score for SME (17%) retlects the prevailing situation in this sector, where involvement of skilled maintenance people is quite low. Most of them claim using facilities offered by local firms. The same applies to the Government sector. Even in manufacturing industries, except from Agro Indust:ry, Stone,Clay,Glass, Concrete, all other firms considered have higher scores for local firms involvement for their Major Repairs. The score is as high as 93% in the Sugar Industry.

Involvement of foreign experts locally or overseas repairs have been seen to be a useful option for companies having major repair problems, as the score turns around 10%.

Foreign experts are seen to be more involved in the EPZ, DC and Pioneer industries. A score of more than 20% is observed in sectors such as the Sugar Industry, Stationary, Printing, Stone,Clay,Glass,Concrete, and the Construction sector. Interestingly, 27% of companies in the Sugar Industry, claim to go for overseas repairs. A considerably larger number of companies in the Electric/Electronic and Jewellery and Dataprocessing sectors also claim to involve foreign experts in their major repair works. (Detailed results for all sectors is available in Appendix XVIII p164).

Concern for major Repairs and Maintenance problems

In the course of the survey, various firms have expressed concern about their difficulty in solving Major Repairs and Maintenance Problems. From the foregoing discussion, however, it would seem that the following observations equally apply for Routine Maintenance and Minor Repairs Around 30% of all the companies surveyed, believe there is lack of local competence with respect to tackling Major Maintenance and Repairs problems. Considerably higher scores were observed in sectors such as the Sugar Industry, Printing, Jewellery, Construction, Marketing and Advertising, and Business Services and Education and Research Institutions. (over 40%) (see also Fig 3.3.38). The Training implication is direct : it follows that the respective organisations, Educational institutions, and Training and Research Centres may have to reconsider the needs of these industries with respect to training for Maintenance staff . External, Company and Manufacturer sponsored training should be reviewed to train in-house maintenance crews to alleviate dependency on Local firms and/or foreign experts locally and overseas.

In addition, around 40% of sectors believe there is a scarcity of spare parts locally. The difficulty in finding spare parts is expressed generally by all sectors, the EPZ, SME, and Pioneer sectors having scores of around 50%, which definitely needs urgent consideration.

Indeed, it is alarming that both well-established as well as emerging sectors, exclaim at the seriousness of the problem. An adequate and appropriate supply of spare parts is a crucial support for all forms of technology, and this is a source of concern, as it is one of the main factors governing productivity in industries. The high scores observed for sectors such as Agro Industry., Textile, Leather products, Stationary, Electric/Electronic, Jewellery, and Construction is very alarming (over 50%) and creates demotivation for further investment. (See Appendix XIX p165).

Interestingly, more companies expressed concern about the non-availability rather than about the cost of the spare parts.

Around 32% of the sectors in general admit high cost of spare parts.

The concern is greater for such sectors as the Agro Industry, Bakery, Textile, Leather products, Furniture & Wood, Electric/Electronic,

and the Construction sector (around 40%). Naturally, the high cost coupled with lack of spare parts certainly acts as a deterrent to investment in new and/or advanced technology.

An appropriate mechanism for accessing information related to spares per sector may need to be set up, for instance, through the use of databases (preferably on-line) containing all local and foreign agencies dealing in spares, which could offer immediate information as to the availability, cost, alternative, and so on. A reduction in customs duties for certain sectors may also need to be considered. Companies should also be advised in terms of spare parts management so that preventive action can be taken related to lead times for spares to be made available at the right time.

Sectors having recourse to foreign expertise for their maintenance and repairs problems expressed their concern for the high cost involved in this practice. Although the average for the population was found to be 13%, sectors such as the Sugar Industry, Textile, Printing, Plastic products, Stone, Clay, Glass, Concrete, Metal produces, and Construction show considerably higher scores (over 20%). The problem will obviously become more acute as companies invest further in new technology. As such, a proper mechanism for transfer of skills from foreign experts to local maintenance crews should be set up such that, in the long run, help of foreign experts be requested mainly for major repairs and not for Routine Maintenance or Major Maintenance as it is the case in some companies at the moment.



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FIG 3.3.3A REPAIRS AND MAINTENANCE (ALL SECTORS)



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FIG 3.3.38 CONCERN FOR MAJOR REPAIR AND MAINTENANCE PROBLEMS (ALL SECTORS)

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3.3.4 Training

The 1990's have been marked by fierce global competition in which only the most productive organisations succeed,or indeed, survive. This necessitates a second look at our management and development of Human Resources, because organisations must now set up appropriate training programmes to ensure the adaptation of the workforce to new technologies and processes which will ensure competitiveness and efficiency. Indeed, not only do new entrants on the labour market require the appropriate training in line with the technologies that will henceforth be used, but also, the current workforce need to be 'retrained' in order to adapt to ever• changing technology. In fact, it has been found that the act of training itself (in the sense of both initial and continuous training), has the added by• product of facilitating learning at future stages, therefore increasing the workforce's ability for flexibility, versatility and positive response to change.

Training and development of employees is considered to be that added 'plus' which will gain employees' involvement in the system, and this is especially important in a manufacturing concern ; Technology and new production techniques have been found to significantly improve performance, productivity, and profitability, but since they require use and application by human beings in order to be successful, this success can only be achieved through maximum employee involvement and participation. As information and access to technology becomes more and more accessible, it is *people* who will be the differentiating factor and who will decide upon the success or failure of our indusnialisation process. Companies using Manufacturing Technology must have a flexible, humane and innovative management organisation with fewer levels, job classifications and rank-oriented status symbols. Retention of well-trained workers is both more important and more feasible under these conditions. Productivity is strongly dependent on human skills, knowledge, and attitudes and on mental, rather than physical, effort...

In the initial stages of the study, some key informants treated the Training aspect as being very important for the success of their organisation and they claimed to devote much time and financial resources to training their workforce.

In this respect, the resulting survey provided more ample information and data as to the extent and types of training provided to the various categories of employees.

The survey disclosed that, to a reasonably large measure, Training is existent amongst the various sectors of the economy, and this is an encouraging piece of data (see Fig.3.3.4). Respondents to the survey were asked to classify their methods of training into the following categories :

• Training given in-house by the staff of the Company

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- Training given in-house, but using trainers from outside the Company
- External training, i.e., employees being sent outside the Company for training
- Training taking place overseas, and sponsored by the Company
- Training taking place overseas, but sponsored by the foreign manufacturer/supplier

In addition, employees were classified under 'Operators', 'Technical Staff', 'Administrative and Clerical Staff', 'Middle Management' and 'Top Management'.

Training



FIG 3.3.4 TRAINING (ALL SECTORS)

Training to operators

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63°/0 of all sectors considered in the survey claimed to provide in-house company training. In the broad categories, the EPZ (76%) and DC (87%) have the highest scores, probably indicating the growing awareness of the major sectors as to the vital necessity of upgrading and maintaining the skills of operators, who are the drivers of the system, not *only* to increase flexibility and versatility, but also to keep up with the level of skills required when machinery and equipment are upgraded or replaced by more recent technologies. This is especially important in view of the shortcomings of the public educational system whose mass output is people who are barely literate and who are called upon in a very near future to be the drivers of highly technological and sophisticated systems.

Those organisations which greatly rely on training their operators by members of their own personnel are from the following sectors (see also Appendix XX p 166):

Sugar (80%) Agriculture & Fisheries (65%) Agro Industry (82%) Textile (80%) Stone, Clay, Glass, Concrete (860/0) Metal Products (79%) Electric & Electronic equipment (83%)

Given the relative ease and accessibility of trauung skills within an organisation to provide in-house training, Government's score was the poorest amongst the broad categories, reaching *only* 47%, even though 'operators' are in substantial number in this category.

However, this figure is not very conclusive, since it is not clear what the perception of 'operators' was by the respondents during the survey.

Also surprisingly low was the score for Hotels and Restaurants (38%). With the knowledge that this sector is given to being of great present and future contribution to the economy, and also given that the workforce of the sector is largely reliant on operational level staff the figure would have been alarming, was it not for the fact that it probably, and hopefully, is not a representative figure, since the response rate for the Hotels and Restaurant sector was very poor (19%).

In sharp contrast to the scores of most sectors for trammg given to employees in-house by in-house staff are the relatively low scores for In• house training given by external trainers and even worse for external training. (Note that trainers were given to mean both local and foreign.). 17% of all sectors replied that external trainers were brought to the company to train operators and 12% replied that operators were sent outside the company to be trained. In spite of the argument that operators are the ones who drive the system, it may be that outside training of this category of workers is unwarranted, given : (a) the level of training required, which is quite low, and can likely be given by the supervisors, for instance, or experienced fellow workers, (b) the reluctance of the company to part with operators, especially in labour-intensive Production processes, and (c) the relative high cost of external training as compared to in-house facilities.

In fact, the only 'high' score for this type of training to operators was in the Sugar sector (53%).

In addition, Governmental organisations seem to rely somewhat heavily on training given by external trainers, both in-house(22%) and out(30%).

As concerns Overseas, company-sponsored training given to operators, the scores appear understandably low : 3% of companies in general, given the level of worker and the cost involved.

Similarly, Overseas, manufacturer/supplier sponsored trallllig figures are also low (20/0 for *all* sectors), except for the Printing sector (14%). ote that the latter. an emerging industry, has recently been re-vamped with substantial amounts of new technology and modem processes. It is likely that the companies supplying our Printing industry with these technologies also supply - i.e. within the sales package - training to operators of the equipment.

Surprisingly, however, the Pioneer status firms (0%) seem not to have benefited from such packages and this could be a source of concern also, since they are inherently new-technology and new-skill based firms and as such require that their operators utilise the equipment appropriately.

Training to Technical Staff

It is essential that this category of staff get adequate and appropriate training, since they are likely to be at Supervisory and Junior Management levels, and in time probably move on to Managerial posts. 44% of our organisations in all sectors offer in-house training to this category using their own personnel, 21% using external trainers, 23% sending technical staff outside the company for training, as much as 12% sponsoring overseas training and 5% of technical staffs training is seen to be sponsored overseas by the manufacturer/supplier of the firm.

Although naturally there is always room for improvement, the figures reveal that Mauritian firms generally seem aware of the need for training to technical personnel.

We note the effort of DC companies to offer in-house training (65%), as opposed to external training(32 % in-house and 33% outside). Depending on the very nature of the firm's operations, it can be seen that the more technical *l* mechanised *l* computerised and/or high-precision the processes, the more emphasis on training to technical staff:

However, the textiles sector has a rather average score (47% in-house by own staff, 28% in-house by outside trainers, and 19% externally) and this situation must definitely be improved.

SMEs also seem to have some difficulty in offering training to technical staff (34% in-house by own personnel, 7% only for all types of external training, 4% send their technical staff overseas, and 2% have technical staff who are sponsored for overseas training by manufacturers). The increasing importance of Small and Medium enterprises is not reflected in their interest or ability to train their technical staff, and so efforts must be made in this respect, perhaps through the SMIDO's assistance, since SMEs are likely suffering from a lack of skilled staff who could train others, as well as a lack of funds for offering external training.

It is vital that all sectors improve on the quality and competence of their technical staff.

The average figures in some sectors and the poor scores in others seem to reinforce the picture that the survey revealed of the Maintenance problems in Mauritius. Indeed, responding to the question as to what reasons they gave for problems encountered in maintenance, an average of 30% of organisations in all sectors responded that lack of local competence was the reason.

For instance, the EPZ sector, of which 40% claim to have maintenance problems due to lack of local competence paradoxically does not offer more than average training to its technical staff.

On the other hand, there appears to be either a lack of training institutions or a problem with the *level* of training available in Mauritius as far as the Sugar sector is concerned : in spite of its high commitment to training its technical staff (see Appendix XXI p167) the sector is still not satisfied with the level of local competence in Maintenance (40%).

Also to be noted is the Printing sector which is still quite dependent on overseas training (18% send their technicians abroad for training) This is an emerging sector which at present utilises technology which is still unfamiliar to locals.

However this trend must not continue, and efforts will have to be put in to exploit the know-how acquired overseas actually by training as many technicians as possible in the operation of the new machines and equipment.

The Electric/Electronic Equipment sector demonstrates the awareness and the will to give maximum training to its technical people and this is commendable, given the increasing importance of this sector. 70% of firms offer in-house training themselves, 48% bring in external trainers, 22% claim to send their technicians off-site for training, and 26% sponsor overseas training of technical staff.

The Data Processing sector similarly offers plentiful training to technical staff, as can be seen in the table.

However, the above few examples illustrate the point that for the time being, it is the newness of the technology that dictates the training need in such sectors, both for operative as well as technical level staff.

Consider that to Question 7 of the survey as to whether investments have been made in the last five years, the majority of the above few sectors responded positively ; 82% of Printing firms said they had recently invested, 83% of Electric/Electronic Equipment firms similarly, and 84% of Data Processing firms said yes *also*. Similarly, The EPZ sector claims to have recently invested (64%). However, this does not correlate positively with the number of EPZ firms sponsoring their technical staff for overseas training (13%). *This* is not a bright picture, since it must be realised that technical staff are those who more so require familiarisation with new equipment. They are the ones who are better placed to train workers in the operation of the equipment, given their higher level of intellect and comprehension, and also given that they are the people - for instance technical engineers - who can better assess the developments in equipment and technology and who can directly contribute to the organisation's plan for technology forecasting.

It is worthwhile pointing out that once the technnical know-how is mastered by the employees, it is the duty of management to offer continuous training and development as part of its human resource management philosophy in order that an ever-improving competence level be maintained. As mentioned in the introduction to the study, it has been found that organisations win greater benefits from technonogical investments if, during the change process - which is ongoing, anyway - managers give primary consideration to the role of people. Advanced Manufacturing Technology requires a highly skilled, versatile, flexible, interactive and committed workforce capable of participating in its own problem-solving (once again, Employee Involvement). Greater interdependence among work activities is necessary, and each unit or section must have fewer employees responsible for a product, a part, or a process. In short, technology utilisation requires a tightly-knit chain of internal customers, and this joins the principles within the concepts of Just-In-Time management and lanufacturing. The dominant theme is that the principles are intended to gain the support of all the stakeholders of the organisation : the organisation and its customers and shareholders profit from decreased costs, increased quality, greater flexibility, decreased production cycle time, improved equipment, and an ability to absorb technology. increased Employees gain through opportunities for learning and retraining, chances for advancement, increased influence, and a more secure employment environment. Even the Unions gain through their participation in a broader agenda of issues affecting their members.

Training to Administrative and Clerical staff

Given that the Administration of any enterprise is the skeleton which holds together all the parts of the organisation, it is necessary that staff of Administration be of comparable competence to their technical counterparts. The survey showed that quite a good amount of training is given to administrative and clerical personnel (overall 49% in-house by company) (see Appendix XXII p168), although predictably the Small and Medium enterprises are the poorer scorers (30% in-house by company), and this situation should be redressed, again perhaps through more support and advice from able institutions.

Since the nature of training to this category of employees is likely to be comparable across sectors and across companies within sectors, it could be both economically and administratively viable to have established Training centres within sectors or indeed within Groups, or even in individual organisations,(for instance Government, or the EPZ, or the Sugar sector which would offer common and collective training in Administrative and clerical skills).

However, even then, Training in such skills should not be strictly limited to in-house Training centres; the wide selection of training institutions in Mauritius makes training in administrative, secretarial and clerical duties very accessible to all sectors of the economy. Noteworthy are the new techniques and office management styles which often do not reach individual companies, except through exposure to external training persons and institutions. Examples are recent Word Processing , Spreadsheet, Costing, Accounting packages, Local Area Networks, and On-line information facilities.

Training to Management (Middle and Top)

A reasonable amount of training was seen to be given to Management using a mix of methods.

We note that much more overseas training is given to this category of employee, indicating that the person's position on the organisational ladder influences the type of training the company offers him/her.

39% of EPZ companies offer in-house company training to middle managers, and 24% external training 42% of DC companies give in• house company training to middle management, and 39% give external training to the same. 23% of DC companies sponsor their Middle managers for overseas training.

The Government sector also holds a corrunendable score, wrth 54% offering external training and 24% sponsoring overseas training for middle managers.

Since Middle managers are those who are in direct contact with the drivers of the system and since they are also the ones responsible for canying out the policy and strategy of the firm as set out by top management, the sky is the limit as concerns training which can be offered to this category. We do note the effort of most sectors, especially in external training, and this trend should continue, and even be made more pronounced.

As concerns Top Management, the EPZ holds the highest score with 25% of firms offering in-house training by the Company itself.

Generally, however, there is heavy reliance on external training, and this is both understandable and justifiable: Management can rarely keep totally abreast of new methods and techniques, such as Quality Management. With reject rates in Mauritius as high as three times those in industrialised economies, Quality Management needs to be dramatically improved. Other equally important areas include Strategy and Policy, Management Information Systems, Technology Assessment and Forecasting, Decision Support Systems, Networking, using Data ban.ks, the management of human resources in a High-technology environment, the Management of Change, to name but a few, and this lacuna is quite easily filled by exposure to external training institutions, or else by company training centres with high-calibre staff dedicated to the training need. The average of 26% of companies giving external training could be further increased.

The sugar sector is by far the leader (see Appendices XXIII p169 and XXIV p170) in offering training to its Management staff (40% offer in• house company-based training, 73% call in trainers, 67% send out their top management, 40% sponsor overseas training, and 20% claim their top managers are sponsored for overseas training by the foreign manufacturer) It may indeed be possible to use this sector as a benchmark for developing training programmes and sensitising other sectors as to the benefits of training and developing managers.

Therefore the recommendation to see the sky as the limit for the training and development of all levels of employees, using a variety of training methods, is reiterated, in order that Mauritius be known in the near future as an industrialised nation with a vast supply of skilled, knowledgeable, flexible and adaptable labour.

OUTLINE ANALYSIS BY INDIVIDUAL SECTOR

4.01 AGRICULTURE AND FISHERIES SECTOR

Profile of sector

This sector concerns mainly agricultural and livestock production, fishing and to a lesser extent agricultural services. 56% responded to die survey i.e.. 23 out of die 41 enterprises surveyed.

9t% of these are Mauritian owned and 4% are jointly local/foreign owned. 61% claim to have a mixed mode of operation i.e. manual/automated. Around 35% declare that they operate manually. 70°0 believe that better equipment does exist for their operations.

Investment

78% invested in die past five years either in new equipment or to upgrade existing ones. The nature of die investment being an increase in similar equipment by 44%, replacement by more sophisticated ones by 67%, addition of more sophisticated ones by 38% and replacement by similar ones by 28%. 83% invested to improve die quality of their product/services, 44% to increase die scale of production and 44% to reduce labour costs. As a result of their investment 78% professed to have improved the quality of their product/services and some 39% experienced a reduction in their labour costs while 61% increased their scale of production.

As a result of such investment, 28% of enterprises claim to have suffered from a lack of skilled labour, 29% from a shortage of qualdied maintenance people, 28% from a lack of spare parts and 22% from a sub-optimal use of equipment.

Use of Information Technology

21 out of the 23 enterprises have stand-alone computers; They are used as follows : $8 \log/0$ for accounting, 76% for payroll, 62% for costing, $43^{\circ}/0$ for stock control, and $24^{\circ}/0$ for production contro\.

Support

A popular source of information on new and emerging technologies in this sector is specialised magazines, as declared by 52% of the respondents. 35% get their technology information from visits to similar organisations and 35% from conferences and seminars. The Agricultural sector is one of the rare sectors which benefit from local R&D and the source of information on new technology for 26% are local research institutions.

Routine maintenance and minor repairs is done in 65° a and 74% of the enterprises respectively by in house staff. Major maintenance is carried out in 39% by in-house staff and in 52% by local firms, || lajor repairs also follow the same trend i.e. in 35% of the enterprises the} are carried out by in-house staff while 74% have recourse to local firms. $||3^{\circ}|$ o resort to foreign expertise for major repairs and maintenance.

As far as training is concerned, 65% provide in-house training by their own personnel to operators, 44% provide such training to their technical staff and administrative/clerical staff. Training by external trainers and overseas training is less for the above categories of staff. Middle and top management benefit from external training in 52% and 35% of the enterprises respectively and from overseas training in 26% and 44% respectively.

4.02 THE AGRO INDUSTRY

Profile of sector

16660.0

This industry is made up mainly of enterprises which manufacture and process food products. Manufacture of confectionery, tea factories, tobacco factories, alcohol distilleries, beer and allied products are all classified in this sector. There are 121 enterprises in this sector according to our database but only 44 (36%) responded positively to our survey. Out of these we gathered that 76% are Mauritian owned, 5% foreign owned, and 16% jointly owned.

93% claim to have a mixed mode of operation i.e. manual/automated and the rest are manually operated. It was interesting to note that around 90% believe that there does exist equipment that is better than what they have.

Investment

In the past five years 77% of the enterprises invested in new equipment or in the upgrading of existing ones, 26% invested through the increase in number of similar equipment, 66% replaced currently used equipment by more sophisticated ones and 570/0 added more sophisticated equipment. Only 20% merely replaced their scrap equipment by similar ones.

The principal reasons for investing were for quality improvement (83%), to increase the scale of production (71%) and to reduce labour costs (51%). 86% did improve their product quality, 69% increased their scale of production and 51% reduced their cost of labour as a result of investment.

Whatever negative impact experienced by some companies were shortage of labour (17%), 26% shortage of qualified maintenance people, 23% a lack of spare parts

se of IT

Around 92% of the enterprises have computers and most of them use computers for accounting (89%), payroll (72%), costing (67°0) and stock control (56°/ $_{0}$). A mere 60/ $_{0}$ are networked.

Support

The main source of information about new and emerging technology is from contact with equipment manufacturers for 73% of the enterprises and specialised magazines for 64%; 52% get such information from visits to similar industries. It is useful to note that 5% consider local research institutions as one of their sources of new technology.

The routine maintenance and minor repairs is carried out by in-house personnel for $82^{\circ}/0$ of the e\\temperson e_\\temperson e_s; *G*?:*N*₀ and carry out t\le'ir own major maintenance and repairs. On the other hand 57% of the enterprises have recourse to local firms for major maintenance and 61% for major repairs.

As far as training is concerned 82% provide in-house training by own personnel to their operators, 52% provide such training to their technical staff, 57% to their administrative/clerical staff. Middle management also benefits from this type of training in 43% of the enterpuses. External training is provided by around 30% of the enterprises to all categories except to operators. Middle and top management benefit from overseas training in 21% and 27% of the enterprises.

4.03 BAKERY

Profile of sector

Of the 86 firms under this category only 18 responded to the survey giving a response rate of 21%, all of which are 100% Mauritian ow ned, 50% of these having just started business. 90% of the firms are registered as SME. Most of the firms use a mixed mode (manual/automated) of operation. Half of them admit the existence of better equipment for their operations while 39% are unaware of such existence.

Investment

72% of the firms surveyed have invested in new equipment in the past 5 years. These investments are mainly towards replacement of equipment with more sophisticated ones (69%) or the addition of more sophisticated equipment (31%). Fewer have invested in similar equipment (23%). Main reasons for investment are improvement of product quality and increase in scale of production (77%) rather than overcoming labor shortage (46%) or the reduction of labor cost (39%)

Problems in investment

Among the firms which have invested 31% claim there is lack of qualified maintenance people to take care of their equipment. 23% faced the problem of shortage of skilled labor while 15% claim there is lack of spare parts for the equipment they have invested in. Only two fmns did not invest in the said period mainly for not having access to credit facilities.

Use of information technology

Two third of the firms surveyed do possess computers, the application of which is mainly for accounting $(83^{\circ}0)$ and stock control $(67^{\circ}0)$. Few use computers for costing and payroll (50%) Depending on the capacity of the plant concerned, use of IT should be investigated upon other areas in the sector, for instance, for bar codes, workstudy, quality assurance and maintenance planning.

Support

66% of the firms participate in trade fairs to obtain informanon related to technology while 44% have contact with equipment manufacturers for the same purpose. Fewer firms (22%) source out information from specialized magazines and also from customer feedback. No other mode, 0Γ sourcing were considered by the firms.

Less than 50% of the firms have their routine maintenance and nunor repairs done by in-house staff, the remaining firms prefer such maintenance be subcontracted to local firms. *Only* 22% had their major repair and maintenance done in-house while more than 60% again have resort to local firms.

The main type of training in this sector is the in-house type given by own personnel, operators being the more exposed to such training (80% of fUllis). 58% claim providing similar training to administrative and clerical staff while *only* 47% offinns give such training to technical staff. Very few training programs involve external trainers.

4.04 BUSINESS SERVICES SECTOR

Profile of sector

The Business services sector as defined in this study consists of 62 enterprises which are employment agencies, enterprises of the export service zone and enterprises involved in management services and management consultancy services. The response rate for this sector is 32% and the number of returned questionnaire is 20.

Of these 20 enterprises, 90% are Mauritian owned, 5% entirely foreign owned and 5% are joint local/foreign venture. Also, 65% say that their operations consist of a mix mode of automated and manual processes whereas 10% say that their operations are essentially manual. 25% claim to possess the best equipment and 60% say that there exist better equipment that would either produce better quality products and/or consume less labour than their existing ones.

Investment

The survey showed that 85% of the Business services sector invested in technology in the past 5 years. Of these enterprises which have invested, 61% of them did it through replacement and 72% by addition of more sophisticated equipment. 23% did it through the increase in number of similar equipment. It is to be noted that only 6% replaced their scrapped equipment by similar ones. The main reason for investment has been quality improvement. Also, 22% say to have invested in technology in order to increase their scale of production. Labour shortage and labour cost has not been a determining factor in the choice of technology. It seems also that these investments have contributed to motivate employees as certified by 83% of these enterprises.

Problems in investment

Having invested in technology in the past 5 years, 22% of enterprises suffered from a problem of shonage of skilled labour and 17% from a shortage of qualified maintenance labour (below-average figures). Also, 28% admit to making sub-optimal use of their equipment.

Use of Information Technology

Enterprises having computers seem to use them mainly for accounting (90%), payroll (74%), office automation (63%). To a lesser extent, computers are used for MIS/DSS $(26^{\circ} 0)$, costing (21%), stock control (21%) and e-mail (16%). It is to be noted that 21\% have nerw ork facilities at their disposal.

Support

Specialised magazines (50%), regular contact with equipment manufacturers (50%) and consultancies and experts are the most popular modes of technology sourcing.

20% do their sourcing through trade fairs, conferences and seminars and 25% through expatriate staff and foreign expertise.

Routine maintenance and minor repairs are done by in-house staff on an average of 25% and 20% respectively and by local firms on an average of 70% and 65% respectively. Major lnaintenance and repairs are done at 80% by local finns. The main reasons why maintenance and repairs problems are difficult to solve is the lack of local competence (45%) and the high cost of spare pans (35%).

In the Business services sector, operators (50% of companies) and technical staff (35% of companies) receive mainly in-house training given by the

company staff About 25% of these enterprises stated that technical staff received external training as well. About 50°0 of the Admilli,ll ative staff receives both external training and in-house training given by company staff Training to middle and top management is done through external training (35% and 30% respectively) and overseas company sponsored training (20% and 30% respectively).

4.05 CHEMICALS & ALLIED PRODUCTS

Profile

There are 31 Chemicals & 1\.\\ied 'QHId\lc\!i. et\\eCQn,;, $\langle n, \dots \rangle$, $\langle n, \dots \rangle$, $\langle n, \dots \rangle$ IJ\l\ it the lot surveyed, only 45% responded. The owner slup su II,, Ilre in this sector is predominantly locally owned. The nature of their business is mainly manufacturing (84%) and the rest being 1, bl.d. nurion of manufacturing and services. The mode of operations is a nu-, of manual and automated (84%). Three per cent claim to have completel, automated operations. Furthermore, 68% realise the existence UI bcucr cl.p.lpment as opposed to their present equipment level, and 11% of this s, ., " claim to have state of-the-art equipment.

Investment

62% responded having invested in the past five years 11 hc:1,a, o did not invest. The nature of new investment was for :

- (i) replacing existing equipment by more sophisticated ones $(5.)^{"}$,
- (ii) adding more sophisticated equipment (42%), and
- (iii) increasing the number of similar equipment (-12".,)

The reason for investment was to increase the scale ul pl,ldllcl, +189%), to improve product and services quality (69%), and to reduce iubor cost (31%). The main reason for non investment was 11,1 accc., to credit (IO0%), followed by equipment being too expensive (50". Illd some companies have just started operating (50%).

Problems in Investment

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Use of Information Technology

14% of the chemicals & allied products sector do not posses» 1 computer. Of those who use IT, most use it for accounting purposes ($\-1"$, costing & stock control (72%), and payroll (59%).

Support

The main sources of new technologies are mostly 111,>ugh, .uact with equipment manufacturers (60%), specialized magazrnes t(,0"., .; d visits to similar industries and organizations.

-i.06 CO STRUCTION SECTOR

Profile of sector

The Construction sector as defined in this study is composed of 49 enterprises involved in road and highway tarring and repairing, job contracting, building and civil engineering, building construction, waterproofing, manufacturing of precast concrete structures and electrical and plumbing work. The response rate for this sector is 47% and the number of returned questionnaire is 23.

Of these 23 enterprises, 78% are Mauritian owned, 4% entii ely foreign owned and 17% are joint local/foreign ventures. Also, 65% snv that their operations consist of a mixed mode of automated and manual processes whereas 26% say that their operations are essentially manual. -i% say that their processes are completely automated. 17% claim to possess the best equipment, 61% say that there exist better equipment that ,, ould either produce better quality products and/or consume less labour than their existing ones and as much as 22% are unaware about this issue.

Investment

According to this survey, 91% of the Construction sector invested in technology in the past 5 years. Of these enterprises which have invested, about 60% of them did it mainly through replacement and addiuon of more sophisticated equipment and about 40% through the replacement and addition of similar equipment. The main reasons for investuent.on an average, have been quality improvement (91%) and increase in the scale of production (74%). But it seems that this sector suffers from a labour problem as about 35% invested in technology to overcome labour shortage and to reduce labour cost.

Problems in investment

It arises from the survey that 33% and 43'}o of enterprises ha, mg invested in technology for the past S years consequently suffered from a problem of shortage of skilled labour and qualified maintenance labour respectively, percentages which are well above the overall average. Also, 29° 0 fmd that there is a lack of spare parts.

Use of Information Technology

Of all enterprises which returned the questionnaire, 9% do not possess any computer. Those having computers seem to use them mainly for costing (81%), accounting & payroll (91%) and stock control (67%). In a lesser extent, computers are used for production control (24%) and (. D (29%). Only 10% uses maintenance planning and work study and 14% raw material ordering. It is to be noted that 24% have die a netwoil, facility at their disposal and that 5% only enjoy the e-mail facility.

Support

Specialised magazines (78%) and regular contact with equipment manufacturers (78%) are the more popular modes of technology sourcing. About 35% do their sourcing through trade fairs and about \$11°0 through visits to similar enterprises and through expatriate staff and foreign expertise. It seems that in die Construction sector, only 17% attend conferences and seminars.

The routine maintenance and minor repairs are mostly done by in-house staff at the average of 91% and 87% respectively. Major maintenance is done by local firms (65%) and 48% by in-house staff.

Over forty percent can carry out their own major repairs. -u⁰⁰ having recourse to local firms and 22% to foreign experts.

The main reason why maintenance and repairs problems air .hfficult to solve is a lack of spare parts with a score of 65%. Also, 52% sal that there is a lack of local competence, 44% say that spare parts are very expensive and 30% say that foreign experts are too expensive.

In the Construction sector, in-house training is given by the company staff to operators (70% of respondents). to technical staff (61%) and administrative staff (48%). Only about 22% of operators enlny training given by external trainers to the enterprise, either the training course being delivered in-house or not. As for the technical staff, 22% bencrir from in• house training given by external trainers and 30% benefit from external training. Training to middle and top management is done through external training (30% and 22% respectively) and overseas company sponsored training (39% and 30% respectively).



4.07 **DATA** PROCESSING SECTOR

Profile of sector

The Data processing sector as defined in this study is composed of 34 enterprises involved in hardware/software services, development and maintenance, computer consultancy services and data capture, entry, storage, processing, retrieval and transmission. The response rate for this sector is 56% and the number of returned questionnaire is 19.

79% of respondents are Mauritian owned, 11% entirely foreign owned and 5% are joint local/foreign ventures. Also, 68% say that their operations consist of a mixed mode of automated and manual processes whereas 21% say that their operations are essentially manual. Also, 11% say that their processes are completely automated. 50% claim to possess the best equipment and 50% say that there does exist better equipment than their existing ones.

Investment

According to the survey, 84% of the DP sector invested in technology in the past 5 years. Of those enterprises, 67% of them did it through replacement and 78% by addition of more sophisticated equipment. One third did it through the increase in number of similar equipment. It is to be noted that only 11% replaced their scrapped equipment by similar ones. The main reason for investment, averaging 94%, has been quality improvement. Also, 39% say to have invested in technology in order to increase their scale of production. Labour shortage and labour cost has not been a determining factor in the choice of technology. It seems also that these investments have contributed to motivate employees as claimed by 72% of these enterprises.

Problems in investment

It emerges that only 17% and 22% of enterprises having invested in technology for the past 5 years consequently suffered from a problem of shortage of skilled labour and qualified maintenance labour respectively. Also, 17% admit to make a sub-optimal use of their equipment.

Use of Information Technology

Enterprises having computers seem to use them mainJy for costing (50%), accounting (78%), payroll (61%), office automation (61%) and stock control (50%). In a lesser extent, computers are used for MIS/DSS (28%) and e-mail (39%). 11 % use bar coding and $(6^{\circ}0)$ maintenance planning & work study. It is to be noted that 61% have a network facility at their disposal.

Support

Specialised magazines (79%) and regular contact with equipment manufacturers (74%) are the more popular modes of technology sourcing. 53% do their sourcing through trade fairs, 63% through conferences and seminars, 37% through visits to similar enterprises and 42% through expatriate staff and foreign expertise.

The routine maintenance and minor repairs are done by in-house staff at the average of 53% and 48% respectively and by local firms at the average of 42% and 37% respectively. Major maintenance is done by local firms (74%) and 37% by in-house staff.

32% can cany out their o, \$11 major repairs, 63°0 contract out to local films and 26% send their equipment overseas to be repaired.

The mam reason why maintenance and repairs problems are difficult to solve is a lack of spare parts (42%). *Also*, 42% say that spare parts are very expensive and 260% say that there is a lack of local competence.

In the Data Processing sector, operators receive mainly in-house training given by the company staff (50% of enterprises). About 50% of these enterprises stated that the technical staff received in-house training given by the company staff and also given by external trainers, external training and overseas company sponsored training. The Administrative staff receives in• house training given by company staff (47%) and also external training (21%). Training to middle and top management is done through external training (320% and 37% respectively) and overseas company sponsored training (32°%) and 26% respectively).

4.08 DRAUGHTMANSHIP SECTOR

Profile of sector

The Draughtmanship sector as defined in this study is composed of 28 enterprises involved in draughtmanship and architectural services, structural designing, engineering consultancy services and quantity surveying. The response rate for this sector is 57% and the number of returned questionnaire is 16.

94% are Mauritian owned and 6% are joint local/foreign ventures. Also, 75% say that their operations consist of a mixed mode of automated and manual processes whereas 6% say that their operations are essentially manual. Also, 6% say that their processes are completely automated. 25% claim to possess the best equipment, 56% say that there does exist better equipment that would either produce better quality products and/or consume less labour than their existing ones and 13% are not aware of such equipment being existent.

Investment

Results show that 88% of the Draughtmanship sector invested in technology in the past 5 years. Of these enterprises which have invested, about 70% of them did it mainly through replacement and addition of more sophisticated equipment and about 30% through the increase in number of similar equipment. It is to be noted that only 6% replaced their scrapped equipment by similar ones. The main reasons for investment, were quality improvement (94%) and increase in the scale of production (50%). It is also claimed by 75% of respondents) that these investments have contributed to motivate employees.

Problems in investment

Problems of skilled labour shortage (25%) and qualified maintenance staff shortage (19%) seem to follow the act of investing in equipment. Also, as many as 31% admit to have made a wrong choice of technology.

Use of Information Technology

Of all enterprises which returned the questionnaire, 9% do not possess any computers. Those having computers seem to use them mainly for costing $(8 \^{\circ}/)$, accounting and payroll (91%), and stock control (67°/). To a much lesser extent, computers are used for production control (24%) and CAD (29° 0). Only 10° 0 use maintenance planning and work study and 14<0 raw material ordering. It is to be noted that 24% have networked computers and 5% enjoy the e-mail facility.

Support

Specialised magazines (78%) and regular contact with equipment manufacturers (78%) are the more popular modes of technology sourcing. About 35% do their sourcing through trade fairs and about 30% through visits to similar enterprises and through expatriate staff and foreign experts. It seems that in the Construction sector, only 17% attend conferences and seminars.

Routine maintenance (average 91%) and minor repairs (average 87%) are mostly done by in-house staff Major maintenance is done at 65% by local firms and 48% by in-house staff 44% carry out their own major repairs, 70% contract out to local firms and 22% to foreign experts. The main
reason (65°0) why maintenance and repairs problems are difficult to solve is a lack of spare parts.

Also, 52% say that there is a lack of local competence, 44% say that spare parts are very expensive and 30% say that foreign expertise is too expensive.

In the Construction sector, operators, the technical staff and the administrative staff receive mainly in-house training given by by company staff. Only about 22% of operators enjoy training given by external trainers to the enterprise. As for the technical staff, 22% benefit from in-house training given by external trainers and 30% benefit from external training. *Training to* middle and *top* management *is* done through external training (30% and 22° o respectively) and overseas company sponsored training (39% and 30% respectively).

-t.09 ELECTRIC & ELECTRO IC EQUIPi\IE T

Profile of sector

The electric & electronic equipment sector as defined in this study comprises 65 enterprises, manufacturing general electrical machinery such as refrigerators, electrical accessories and fittings, professional and scientific measuring and controlling equipment, watches and clocks, and assembling Radio & T.V sets, communication and electronic equipment like computers. For 23 questionnaires returned, the response rate was 350/0.

Of these 23 enterprises, 44% are Mauritian owned, $22^{\circ}/_{0}$ entirely foreign owned and another 30% are joint local/foreign venture. Also, 52% say that their operations consist of a mixed mode of automated and manual processes whereas the other 48% say that their operations are essentially manual, which could be explained by the high percentage of enterprises engaged in assembly operations. Moreover, 26% of respondents claim to possess the best equipment, 52% say that there must exist better equipment elsewhere than whatever they presently have, and $|4^{\circ}_{0}$ are unaware of any such equipment.

Investment

83% of the Electric and Electronic equipment sector invested in technology in the past 5 years. Half of these did so mainly through the addition of a number of similar equipment and more sophisticated equipment to their own. It is to be noted that 16% of them merely replaced their scrapped equipment with similar ones and 26% with more sophisticated ones. The main reasons for investment, stated, on average, quality improvement (68%), and increase in the scale of production (47%). Also, approximately $60^{\circ}0$ have in effect succeeded in obtaining quality improvement and increase in scale of production. as well real reduction of labour costs after investment (32%).

Problems in investment

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The main problem arising in this sector after investment is a lack of spare parts as stated by 26% of enterprises. Also, 21% say that there is a shortage of skilled labour.

Use of Information Technology

Of all enterprises which returned the questionnaire, 9% do not possess computers. Those having computers seem to use them mainly for accounting (90%), payroll (75%) and stock control (70%). To a lesser extern, computers are also used for production control (20%), raw materials ordering and maintenance planning (25%), and costing (40%). Only 10% use process control and real time control. It is to be noted that $24^{\circ}/1$ have networked computers and that 14% enjoy the use of electronic mail.

Support

Specialised magazines (440/0) and regular contact with equipment manufacturers (57%) are the more popular modes of technology sourcing. 35% do their sourcing through trade fairs and about 30% through visits to similar enterprises and through expatriate staff and foreign expertise in general.

Routine maintenance and minor repairs are mostly done by in-house staff (average 80%). Major maintenance is also done mainly by in-house staff (61%) whereas the major repairs are done by the in-house staff (39%), by local firms (52%) and by sending the equipment abroad (44%).

"''' ,nc"'' reaben for wh,cn marmenance and repairs problems prove difficult to solve is a lack of local spare parts (65%) as well as their high costs (390/). Also, 30% say that there is a lack of local competence.

In this sector, operators, technical staff and administrative staff receive mainly in-house training given by the company staff (respectively 83%, 70% and 61% of enterprises). In-house training by external trainers to the enterprise is also given to operators (30%) and technical staff (48%). Middle and top management are seen to benefit from overseas company sponsored training (35%).

-'.10 Flt A CIAL ERVICES SECTOR

Profile of sector

The Financial services sector as defined in this study consists of 77 enterprises involved in banking, stock brokering and insurance mainly. The response rate for this sector is 43% and the number of returned questionnaire is 33.

Of these enterprises, 64% are Mauritian owned, 24% entirely foreign owned and 12% are joint local/foreign venture. Also, $88^{\circ}\circ$ say that their operations consist of a mixed mode of automated and manual processes, 3% say that their operations are essentially manual and 6% say that their operations are completely automated. $15^{\circ}\circ$ claim to possess the best equipment, 64% say that there does exist elsewhere better equipment that would either produce better quality products and/or consume less labour than their existing ones and 12% are unaware about the existence of such equipment.

Investment

According to this survey, $82^{\circ} \circ$ of the Nlarket mg & Advertisement sector invested in technology in the past 5 years. Of these enterprises which have invested, 64% of them did it through replacement and 79% through the addition of more sophisticated equipment. $43^{\circ} \circ$ increased the number of equipment by acquiring similar ones. It is to be noted that only 7% replaced their scrapped equipment by similar ones. The main reason for investment has been quality improvement (average of 96%). Also, 36% say to have invested in technology in order to increase their scale of production. Labour shortage and labour cost has not been a determining factor in the choice of technology. Interestingly, 64% of these enterprises claimed that thee new investments have contributed towards motivating employees.

Problems in investment

It arises from the survey that enterprises having invested in technology for the past 5 years consequently suffered from a problem of shortage of skilled labour (14%) and qualified maintenance labour (18%). Also, 18% admit to making sub-optimal use of their equipment.

Use of Information Technology

Enterprises having computers seem to use them mainly for accounting (84%), Payroll (48%), office automation(58%). To a considerably lesser extent, computers are used for MIS/DSS (13° c) , costing (23%), stock control (13%) and e-mail (16%). We note that 32% have computers which *are* networked.

Support

Regular contact with equipment manufacturers (46%) is the most popular mode of technology sourcing. 36% do their sourcing through specialised magazines, approximately 30% through visits to similar enterprises, conferences and seminars, through expatriate staff and foreign expertise and some 20% through trade fairs.

Routine maintenance and minor repairs *are* done mainly by local firms at an average of 85% and 65% respectively. lajor maintenance and repairs *are* mainly done by local firms (80%). The main reason for which maintenance and repairs problems are difficult to solve is the lack of local competence (24%). However, 46% claim that these problems are not difficult to solve.

In the Financial services sector, operators receive in-house training given by company staff (42° 0), in-house training given by external trainers to the company (24%) and external training (30%).

Technical staff receive in-house training given by company officials (33°) , in-house training by external trainers (18%), and external, off-the-job training (39 \langle 0). In-house training is given by the company to administrative staff (55%), external trainers come to the company to train them (33%) and 33% of enterprises send out their administrative staff to external training sources. Training to middle and top management is given using mainly external training and overseas company sponsored training (18% & 24% respectively).

4.11 FLO\VERS SECTOR

Profile of sector

The Flowers sector consists mainly of enterprises producing anthuriums and andreanums. Out of the 64 enterprises only 25% responded to the questionnaire. 4 out of these respondents form part of the EPZ and they are all Mauritian owned.

The mode of operation for most of them (81%) is manual although 13% claim to have a mix of manual and automated processes.

38% believe that equipment better than what they have does exist while 25% do not think so and 19% do not know of any such existence.

Investment

In the past five years 44% of the enterprises invested in new equipment or in the upgrading of existing ones. 22% invested through the increase in number of similar equipment, 33% replaced currently used equipment by more sophisticated ones and 22% added more sophisticated equipment. Only 11% merely replaced their scrapped equipment by similar ones.

The principal reasons for investing were for quality improvement (78%) and to increase the scale of production (67%). 78% did improve their products quality and 67% increased their scale of production as a result of the investments.

Not many enterprises seem to have faced with problems as a result of investing except for one.enterprise which felt the shortage of labour and lack of qualified maintenance people.

Use of IT



Around 70% of the enterprises have computers and most of them use computers for accounting (82%), stock control (64%), costing (64%), payroll (46%) and production control (46%). etworks and e-mail facilities are quasi-inexistent in this sector.

Support

The main source of information about new and emerging technology is from specialised magazines for 56% of the enterprises. 44% get such information from visits to similar industries , 25% from conferences and seminars, 25% also acquire it from customer feedback. It is useful to note that 13% consider local research institutions as one of their sources of new technology.

The routine maintenance and nunor repairs is carried out by in-house personnel for 62% and 50% of the enterprises. On the other hand major maintenance and major repairs is carried out to a lesser extent by in-house staff (31% and 13% respectively) and some enterprises (44%) have recourse to local firms for major maintenance and repairs.

Training for operators in the Flowers sector is provided in-house by own personnel in 38% of the enterprises. Technical staff receive in-house training in 31% of the enterprises and in 6% by external trainers. Training to administrative staff, middle and top management is even poorer (in less than 20%).

t.12 FURNIT RE AND \VOOD

Profile of sector

More than 75% of the firms under this category are registered as SME and are involved in cabinet making. The rate of return is 29% with 54 firms responding, 89% of which are completely Mauritian owned. 15% of the firms use manual operations while the remaining use a combination of manual and automated processes. 70% claim existence of better equipment while 130/replied by the negative, 11% responding not being aware of existence of such equipment.

Investment

Around 63% of the firms claim having invested in last the 5 years and only 9% claim not having done so; 17% have partially invested. Most investment has been towards addition of more sophisticated facilities (57%). Some 41% of the firms have replaced existing equipment by more sophisticated ones while 40% of them have gone for replacement by similar equipment. Investment has by large been made for improvement in product quality (91%) while 67% have invested to increase their scale of production. Reduction of labor cost and overcoming its shortage have also been key factors influencing investment. Very few of the firms affirm the availability of incentives for further investment.

Problems in investment

Of the firms which have invested few of them claim facing problems related to shortage of skilled labor (30%), lack of qualified maintenance personnel (24%) or lack of spare parts (20%).

The main reasons put forward for non investment (17 firms) are equipment being too expensive $(47\)$ and firms having no access to credit (35%). 29% of them believe there is insufficient incentives to go for new investment.

18% of these firms have just started operating and some 24% claim there is a shortage of trained/skilled labor in the sector.

Use of Information Technology

48% of these firms have computers which are used for stock control (77%), costing (73%), accounting (65%), payroll (54%), production control, order processing (39%) and raw materials ordering (35%). The use of other computer applications *is* insignificant, for instance, office automation and workstudy (23%), maintenance planning and process control (12%).

Support

570% of the firms obtain information related to new technology from specialized magazines while 41% participate in trade fairs to that purpose. A third of these firms rely on customer feedback, visits to similar organizations and industries, contact with equipment manufacturers to obtain similar information. 24% claim participating in seminars and conferences to update their knowledge on new technology. Other sources are used by a minimum number of firms.

Related to maintenance and repairs, most routine activities are taken care of by in-house personnel (70% of the firms) while major maintenance work is preferably subcontracted to local firms (60%).

61% of the firms provide in-house training to operators. Training to other categories of staff is not available in a considerable number of the firms;

only a third or even less having claimed to offer these staff in-house training by own personnel. External training equally exists in only a few of the firms (less than 10%).

4.13 JEVELLERY

Profile of sector

The Jewellery sector is composed of enterprises operating on an industrial basis as well as those operating as craftsmen. Nearly 50% of the 76 jewellers listed in the sample are SME while approximately 25% are in the EPZ. It is to be noted that more EPZ enterprises than SME returned the questionnaire. The response rate for this sector is 36% and the number of returned questionnaires is 27.

Of these 27 enterprises, 56% are Mauritian owned, 22% entirely foreign owned and another 22% are joint local/foreign venture. Also, 82% say that their operations consist of a mixed mode of automated and manual processes whereas 15% say that their operations are essentially manual. 22% claim to possess the best equipment, 44% say that there exists better equipment than theirs and as much as 30% do not know of the existence of such equipment.

Investment

It emerged that 85% of the Jewellery sector has invested in technology in the past 5 years. Of these enterprises, approximately 75% of them did so mainly by increasing the number of similar equipment and the replacement of their initial equipment by more sophisticated ones. It is to be noted that only 130/ merely replaced their scrapped equipment by similar ones. The main reasons for investment, have been quality improvement (average of 90%) and increase in the scale of production. Approximately 80% succeeded in effectively obtaining quality improvement and increased scale of production. But it seems that this sector suffers from a labour problem as about 50% invested in technology to overcome Jabour shortage and to reduce Jabour cost and 30% did bring down their labour costs consequently.

Problems in investment

Respondents in this sector claim having suffered from a problem of shortage of skilled labour (46% of enterprises) and qualified maintenance labour(58%), as a consequence of having made investments in technology in the last five years, percentages which are well above the overall average for all sectors.

Use of Information Technology

Of all enterprises in this sector which returned the questionnaire, one quarter do not possess computers. Those having computers seem to use them mainly for order processing (45%), costing (30%), accounting and payroll (70%), stock control (65%) and production control (50%). Only 5% use CAD and maintenance planning and 15% real time control and work study. It is to be noted that one company (out of 20) has a network and bar-code facility, but no one uses e-mail.

Support

Specialised magazines (52%) and regular contact with equipment manufacturers (67%) are the more popular modes of technology sourcing. About 40% do their sourcing through trade fairs and about 25% through visits to similar enterprises and through expatriate staff and foreign experts. It appears so far that for the jewellery sector, there are no conferences and seminars taking place which *could* help in technology sourcing. Also, 15% of enterprises returning the questionnaire do their sourcing through joint ventures.

The routine maintenance and mmor repairs are mostly done by in-house staff at the average of 85% and 63° o respectively.

Major maintenance is done at 56% by local firms and 33% by in-house staff. Only 11% can carry out their own major repairs, 37% having recourse to local firms and as many as 44% sending their equipment abroad. The main reason why maintenance and repairs problems are difficult to solve is a lack of spare parts (claimed by 74% of respondents in this sector). AJso, 48% say that there is a lack of local competence and 26% say that spare parts are very expensive.

In-house training programmes run by the company itself are offerred to operators (67% of respondents' claim), technical staff (48%), and administrative staff (56%). Only about 20% of the operators and technical staff enjoy training given by external trainers to the enterprise, both through courses delivered in-house and off-the-job. Training to middle and top management is quite minimal, 15% claiming to receive external training.

4.14 LEATHER PRODUCTS

Profile of sector

The rate of return for this sector which mainly include shoes and bags manufacturers, was 39% with 29 firms having positively responded. 72% of these firms are completely Mauritian owned while 7% are foreign owned and 140% are joint ventures. 50% of them are registered as SME. Almost a third of the firms involve manual processing while the remaining use a combination of manual/automated processes. There is a considerate degree of unawareness related to existence of better processing equipment (21%) while 65% admit the contrary.

Investment

Of the 23 firms which have invested in the last 5 years, 52% have opted for replacement or addition (44%) of more sophisticated equipment. Such investment have mainly been effected to increase scale of production (87%) and improve product quality (83%). Reduction of labor cost has also been a governing factor for investment (52%). 22% of firms invested to replace present equipment with similar ones. There has not been any indication for availability of incentives for investment (13%). 39% invested to overcome labor shortage and 24% of them for waste reduction.

Problems in investment

Of the firms which have not invested in the past 5 years (13 out of 29), 23% claim the market for their products is on a decline, while 54% claim having no access to credit. An equally large number of the firms (39%) have shown concern for high cost of equipment. Of those who have invested, 52% claim facing a shortage of skilled labor and to a lesser extent shortage of qualified

maintenance people (39%). 22% expressed concern for availability of spare parts and this figure is almost triple for the population (62%).

Use of Information Technology

35% of the firms admit not having computers. The remaining use computers mainly for stock control (90%), Accounting (79%), payroll (74%), production control (68%), costing (58%), and raw material ordering (53%). Fewer firms use computers for other applications like order processing (37%), office automation (32%), process control (21%) and workstudy (16%), while negligible number of the firms find other applications for computers.

Support

55% of the fluils find information related to new technology from specialized magazines and 41% from trade fairs. A third of the fluils use contact with equipment manufacturer and customer feedback as major sources of information. Except from visit to similar industries and organizations (21%), other sources are not widely used by the firm manufacturing leather products.

Most maintenance work is done by in-house personnel except for major repair and maintenance whereby around 50% of those surveyed claim having resort to Local firms for the purpose. Negligible number of firms have resort to foreign expertise for their maintenance and repairs.

In terms of training, except from that given in-house by own personnel to operators (76%), few firms admit offering training to the other categories of their personnel (<30%)

4.15 MARKETING AND ADVERTISEMENT SECTOR

Profile of sector

The Marketing & Advertisement sector as defined in this study consists of 20 enterprises involved in advertisement activities mainly. The response rate for this sector is 40% and the number of returned questionnaire is 8.

Of these 8 enterprises, 88% are Mauritian owned and 13% entirely foreign owned. Also, 63% say that their operations consist of a mix mode of automated and manual processes whereas 13% say that their operations are essentially manual. 50% claim to possess the best equipment and 50% say that there exist better equipment that would either produce better quality products and/or consume less labour than their existing ones.

Investment

According to this survey, 75% of the Marketing and Advertisement sector invested in technology in the past 5 years. Of these enterprises which have invested, 71% of them did it through replacement and addition of more sophisticated equipment. 29% did it through the increase in number of similar equipment. It is to be noted that no one replaced their scraped equipment by similar ones. The main reason for investment, stated at the average of 100%, has been quality improvement. Also, 43% say to have invested in technology in order to increase their scale of production. Labour shortage and labour cost has not been a determining factor in the choice of technology. It seems also that these investments have contributed to motivate employees as certified by 71% of these enterprises.

Problems in investment

It arises from this survey that 29% of enterprises having invested in technology for the past 5 years consequently suffered from a problem of shortage of skilled labour and qualified maintenance labour.

Use of Information Technology

Enterprises having computers seem to use them mainly for accounting (100%), payroll (50%), office automation (75%) and costing (50%). To a lesser extent, computers are used for MIS/DSS (25%), stock control (38%) and CAD (38%). It is to be noted that 13% have the networks and e-mail facility at their disposal.

Support

Regular contact with equipment manufacturers (75%) is the most popular mode of technology sourcing. 50% do their sourcing through specialised magazines and consultancies & experts.

The routine maintenance is done by in-house staff (63%) and by local firms (50%), the major maintenance being done mainly by local firms (88%). Minor and major repairs are also mainly done at 88% by local firms. The main reason why maintenance and repairs problems are difficult to solve is the lack of local competence (63%). 380% say that there is a lack of spare parts and another 38% say that these problems are not difficult to solve.

In the Marketing and Advertisement sector, operators receive in-house training given by company staff (50%) and in-house training given by external trainers to the company (25%).

The technical staff and the administrative staff receive similar forms of training, i.e 38% and 50% respectively for in-house training given by company staff and 25° '. for in-house training given by external trainers to the company.

External training is given to the technical staff (13%), the administrative staff (25%) and to the middle and top management (25%). Training to middle management is also done in-house by company staff (25%) and top management enjoy also overseas company sponsored training (25%).

.t.16 METAL PRODUCTS

Profile

There are 157 metal products industries in Mauritius at present. Out of the lot surveyed, only 36% responded. The ownership structure is predominantly Mauritian owned (86%). The nature of their business activities are mainly manufacturing (68%) and the rest is a mixture of manufacturing & services (21%) and services (11%). The nature of operations is a mixture of manual and automated process (70%). Further, 28% is manual and 2% is completely automated, 61% acknowledge the existence of better equipment whereas 21% claim to have state of the art equipment for their application.

Investment

67% of the lot responded, have invested over the past five years, whereas 260% did not invest. The nature of new investment were to

- (i) add more sophisticated equipment (58%)
- (ii) increase number of similar equipment.

The reasons for investment was to improve product & services quality (90%), to increase the scale of production (50%), to reduce waste (50%), to reduce labor cost (33%). The reasons for non investment is due to no access to credit (41%), just started their operations (41%), too expensive to purchase new equipment (41%). Shortage of trained and skilled labor (24%) seems to be one contributing factor for non investment.

Problems in Investment

There are a few problems associated with investment in the metal products sector, there is a shortage of skilled labor (40%), lack of spare parts (18%), and a sub-opnrnal use of equipment (13%) after investment.

Use of Information Technology

26% of the metal products sector possess no computer, of those who uses information technology, its mostly for accounting purposes (74%), payroll (76%), costing (62%), stock control (55%).

Support

The main sources of new technologies are mostly through contact with equipment manufacturers (65%), specialized magazines (56%), trade fairs (40%) and visits to similar industries and organizations. Conferences and seminars (230/) seem to have a significant role to play in this sector.

4.17 PLASTIC PRODUCTS

Profile

There are 73 plastic products industries in Mauritius at present. Out of the lot surveyed, only 30% responded. The ownership structure *in* this sector is predominantly Mauritian owned (82%), and the rest being joint ventures with foreign investors. The nature of their business activities are mainly manufacturing (82%) and the remainder is a mixture of manufacture and services. The mode of operations is a mixture of manual & automated process (82%) and fourteen per cent being completely automated. In this sector, 55% acknowledge the existence of better equipment relative to their process. On the other hand 32% claim to be using state of the art equipment.

Investment

 68° o of the lot responded, have invested over the past five years whereas 32% did not invest. The nature of the new investment were to :

- (i) add more sophisticated equipment (67 < 0),
- (ii) replace existing equipment with more sophisticated ones (40%),
- (iii) increase the number of similar equipment (33%).

The reasons for investment was to improve the product and services quality (87%), to increase the scale of production (67%), to overcome labor shortage (53%), to reduce waste (33%), reduce layout cost (27%). The reason for non-investment was mainly due to just started the operations (43%), followed by being too expensive to purchase new equipment.

Problems in Investment

There are a few problems associated with investment in the plastic product sector, there is a lack of qualified maintenance people (20%), lack of spare parts (20%).

Use of Information Technology

27% of the plastic products sector possess no computer. Of those who uses information technology, it is most for stock control (81%), accounting (69%), payroll (63%) and cost (56%)

Support

The main sources of new technologies are mostly through contact with equipment manufacturers (59%), specialized magazines (50%), trade fairs (41 0). There is no consultancy and expert involvement in this sector.

♦.18 PRINTING

Profile

There are 71 printing industries in Mauritius at present. Out of the lot surveyed, 31% responded. The ownership structure is predominantly Mauritian owned (82%) and 14% are joint/local/foreign venture. The nature of their business activities are mainly manufacturing (77%). The mode of operations is a combination of manual/automated process (82%) and the rest being fully automated. Furthermore, 55% reckon the existence of better equipment, 23% claim using state of the art equipment.

Investment

82% of the lot responded, have invested during the past five years. The nature of the new investment were to

- (i) add more sophisticated equipment (60%),
- (ii) replace by more sophisticated equipment (45%),
- (iii) increase number of similar equipment (30%).

The reason for investing was to improve product and services quality (100%), followed by increase the scale of production (65%), reduction of labor cost (40%).

Problems in Investment

There are a few problems associated with investment in the printing sector, there is a shortage of skilled labor (55%), lack of qualified maintenance

people (40%). a lack of spare parts (25%) and a sub-optimal use of equipment offer investment.

Use of Information Technology

5% of the printing sector possess no computer. Of those who uses information technology, its mostly for accounting (71%), stock control (67%), payroU (57%) and order processing.

Support

The main sources of new technologies are mostly through, contact with equipment manufacturers (73%), specialized magazines (68%), trade fairs (50%) and visit to similar industries and organizations (41%).

4.19 STATIONERY

Profile

There are 39 stationery industries in Mauritius at present. Out of the lot surveyed, only 28% responded. The ownership structure in this sector is predominantly Mauritian owned (82%). The nature of their business activities are mainly manufacturing (82%) and the rest being services (18%).

The mode of operations is a mixture of manual and automated (91%). There is no indication of fully automated operations in this sector. Furthermore, 73 < 0 of the industries reckon the existence of better equipment for their application.

Investment

73% of the lot responded, have invested during the past five years. The nature of the new investment were to :

(i) replace existing equipment by more sophisticated ones (67%),

(ii) add more sophisticated equipment (33%).

There is an indication of expansion in this sector. TIle reason for investing was to improve product and services quality ($|00\%\rangle$), followed by increase the scale of production, reduction in waste and reduction in non-labor cost (44%).

There are a few problems associated with investment in the stationery sector, that is there is a shortage of skilled labor (33%), a lack of qualified maintenance people (22%) and a lack of spare parts (22%) after investment.

se of Information Technology

18% of the stationery sector possess no computer. Of those who uses information technology, its mostly for accounting & payroll (100%), for costing purposes (78%), stock control (78%) and production control (67%).

Support

Trade fairs (73%), contact with equipment manufacturers (55%) and specialized magazines (46%) are the main modes of new technology sourcing. Consultancies and experts in *this* field are contributing quite significantly in this sector (27%).

4.20 THE SUGAR INDUSTRY

Profile of sector

The Sugar Industry sector comprises of 18 sugar factories. 15 out of these responded to the survey.

Of these 15 enterprises, 80% are fully Mauritian owned, 130/0 entirely foreign owned and another 7% are joint local/foreign ventures. The mode of operation of all the 14 factories is a mix of automated and manual processes. The enterprises unanimously claim that there does exist better equipment that would either produce better quality products and/or consume less labour than their existing ones.

Investment

According to this survey, the entire sector invested in technology in the past 5 years. Of these enterprises which have invested, about 33% of them did it mainJy through the increase of the number of similar equipment, 10% through the replacement of their initial equipment by more sophisticated ones and 67% added more sophisticated equipment. It is to be noted that 20% of them merely replaced their scrap equipment with similar ones. The main reasons for investment have been stated as being reduction in labour cost (73%) and quality improvement and increase in the scale of production(67%). 73% succeeded in obtaining effective quality improvement and scale of production after investing, and 53% felt that it caused a reduction in labour cost. It seems that this sector suffers from a labour problem as about 49% invested in technology to overcome labour shortage and 73% to reduce labour cost. The survey shows that 27% of enterprises having invested in technology for the past 5 years consequently suffered from a problem of shortage of skilled labour and 33% felt that it gave rise to a lack of qualified maintenance labour.

Lise of Information Technology

All the sugar factories have computers. The use of computers seem be very high for costing (93%), accounting & payroll (93° $_0$), stock control (100° $_0$), production control (53%) and maintenance planning(40%) while at the same time 87% have automated process control. These figures are much higher than the overall average of all sectors together. Only 13% use CAD and it is also noted that 20% are networked.

Support

100% of the respondents derive their new technology from the extensive contact they have with equipment manufacturers, (80%) from specialized magazines and visus to sugar factories in other countries. Conferences and seminars also contribute to the transfer of new technology(73%). 27°'o get information on new technology from research institutions locally.

For 80% the routine maintenance and minor repairs are mostly done by m• house staff The latter also carry out the major maintenance in 60° o of the enterprises and major repairs in 47%. 87% have recourse to local firms for major maintenance and 93° o for major repairs. 33° o make use of foreign expertise and as much as 27% send their equipment abroad for major repairs.

Operators, administrative staff and middle management receive in-house training given by the company staff as stated respectively by 80%, 60% and 53% of enterprises. Technical staff,administrative staff,middle management and top management enjoy training given by external trainers in about 60% of the enterprises, the training course being delivered in-house or externally. 27% provide overseas training to their technical staff and 40% sponsor such training for their top management.

-1.21 TEXT ILE

Profile of sector

The response rate is 28%; 125 firms having responded to the survey. Type of firms which was meant to cover are Spinning and Weaving, Screen Printing, Dyeing, Embroidery, Carpets and Rugs, Textile Fittings, Knitted Apparel and Manufacture of Apparel, the last two making around 85% of the population. 18% of those responded are 100% foreign owned, the remaining being Mauritian (62%) or joint ventures (18%).

29% of firms use essentially manual operations while 70% use a combination of manual and automated processes. Surprisingly, around 24% of firms claim not being aware of existence of better equipment and $9^{\circ} \circ$ claim inexistence of such equipment. 65% admit better facilities do exist for the work they are involved in.

Investment

63% of the firms have invested in the last 5 years while 21° claim not having done so in the same period. Together with those who are unaware, these are evidently figures of concern as our textile industry is airning for the high end of the market. Of those who have invested, even partially. the investment has mainly been to increase the number of similar equipment (68%) with a view to increase the scale of production (79° o) and improve product quality (89%). Around 55% invested on more sophisticated equipment for similar reasons. 17% of firms replaced equipment with similar ones. With respect to other factors governing investment 47% of firms expressed concern for labor cost and 36% for shortage of labor. 35% invested to reduce waste. OnJy 6% admit availability of incentives for investment. 52% of firms viewed investment as a motivating factor for employees.

Problems of investment

Of the firms which have invested in the past 5 years, around 40% face the problem of scarcity of labor and qualified maintenance people. Shortage of trained/skilled labor has even been observed to be the major reason put forward by firms not having invested in the said period (40% of the 41 firms). 29% of the same group claim not having access to credit and equipment being too expensive. Concern was also expressed by 17% of them about declining market. 22% of those who have invested believe there is lack of spare parts for their new equipment.

Use of Information Technology

Most of the firms do have computers which are mainly used for payroll, accounting and stock control (>75%). Less than 50% of them use computers for other purposes like costing, plant loading/planning, order processing, production control and office automation (35-50%) and even lower scores were observed for shipping, bar-codes, worksrudy, process control, quality assurance, CAD/CAJ\!, and raw material ordering (15-20%). Use of computers for maintenance planning. MTS/DIS, Email is almost inexistant in textile fTTIIs.

Support

A wide range of facilities exists for obtaining information related to technology in the textile sector. Around 50% use specialized magazines, contact with equipment manufacturer and trade fairs for the purpose.20 to 300/ of firms use other modes of sourcing for instance, customer feedback, visit to similar industries & organisations, using foreign expertise, conferences and seminars and through consultancies and experts.

Most of the routine mamtenance and mmor repairs are done III-h use by own personnel.

Moreover, local firms are more and more involved for major maintenance and repairs (54% and 66°k of all the firms respectively). $22^{\circ}1$, of firms admit even having their minor repairs subcontracted to local firms, Negligible maintenance is taken care of by foreign experts except for major repairs where 10% of firms were seen to be involved.

Most of the firms offer in-house training by own personnel be it, to operators (80%), technical staff (47%), administrative and clerical staff (58%) or to middle (24%) and top management (14° {.) Few of them use external trainers for the training programs; 28% firms providing such training to technical staff and only around 12% for the remaining categories of personnel. External training mostly benefit middle and top management (29%) and to a lower extent to Technical (19%) and administrative and clerical staff (17%). Overseas training is negligible in the textile sector; only 10% of firms providing such training to their technical staff.

t.22 TRANSPORT

Profile of sector

The response rate was 32%; 37 firms consisting mainly of freight transport by road, car renting service, ocean and coastal water transport, container services, air transport, clearing and forwarding, travel agencies and tour operators, having responded to the survey. None of them is foreign owned, 78% being mauritian and 19% joint ventures. This is a typical service sector, 24% of the firms being involved in only manual operation and 65% using a combination of manual/automated processes. 70% of the 37 firms admit the existence of better equipment for their business while 19% are unaware of such existence.

Investment

All the firms claim having invested in new technology in the last 5 years. The type of investment is evenly spread over, increase of similar equipment (41%), replacement of equipment with similar ones (30° o], replacement by more sophisticated ones (57%) and addition of more sophisticated equipment (43%). The main reason behing investment has been to improve service quality (89%). The other reasons are not widely seen as the governing factor of investment, the highest score being 33% for reduction of non labour cost, and around 25% of the firms claim having invested *to* reduce labour cost, reduce waste, and increase scale of production. Fewer were concerned about shortage of labour (11%). Investment has led 57% of the firms *to* better motivation of employees.

Problems in investment

Around 20% of the firms having invested showed concern for lack of skilled labour and qualified maintenance people to support their investment.

The same number of firms admit having sup optimal use of their equipment, though only 5% claim having made the ,, rang choice of technology. Only 4 of the 37 firms have not invested in the said period for reasons like shortage of skilled labour, no access to credit and equipment being too expensive.

Use of Information Technology

Only one of the firms surveyed claim having no computers. The remaining use the facility mainly for accounting (86%), payroll (67%), and around a third of them for costing, order processing, shipping and stock control. A considerate number of firms are also involved in office automation (\cdot 13° 0) and networking (42%). 22% of the firms claim using Email which is the third highest score among all the sectors considered in the survey, after data processing (39° 0) and communication (33° 0).

Support

Specialised magazines, contact with equipment manufacturers and Consultancies and Experts are the most popular modes of technology sourcing, 60%, 51°_{\circ} and 49% of firms having respectively expressed the opinion. Less than a third (22-32%) of firms admit using trade fairs, conference and seminars, customer feedback and foreign expertise as source for new technology.

With respect to repair and maintenance, 30% of the firms showed concern for lack of local competence to solve their problems and there is equally the problem of shortage and cost of spare parts being too high. Around 50% of the firms have their routine maintenance and minor repairs subcontracted to la<ahrd>cal fill, R aldmi M aldmi M as 73%. There is a clear need for training the the area.



Such training to technical staff is offered by only 43° of the firms, in• house by own personnel, 22% of them have organisation of in-house training by external trainers and 38% of the firms provide external training to the same staff. Overseas training is negligible. Around 30% of the firms claim providing both in-house and external training to the other categories of employees. In-house training by own personnel to operators and administrative and clerical staff is evidently higher, 65% and 60% respectively.
APPENDIX II

SUMMARY OF FINDINGS FROM KEY INFORMANTS

I. INTRODUCTION

The purpose of the project, 'Technological Competence in Mauritius, is to give a picture of what is happening now concerning technology and related issues in all sectors and subsectors of the economy and consequently to serve as a base for a science & technology strategy.

The wide objectives of this study are:

To determine the current technology level in Mauritius. To understand the mechanisms of obtaining existing technologies. To identify the technological gaps between existing local technologies and whatever exists on the world market. To determine how technological assessment and forecasting are being done. To find out how technology sourcing is being effected. To ascertain possibility of solving technical problems in

the country.

To determine the strength of the R&D system.

2. *IETHODOLOGY*

The methodology adopted is the classical one using survey techniques. In addition to a documentary approach, information was collected in three steps.

Step 1 : Interview of key informants Step 2 : l\lail questionnaire Step 3 : In-depth interviews

The purpose of interviewing key informants was to gather qualitative data whereas the questionnaire, with its set of predetermined questions in a specific format, is used to obtain quantitative data for statistical analysis.

Step I

Interviews were carried out amongst twenty key informants, all professionals chosen from various sectors of the economy. The selection criteria of the key informants were based upon their position and level of knowhow and competence in the field of technology and its related aspects. Step I aims at achieving some of the objectives mentioned in the

introductory section as well as serve as a basis for the setting of the questionnaire through the opinions and views expressed by the key informants.

The following is a synthesis of the different views expressed and suggestions made during the interview of the key informants.

3. INVESTMENT

From the views expressed by the key informants, it can be noted that the level of technology used in the different sectors of the economy varies widely. *In* some sectors, the gap is not very wide as compared to developed countries as is the case for the telecommunication sector. In others, however, Mauritius is lagging far behind. Within sectors there exists wide differences as well



Within the textiles sector, for instance, some companies are using state-of• the-art equipment and others are still highly labour intensive, and operating outdated machinery. It has been found that within a company, both new and old technology are being used in parallel lines of production/process or in the same production/process line. Thus, the C.E.B has departments which are well equipped with up-to-date technologies while in others obsolete equipment are still in use. In the textiles sector, where this situation exists, some companies have upgraded the old machines so as to make them more performant.

3.1 REASO1 S FOR 1 fVESTI\IENT

With the increasing awareness of companies to produce quality products as a tool for competitiveness, the demand for technology is increasing. Indeed investment in modem technologies, including use of I.T., has been considered a must for companies wishing to retain or increase their competitiveness.

loreover, some high precision works can be more easily carried out with modem equipment. Investment must be made for such operations thus reducing the production time and enhancing quality.

When investing in technology, the entrepreneur expects not only improved quality but increased quantity as well.

3.1.1 LABOUR SHORTAGE

Labour shortage coupled with the increasing cost of labour have prompted companies to become more capital intensive. Hence, the use of more sophisticated and automated machines requiring fewer workers is a means to counteract the labour shortage problem. In the agricultural sector, the trend is towards mechanisation even for small planters. As mecharnsauon is usually used m large scale operations, the Land Area lanagement nit groups small units into larger ones so that small planters and farmers can take advantage of its facilities.

The lack of qualified human resources acts as a constraint to investment in technology-based industries where highly qualified labour is required. Moreover, the lack of qualified labour hinders investment on new technologies since maintenance problems cannot be resolved by the employees and expatriate staff is required for those jobs.

It has been pointed out that the shortage of qualified personnel can be partly overcome if proper incentives are given to Mauritians working abroad to come and work locally. This will also help slow down the problem of braindrain away from the country.

3.2 INCENTIVES

Some incentives for the development of technology are provided by the Ministry of Finance. A budget to this end is allocated each year to the different bodies to foster investment. Other incentives such as exemption of customs duty on imports of equipment. Income Tax relief that is investment allowances are given .

3.3 ACCESS TO CAPITAL

Apart from the incentives mentioned above, companies can obtain capital from banks. Funds are available from DBM in the form of soft loans for those investing in LT. While some infonnants consider that loans, i = 1, i

3A BARRIERS

In the past the main factor which acted as a barrier to investment in technology was psychological. There was a resistance to change and modernisation.

Another factor which prevents businessmen from making technological investment is their ignorance of the potential of new technologies. Some managers are technology-illiterate and do not have the necessary know-how to make wise investments. Therefore, either no investments are made at all or they invest in state-of-the-art equipment without any prior study to determine whether those equipment are really needed and to what extent it will be profitable to acquire them.

Companies' tendency to focus more on short term profits is made at the expense of longer term planning. They are not willing to make investments which will decrease their profit level and increase their debts. Investments are thus postponed for a later date and by that rime prices would have risen making investments even less attractive.

Some companies launch their businesses by taking huge loans. This causes their company to have a high gearing ratio, that is, most of their revenues are used to repay loans. They become more prone to getting bankrupt and being forced to close down. Such companies are not able to invest in technology as they do not have the necessary finance and cannot take more loans.

There are foreign companies whose sole interests are to make profits by taking advantages of incentives given by the government and cheap labour costs. Such companies are not interested in investing money in technologies since once the ten-year tax holiday is over, they move to more appealing countries. Madagascar and other countries with cheaper labour then become their operating centres.

3.4. I. LEGAL FRAI\IEWORK A D GOVERNMENT POLICIES

In the electronics sector, it is felt that the E.P.Z laws do not provide the legal framework to foster the creation of companies but it acts more as an obstacle to its development.

It has been observed that the level of bureaucratic procedures involved discourages entrepreneurs from launching their business and they may prefer more traditional ways of investing their money.

One of the reasons which incites businessmen not to invest and to move out is the lack of appropriate transport facilities and poor infrastructure. in general. It is also believes that government policies concerning workers conditions makes it difficult to motivate workers and that there is an abuse of leaves, sick and local, made by workers leading to a high absenteeism rate. Policy makers should set more realistic standards.

4. SO RCING

Most of the key informants interviewed agree that the main source of information concerning new technologies resides mainly in suppliers. However, as pointed out by an informant, investors should not rely mainly on local sales agencies but must deal directly with the foreign to obtain the necessary know-how.

Technology transfer is also carried out by those who travel widely, mainly consultants and expatriate staff. The latter are aware of new and emerging technologies and are thus more apt to facilitate implementation of those technologies.

Technical IllfonnatlOll is available in specialised publications and they act as a good source of information to those who subscribe to them or who receive them otherwise. In the agricultural field, information and knowledge were readily shared before but not any more due to high cost of research. Only the companies which subsidise research work are entitled to the results. As for small and medium industries, businessmen can have access to the directories of suppliers and trade associations at the SMJDO's office. In addition, SMIDO is considering implementation of a complete databank of local suppliers that will be made available to its members.

The MEDIA provides an on-line service free of charge to those wishing to retrieve information from databanks.

Another source of technical information lies in forums, workshops and fairs. The holding of such gatherings enable companies to get acquainted with new technologies and can ultimately help in information sharing.

Those companies who cannot afford more costly sourcing methods can seize those opportunities to acquaint themselves with emerging technologies. There is, however, a lack of interest on the part of businessmen to participate and visit the fairs.

It has been noted that there should be more cooperation amongst firms in the same industry to promote technology transfer. Benchmarking amongst firms is not very common but there exists some coorperation between local suppliers and their customers, an example of which being between local fabric suppliers and clothing industries.

5. H i\IAN RESOURCES

5.1 MANAGEI\IENT

Deciding on the type of technology to be acquired is a decision that should be taken not only by management but in collaboration with the parties to be affected by its introduction. Hence, management should consult the technicians, the workers and all partners concerned first so that the new technological device do not intrude on the work but is rather welcomed as a more effective means of production. There should be good communication so as to increase commitment on the part of all those concerned and more importantly on the part of management. The new investment will then be worthwhile and can be used to its full potential.

It has been pointed out that in the textiles sector, management is reluctant to invest on testing instruments to monitor production and quality.

5.2 FORECASTING

A trade union representative proposes that management prepares a good forecast so that introduction of technologies do not give rise to laying off of employees. Such a plan will include no new recruits and no replacement of retiring employees for a stipulated time so that the targeted number of employees is reached. The employees affected by the introduction of new technologies can be redeployed and hence prevent massive labour cut downs.

5.3 TRAI ING

This is one of the most important issues concerning technological implementation. Some key informants treated this aspect as being very important for the success of their organisation.

These claimed to devote much time and financial resources to the training of their labour force. Thus, some companies employ consultants to give refresher courses to their staff or train them on a new technological device Also, some companies send their technicians abroad for training so that proper preventive maintenance can be implemented.

Management must set up appropriate training, <u>income</u> am to e.tl. Ille. the **A** in the income acquiring new technology must also invest in the know-how, that is, how to use and maintain the equipment so that the investments will be optimised.

Automation is very often associated with reduction of the workforce. This knowledge creates apprehension amongst workers when informed about the introduction of new technologies. They are afraid of being replaced by machines and made redundant.

However, management has an important role to play concerning proper planning of investment so as to ensure that technological innovation is not made at the expense of workers' jobs. Retraining should form part of the plan thus giving employees the necessary skills to adapt to other Jobs. Moreover, employees must be motivated and must be made to feel a sense of belonging to the organ.isation.

Another reason why new technologies are not welcomed by employees is that the amount of overtime is reduced. Also, when working with modem equipments, the employee's output increases and he expects his returns to rise accordingly. However, this is not often the case and therefore management should review its reward policies to include this new aspect

Seeing that certain core subjects are common to organisation such as M.T., C.E.B, C.W.A etc., it has been proposed that a collective training is organised so as to optim.ise investment on training.

Efforts should be coordinated and a national plan elaborated by taking into consideration the training needs of the above-mentionned organisations so that a more economical way of training people is achieved.

In the trade and shipping sector, there exists a training school which provides training for seaman. However, with its present infrastructure, training of high calibre personnel cannot be achieved. For this, massive investments must be made by the authorities in proper technology. It is proposed that in order to optimise the return on investments, the training center is used to cater to the training needs in the shipping sectors in the nearby region for well qualified personnel.

5.4 EDUCATION

The level of literacy is a key aspect to technological change. The more use of computer controlled equipment being made, the higher the degree of education required.

Some companies are faced with the problem of low-literacy labour force, due to lack of qualified people at the time when recruitment was done. This hinders the application of new technology where skilled and highly adaptable persons are needed.

Much blame *is* put *on* the *education system which fosters competition but* does not favour creativity and maturing. The system based more on memorisation than understanding makes the employees less adaptable. The employee having learnt his job on the floor becomes competent in it due to its high repetitive nature. Thus, the worker is unable to adapt to changes and work on a newly introduced technology. Moreover, once an employee is used to working on a particular machine, he is reluctant to learn to work on new machineries.

There is a need for a highly advertised national campaign to promote new technologies and inform workers on the need to modernise the production tools.

6. RESEARCH AND DEVELOPMENT (R&D)

Research and development is made mostly in the agricultural field. The MSIRI being the organisation, par excellence, engaged in research in the sugarcane area. Sugar estates are now starting to make their own developments. The Ministry of Agriculture also carries out research and this will be done under the Directorate of Agricultural Research and Extension (DARE).

Apart from the above-mentionned organisations, very little R&D is actually carried out in Mauritius. This can be attributed to the missing R&D culture in the country and *the* lack of funds allocated to R&D. The education system is believed to play a negative role as far as R&D is concerned. The system does not foster creativity in the students even though the potential exists.

It has been pointed out that the necessary legal framework and structure does not exist to support and promote R&D. There are also not enough planning and too much political interference \\ hich hinders R&D. \\ lore incentives, in the form of grants and subsidies, should be given to encourage R&D. Highly qualified and experienced expatriates could *be* encouraged to come and work in l\lauritius. It is proposed that there should be more cooperation between the University of Mauritius and the industries, namely the FARC. It has been mentionned by an officer from the agricultural sector that funding for research purposes can be obtained from international institutions such as E.E.C.

Some of the factors which discourage companies from engaging in R&D is firstly its high costs. Research and development require high levels of investment.

A second reason h R&D is not t' popular III i/launtrus is because management considers that by tille a result is obtained II h already have been obtained III developed countries.

Though pure R&D is not very common in the different sectors, excluding agriculture, some companies do *try* to make some developments and modify *their technologies to suit their* requirements. In the textiles sector, some technicians, in a few companies, are requested to adapt the technology purchased to the firm's requirements. It has been proposed that at the M.T, the softwares used should be modified by the LT engineers, thus reducing the cost and developping technological competence.

Satellites industries could be encouraged to grow out of major industries and then the secondary industries can become specialist in the specific fields. This will indirectly promote R&D and design.

APPE�DL\'.. III

QL'''ESTIO **\$**AIRE

Na	me of Organiz.auon:			
Ac	ddress:			
	Tel:		Fax:	
	Contact Person:		Designation	
QI.	No of Employees	Q2.	Year Started Operations	
QJ. O I. O 2.	What is the ownership structure of you 100% Mauritian owned. 100% foreign owned	our enterpri	 D 3. Joint local/foreign venture. D 4. Other. 	
Q4. 0 1 0 2.	What is the nature of your business? Manufacture (state product(s)) Service, including wholesale & retail	(Multiple ro	esponses allowed, tick all that are applicable) product of service (s))	
Q5. He	ow would you describe the nature of yo	our operatio	ons?	
 O 1. O 2. O 3. O 4. 	<i>Essentially manual process</i> Mixture of manual and automated process. Completely automated process. Other, specify	ocess		
Q6. that are	For what applications is Information e applicable)	Technolog	y (IT - computer) used? (Multiple responses allowe	d, tick a:

- O I. Order processing.
- O 2. Costing.
- **0** 3. Accounting.
- D 4. Payroll.
- O 5. Office automation
- **0** 6. MIS/DSS
- **0** 8. Stock control.
- **0** 9. Bar codes.
- **0** I.O. Plant loading planing
- **0** 11. Raw materials ordering
- **D** 12. Raw materials ordering
- 0 13. Maintenance planning
- 0 14 Process control.
- **1**6. Real time control.

- **0** 17. Quality assurance.
- **0** 18. CAD
- **0** 19. CAM
- **D** 20. Electronic mail/EDI
- **0** 21. Networks.
- **0** 22. Others, specify.....

Q7. In the past 5 vears (or since operations started if less than 5 years), has there been any m, estmalt m nee, equipment or upgrading of exisung ones that are directly related to your acuviues?

- O Yes Answer 7a, 7b. 7c and then go to 8.
- O 2 No Skip to 7d directly

O 2

Q7a. Nature of new investment (Muluple responses allowed, lick allthat are applicable)

- 0 Increase number of similar equipment
- 0 4 Add more sophisucated eqwp (to existing one)
- 0 5. Others, specify
- O 3 Replace by more sophisticated equipment

Replace exisung equipment by sirrular ones

Q7b. Reasons & motivation for investment, (Why did you invest"), (Multiple responses allowed, tick all that are applicable)

0	I	To improve quality of products or services	0	5.	To reduce waste.
0	2	To overcome shortage of labor	0	6.	To increase scale of producuon
0	3	To reduce labor costs.	0	7.	Due to incentives obtained
0	4	To reduce costs other than labor cost.	0	8.	Others, specify .

Q7c. Impact of investment (',\'hat of the following, positive and neative effects have actually resulted from this investment?) (Multiple responses allowed, tick all that are applicable)

Posinve effects Negative effects 0 O 7. shortage of skilled labor Quality improvement. **O** 2. Reduction of labor cost. D 8. Lack of qualified maintenance people **O** 3 Increase in scale of production D 9. Lack of spare pans. D 4. Reduction of other costs. **O** JO. Womg choice of technology 0 5. Better motivation of employees. O 11. Sub-optimal use of equipment D 6. Others, specify..... D 12. Others, specify Q7<L Reasons for non investment (Multiple responses allowed, tick all that are applicable) D No access to credit, loan, financial aid ... O 8. Not sufficient incentives. D 2. Just started. O 9. Cheap labor. **U** 3. Too expensive. O IO. Declining market. D 4. Shortage of skilled and trained labor. O 11. Planning to invest elsewhere. O 5. Better motivation of employees. 0 2. Lack of support from employees. **D** 6. High custom duties. O 13. Others, specify O 7. Scale of production.

Q8. Do equipment currently exist that can either produce better quality products and/or services and/or consume less labor than your eixsting equipment?

O I. Yes

D 2. No

D 3. Do not know.

Q9. Fram where do you gel mformauon about new and emerging technologies" (Muluple responses allowed. uck all that are applicable)

0	١.	Regular contact with equip manufacturers.	0	8.	Feedback from customers
0	2	Trade fairs	0	9.	Main-contractors.
0	3	Conferences & seminars.	0	ΙΟ.	Benchmarking
0	4.	Consutancies and experts.	0	11	Joint ventures.
0	5	Visits to sinular industries/organizations.	0	12	University. research institutes, networks
0	6.	Expatriate staff and foreign expertise.	0	13.	Others, specify

QIO. How did you obtain your existing technology? By which mechanism? (Multiple responses allowed, tick all that arc applicable)

0	Local investment	0	Joint ventures	Ο	Subcontracting
0	Foreign investment	0	Expatriate involvment	Ο	Others, specify

Qt I. To what type of training do different categories of employees of this enterprise/organization have access to" (Muluple responses allowed, tick all where applcable in the following matnx)

	A. In-house	B. In-house	C. External	D. Overseas	E. Overseas
	training by own oersonal	training by external trainers	training	(company sponsored)	(sponsored by manufacturers)
I. One raters				* '	
2. Technical staff					
3 Adm & clerical staff					
4 Middle manazement					

5 Too manazernent

Qt 2. Who carried out your maintenance and repairs? (Multiple responses allowed, tick all where applicable in the following matrix)

	A. In-house staff	B. Local fums	C. Foreign experts locaUy	D. Equip sent abroad
I. Routine maintenance				
2 Major maintenance				
3. Minor reoair				
4. Major reoair				

QJ3. Reasons why you consider major repairs & maintenance problems difficult or near impossible to solve? (Multiple responses allowed, tick all that are applicable)

O | No reasons.

O 4. High cost of spare parts.

O7. Other, specify.

- O 2. Lack of local competence. O 5. Foreign experts expensive.
- O 3. Lack of spare parts locally.

0 6. Long down times.

Q14. Are you interested in having a resume of the major findings of this study?

O1. yes

O 2. No.

APPENDIX IV

SOURCES OF I 'FORJ\1ATION

Information were obtained from different sources to build up the database of Mauritian organisations:

- Ministry of Industry & Technology for lists of industries possessing EPZ. Pioneer & DC certificates.
- Small & Medium Industries Development Organization (SMJDO) for the list of their members.
- Association des Hoteliers et Restaurateurs Ile Maurice (A.H.R.I.M) for the list of their members.
- Mauritius Employers Federation for the list of their members.
- The Mauritius Export Directory published by the MEDIA.
- Annuaire MINAS de L'Ile Maurice.

APPENDIX V

RESPONSE RATES BY CATEGORIES AND SECTORS

	TOTAL	RETURN	%RESPONSE
ALL SECTORS	2823	900	32%
BROAD CATEGORIES			
FP7	464	194	42%
SM F's	652	166	25%
	134	69	51%
PIONEER	42	21	50%
GOVERNMENT	166	74	45%
OTHERS	1365	376	28%
MAIOR SECTORS			
NIAJOR SECTORS	17	1 5	000/
SUGAR IND.	66		00%
	40	22	27 70
	40	12	26%
RAKEDV	20	43	20%
	111	125	20 /0
LEATHER PRODUCTS	75	29	20%
FURNITURE & WOOD	185	54	29%
STATIONERY	40	12	20%
PRINTING	71	22	31%
CHEMICALS & ALLIED PROD	83	37	45%
PLASTIC PRODUCTS	73	22	30%
STONE CLAY GLASS CONCRETE	35	6	17%
METAL PRODUCTS	158	58	37%
ELECTRIC/ELECTRONIC EQUIP	65	23	35%
JEWELLERY	76	27	36%
HANDICRAFT	109	35	32%
CONSTRUCTION	49	23	47%
DRAUGHTMANSHIP	28	16	57%
COMMUNICATION	3	3	100%
TRANSPORT	115	37	32%
MARKETING & ADVERT	19	7	37%
DATA PROCESSING	29	14	48%
BUSINESS SERVICES	60	18	30%
FINANCIAL SERVICES	77	33	43%
WHOLESALE & RETAIL TRADE	436	147	34%
HOTELS & RESTAURANTS	124	23	19%
EDUC. & RESEARCH INS.	37	23	62%
PHOTOGRAPHY	17	3	18%
OTHER SERVICES	75	34	45%

APPENDIX VI

ALL SECTORS	TOTAL	% OF TOTAL	RESPONSE	RESPONSE RATE
ALL SECTORS	2020		200	
CATEGORIES				
FP7	464	16%	194	229
SM F's	652	238	166	18 %
	134	5%	69	8.9
PIONEER	42	1%	21	22
GOVERNMENT	166	68	74	20
OTHERS	1365	48%	376	428
OTTIERO	10 00	10 8	570	0 15
MAJOR SECTORS				
SUGAR IND.	17	18	15	28
FLOWERS	66	28	18	28
AGRICULTURE & FISHERIES	4 O	1%	22	28
AGRO INDUSTRY	120	4%	43	58
BAKERY	86	3%	17	28
TEXTILE INDUSTRY	444	16%	125	14 %
LEATHER PRODUCTS	75	38	29	38
FURNITURE & WOOD	185	78	54	68
STATIONERY	40	18	12	18
PRINTING	71	38	22	28
CHEMICALS & ALLIED PROD.	83	38	37	48
PLASTIC PRODUCTS	73	38	22	28
STONE, CLAY, GLASS, CONCRETE	35	1%	6	18
METAL PRODUCTS	158	68	58	68
ELECTRIC/ELECTRONIC EQUIP.	65	28	23	38
JEWELLERY	76	38	27	38
HANDICRAFT	109	48	35	4 %
CONSTRUCTION	49	28	23	38
DRAUGHTMANSHIP	28	18	16	28
COMMUNICATION	3	0 응	3	0 %
TRANSPORT	115	4 %	37	48
MARKETING & ADVERT	19	18	7	18
DATA PROCESSING	29	18	14	28
BUSINESS SERVICES	60	28	18	28
FINANCIAL SERVICES	77	38	33	48
WHOLESALE & RETAIL TRADE	436	15 %	147	16%
HOTELS & RESTAURANTS	124	4 %	23	38
EDUC. & RESEARCH INS.	37	18	23	38
PHOTOGRAPHY	17	1%	3	0 %
OTHER SERVICES	75	38	34	4%

COMPARISION OF SECTOR REPRESENTATIVENESS WITH SECTOR RESPONSE RATE

			%	
	No o f org.	Manual	Manual/ Automated	Automated
ALL SECTORS	900	25	69	2
BROAD CATEGORIES				
EPZ	194	35	64	1
SM E's	167	19	78	2
DC	68	9	83	6
PIONEER	21	33	62	5
GOVERNMENT	74	19	70	1
OTHERS	375	26	65	2
MAJOR SECTORS				
SUGAR IIND.	15	0	100	0
FLOWERS	16	81	13	0
AGRICULTURE & FISHERIES	23	35	61	0
AGRO INDUSTRY	44	7	93	0
BAKcRY	18	6	89	0
TEXTILE INDUSTRY	125	29	70	1
LEATHER PnODUCTS	29	35	66	0
FURNI URE & WOOD	54	i 5	82	2
STATIONERY	11	9	91	0
PRIIHII,G	22	0	82	18
Chemig, LS & Pllied P:=10D.	37	14	84	3
PLASTIC PFICDUCTS	22	5	82	14
S OI≬E. CLAY, GLASS, CONCRETE	7	29	57	14
METAL PRCDUC, S	57	28	70	2
ELECTR, ICIELEC RONIC EQUIP.	23	48	52	0
JEWELLE!'iY	27	1 5	82	0
	35	46	54	0
	23	26	65	4
DRAUGHH.1ANSHIP	16	6	75	6
COMILUNICATION	3	0	67	33
TRANSPORT	37	24	65	3
MARKETING & ADVERT	8	13	63	0
DATA PROCESSING	19	21	68	11
BUSINESS SE'I'/!CES	20	10	65	0
FINANCII' L SERVICES	33	3	88	6
WHOLESALE & r'ET,'IL T:'IACE	156	37	55	0
HOTELS & R:S AURP'HS	24	58	42	0
EDUC. & RESEArCH 11,S.	24	25	50	0
PHOTOC;RA?HY	3	0	67	33
OTHER SE!'IVICES	34	27	65	3

APPENDIX VII Mode of Operations

			%	
	No of org.	Yes	No	Do not know
ALL SECTORS	900	62	16	16
BROAD CATEGORIES	104	ΕO	1 0	2.2
SM E'C	194	59	10	17
	60	65	22	17
	00 21	52	20	5
COVERNMENT	21	1 68	12	16
OTHERS	375	62	16	13
omeno	575	02	10	10
MAJOR SECTORS				
SUGAR IND.	15	100	0	0
FLOWERS	16	38	25	19
AGR\CUU\JRE & r\SHER\'f:S	23	70	4	4
AGRO INDUSTRY	44	89	9	23
BAKERY	18	5 O	0	39
TEXTILE INDUSTRY	125	65	9	24
LEATHER PRODUCTS	29	62	10	21
r\JRNrT\JR'f: & WOOD	54	70	13	11
STATIONERY	11	73	9	9
PRINTING	22	55	23	18
CHEMICALS & ALLIED PROD.	37	68	11	11
PLASTIC PRODUCTS	22	55	32	14
STONE, CLAY.GLASS, CONCRETE	7	71	14	14
METAL PRODUCTS	57	61	21	9
ELECTRIC/ELECTRONIC EQUIP.	23	52	26	9
JEWELLERY	27	44	22	30
HANDICRAFT	35	49	23	20
CONSTRUCTION	23	61	17	2.2
DRAUGHTMANSHIP	16	56	25	13
COMMUNICATION	3	67	33	0
IRANSPORI	37	70	5	19
MARKETING & ADVERT	8	50	50	0
DATA PROCESSING	19	68	26	5
BUSINESS SERVICES	20	60	25	0
FINANCIAL SERVICES	33	64	15	12
WHOLESALE & RETAIL TRADE	156	54	19	17
HOTELS & RESTAURANTS	24	50	17	21
EDUC. & RESEARCH INS.	24	71	8	13
PHOTOGRAPHY	3	33	33	33
OTHER SERVICES	34	62	15	15
			-	

APPENDIX VIII Level of Satisfaction with Current Equipment

SJ''HCl:: s=1• c QIO ¦, + = ∅11 oloi -1 ' |.'-' 'NI''1 1 , , , i-' | ∘]**N]•}Q** LIGOV.)TOIO +++ = • ,....,l**,** ∲J':t:)lr'I •IN ^N:;; !I= NO <N CI'0':JJ� •• • .r. MM .:iuv.nm'0' Al.ivno''' , ⊂ 0 MIO • - • 0₁² M]=i°l ·]"|01";=; ·]', !olol: ol= • Cl•Hc •⊂ .INIMI••1 · 1 · 0 • IN'0 cjclo', 11', ; · IMIMIMI • 0]= •...; ...'. -- "i¢t. sjil: ... : Q5! IOHUO:J VWU tIII:I " 10HUO:J uo,1:,npo,�� стэ**- N NI-** *и* 1101-111 г. N гт 1-1 1�1= "^C": HNIÛÎÛ :i=HRIÛÛHÛI-+1ÛÛ:o•H=I+H}!Û Mel:1, ¹0ja = ™- • o 0101Û •*Inn* •le\M !lolololcl•I: •:Ce z = 1.2 =rolluo::> cs_::io•c! = .:.., Ø = · llun,u_ld _::u1u1:u11v;; m $\begin{array}{c|c} \mathbb{MN} & \mathbb{Q}_{\mathbf{N}} \mathbb{M} & \mathbb{N} \\ \mathbb{MN} & \mathbb{Q}_{\mathbf{N}} \mathbb{M} & \mathbb{N} \\ & & \mathbb{MN} \\ & & \mathbb{MN} \\ & & \mathbb{MN} \\ \end{array} \xrightarrow{} \mathbb{MN} & \mathbb{NN} \\ & & \mathbb{NN} \\ & & \mathbb{NN} \\ & & \mathbb{NN} \\ \end{array} \xrightarrow{} \mathbb{MN} & \mathbb{NN} \\ & & & \mathbb{NN} \\ & & & \mathbb{NN} \\ &$ NMIN :C @ : BulltPIO |t|llltW Mil: * • N e • • Appis HON 🔶 $0 = H\mathbf{\hat{0}} + t, + olc_{\mathbf{a}} = \mathbf{\hat{0}} = \mathbf{\hat{0}} = \mathbf{\hat{0}}$ <u>.</u> . :0 _ . BUJUUIIJd t llurp_01 lUIIId e- $\mathbf{\hat{k}} = \mathbf{\hat{k}} = \mathbf{\hat{k}} + \mathbf{\hat{$ H:I= -H=] , m c:o -e =:<ti: OHO MO -loo J,] M Qe. 11po:, IIS 🖗 -=-i ;? = ku:uo:, ll:io1�� "r ø… Qe _{cl}. olm o=H**ŷ** "•• • •• •10 ,lel, :♥ 'oj**ŷ**lo c oH •• • • • • lluiddl\l! m

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			%	
	No o f org.	YES	NO	PARTIAL
ALL SECTORS	900	71	18	9
BROAD CATEGORIES				
EPZ	194	64	24	10
SME"s	167	59	20	14
DC	68	78	16	6
PIONEER	21	71	29	0
GOVERNMENT	74	82	10	7
OTHERS	375	76	15	8
MAJOR SECTORS				
SUGAR IND.	15	93	0	7
FLOWERS	16	44	38	13
AGRICULTURE & FISHERIES	23	74	9	4
AGRO INDUSTRY	44	66	18	11
BAKERY	18	72	11	0
TEXTILE INDUSTRY	125	63	21	12
LEATHER PRODUCTS	29	55	21	24
FURNITURE & WOOD	54	63	9	22
STATIONERY	11	73	9	9
PRINTING	22	82	9	9
CHEMICALS & ALLIED PROD.	37	62	30	8
PLASTIC PRODUCTS	22	68	32	0
STONE, CLAY, GLASS, CONCRETE	7	57	14	29
METAL PRODUCTS	57	67	26	4
ELECTRIC/ELECTRONIC EQUIP.	23	83	17	0
JEWELLERY	27	85	11	4
HANDICRAFT	35	63	29	3
CONSTRUCTION	23	91	9	0
DRAUGHTMANSHIP	16	88	0	13
COMMUNICATION	3	100	0	0
TRANSPORT	37	89	0	11
MARKETING & ADVERT	8	75	13	13
DATA PROCESSING	19	84	5	11
BUSINESS SERVICES	20	85	10	5
FINANCIAL SERVICES	33	82	12	0
WHOLESALE & RETAIL TRADE	156	69	24	5
HOTELS & RESTAURANTS	24	58	17	25
EDUC. & RESEARCH INS.	24	96	4	0
PHOTOGRAPHY	3	33	67	0
OTHER SERVICES	34	79	12	6

APPENDIX X Investment in the Past Five Years

-

				%	
	No of org. having inv	lner. no. of similar equip	Replace wit similar ones	Repl. by more soph. equip.	Add more soph. equip
ALL SECTORS	717	43	19	55	57
RECAD CATEGORIES					
	140	F /1	15	5.0	57
SM E's	143	11	15	50	16
	123	41	20	57	50
DONEED	15	30	21	52	53
	15	40	1.4	55	65
OTHERS	21.0	49	14	4 /	50
UTHERS	51Z	29	22	01	59
MAJOR SECTORS					
SUGAR IND.	15	33	20	1 O	67
FLOWERS	9	22	1 1	33	22
AGRICULTURE & FISHERIES	10	44	28	67	38
AGRO INDUSTRY	26	26	20	66	57
BAKERY	13	23	31	69	31
TEXTILE INDUSTRY	94	68	17	54	57
LEATHER PRODUCTS	23	48	22	52	44
FURNITURE & WOOD	46	46	17	41	57
STATIONERY	9	1 1	22	67	33
PRINTING	20	30	15	45	60
CHEMICALS & ALLIED PROD.	26	42	23	53	42
OLASTIC PRODUCTS	15	33	7	40	67
STONE, CLAY, GLASS, CONCRET	6	33	50	50	83
METAL PRODUCTS	40	33	20	58	58
ELECTRIC/ELECTRONIC EQUIP.	19	53	16	26	47
JEWELLERY	24	75	13	71	58
HANDICRAFT	23	26	30	48	48
CONSTRUCTION	21	42	43	62	57
DRAUGHTMANSHIP	16	31	6	69	75
COMMUNICATION	3	67	0	100	100
TRANSPORT	37	41	30	57	43
MARKETING & ADVERT	7	29	0	71	71
DATA PROCESSING	18	33	1 1	67	78
BUSINESS SERVICES	18	28	6	61	72
FINANCIAL SERVICES	28	43	7	64	79
WHOLESALE & RETAIL TRADE	11 5	41	27	57	50
HOTELS & RESTAURANTS	20	30	25	5 O	50
EDUC. & RESEARCH INS.	23	35	9	52	52
PHOTOGRAPHY	1	0	0	0	100
OTHER SERVICES	29	38	14	55	76

APPENDIX XI Nature of New Investment

	%							
	No of org. having inv	Improve pd serv. qual.	Overcome lab. Shor	Red. Iab Cos	ied. Non Lab. Cos	Red. Wast	Iner. Seal of Prod.	l ncentives a∨ailabintv
ALL SECTORS	717	87	26	33	23	22	54	12
BROAD CATEGORIES								
FP7	1/13	0.2	2.0	30	25	27	71	5
SM F's	123	0.1	29	13	20	27	71	17
	50	91	21	40	22	25	60	17
PIONIFER	16	70	10	10	22	20	69	20
COVERNMENT	15	87	13	1.5	20	33 1 E	07	20
OTHERS	21.2	89	20	20	20	10	32	9
OTHERS	JIZ	89	20	30	21	18	40	14
MAJOR SECTORS								
SUGAR IND.	1 5	67	40	73	53	27	33	47
FLOWERS	9	78	1 1	22	1 1	22	67	0
AGRICULTURE & FISHERIES	10	83	39	44	28	1 1	44	6
AGRO NDUSTRY	26	83	31	51	46	40	71	20
BAKERY	13	77	46	39	31	15	77	23
TEXTILE INDUSTRY	94	89	36	47	29	35	79	6
LEATHER PRODUCTS	23	83	39	52	4	26	87	13
FURNITURE & WOOD	46	91	39	50	30	24	67	1 1
STATIONERY	9	100	22	33	44	44	44	22
PRINTING	20	100	25	40	25	25	65	20
CHEMICALS & ALLIED PROD.	26	69	23	31	19	23	89	12
PLASTIC PRODUCTS	1 5	87	53	27	13	33	67	7
STONE, CLAY, GLASS, CONCRET	6	67	0	33	0	50	50	0
METAL PRODUCTS	40	90	33	30	15	33	70	15
ELECTRIC/ELECTRONIC EQUIP.	19	68	21	37	1 1	1 1	47	11
JEWELLERY	24	92	42	50	21	21	BB	17
HANDICRAFT	23	61	17	35	26	13	61	9
CONSTRUCTION	21	91	33	38	24	29	74	10
DRAUGHTMANSHIP	16	94	6	13	6	6	50	13
COMMUNICATION	3	100	33	33	33	33	67	0
TRANSPORT	37	89	1 1	24	32	22	27	1 1
MARKETING & ADVERT	7	10.0	14	14	14	0	4.3	29
DATA PROCESSING	18	94	1 1	1 1	2.2	17	39	6
BUSINESS SERVICES	18	10.0	0	6	17	6	22	11
FINANCIAL SERVICES	28	96	7	18	18	21	36	7
WHOLESALE & RETAIL TRADE	115	91	27	35	24	24	41	16
HOTELS & RESTAURANTS	20	85	20	15	15	2.0	15	0
EDUC. & RESEARCH INS.	23	91	17	4	4	4	3.0	4
PHOTOGRAPHY	1	0	_ , 	_ _	100	0	0	0
OTHER SERVICES	29	100	28	31	14	3	38	0
			2 0					

APPENDIX XII Reasons for Investment

	%					
	No o1 org.	Quality	Reduc. of	\ncr. in Scale	Reduction of	Better motiv.
	having inv	mprov.	Labour Cos	of Production	Non Lab. Cost	of emp\.
ALL SECI"ORS	1\1	-	! ?? ⁻ "	'ti""	'1 "'2i	50
BROAD CAI"EGORIES						
EPZ	143	BO	32	68	26	42
SM E's	123	87	46	78	23	42
DC	58	78	38	72	35	40
PIONEER	15	80	20	67	33	60
GOVERNMENT	66	85	24	35	24	65
OTHERS	312	84	28	42	27	55
MAJOR SECTORS						
SUGAR IND.	15	73	53	20	60	67
FLOWERS	9	78	44	67	11	22
AGRICULTURE & FISHERIES	10	78	39	61	28	44
AGRO INDUSTRY	26	86	46	69	51	37
BAKERY	13	77	39	77	15	39
TEXTILE INDUSTRY	94	87	37	77	19	52
LEATHER PRODUCTS	23	74	48	87	13	17
FURNITURE & WOOD	46	89	44	80	26	52
STATIONERY	9	89	33	67	67	44
PRINTING	20	90	40	85	45	45
CHEMICALS & ALLIED PROD.	26	69	23	81	27	35
PLASTIC PRODUCTS	15	80	40	80	33	27
STONE, CLAY, GLASS.CONCRET	E 6	67	50	33	33	33
METAL PRODUCTS	40	78	38	68	18	45
ELECTRIC/ELECTRONIC EQUIP.	19	63	32	47	26	26
JEWELLERY	24	83	33	83	46	42
HANDICRAFT	23	61	30	62	30	26
CONSTRUCTION	21	91	57	57	29	38
DRAUGHTMANSHIP	16	88	13	50	19	75
COMMUNICATION	3	100	3	67	67	100
TRANSPORT	37	87	24	35	38	57
MARKEI"ING & ADVERT	7	86	14	43	29	71
DATA PROCESSING	18	94	11	39	28	72
BUSINESS SERVICES	18	100	11	22	17	83
FINANCIAL SERVICES	28	89	14	36	14	64
WHOLESALE & REI"AIL TRADE	115	79	35	47	30	52
HOTELS & RESTAURANTS	20	80	15	20	40	45
EDUC. & RESEARCH INS.	23	78	9	30	13	39
PHOTOGRAPHY	1	100) ()	0	0	100
OTHER SERVICES	29	100) 31	38	7	59
APP - XIII POSITIVE EFFECTS	OF INVEST	MENT				

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Reasons for non investment

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APPENDIX XV

I 'CENTIVE SCHEMES

I 'CENTIVES	QUALIF\1NG	MTNIMU 1	INCENTI\'ES
SCITEMES	ACTIVITIES	REQUIREMENTS	
11.X1'ORT ENTERPRISE	'Ex\)ort. oriented		 -C.c.,pctate tax at fue rau of 15°'o for whole life o company Tax exemption or shareholders dividends fo the first ten years Exemption from paymei of duty, levy or sales ta on scheduled materials ar scheduled equipment
SMALL &		The aggregate CIF value of	Exemption from payme
J\1EDIUJ\1 ENTERPRISE		production should not exceed Rs 5.0m	of customs duty. impc levy on productn equipment
PIONEER STATUS E ITERPRISE		The activity proposed involves a technology or skills which are above the	-Corporate tax at the r: of 15% for IO years - Tax exemption
		average existing m Mauritius and enhances	shareholders dividends 1 IO years
		industrial and technological development in Mauritius	- Exemption from payrm of duty, levy or sales t on scheduled matenals a scheduled equipment
MODERNISATIO N & EXPANSION "-ŷ"-"-Wl ?!.	Investment III production machinery \=0 "".""1"""11.\nc\uomg	Likelyto: + enhance the economic or \\ecrmo\O!!)ca'l oeve\ovmen	 Enterpnse investing modemisation but not t vol\ution control

+ Computer apphcauons	of Maunuus	environmental production
to mdustrial design.	+ substantially increase the	technology
manufacture, maintenance (CAD/CAM) and	volume of that acuvity + substantially diversify its production range	+ Tax credit of 10° o or investment of at least R 10m made on acquisuio
auto,nat,on	- Introducmg anti-pollution	of 11eW plant ar
+ Automation of	technology for the	technology
equipment and systems +Rationalisauon and automation of production equipment	protection of th envi ronment	e moderrusauon a, expansion, within 1, years from the date of rss of certificate. tax ere
+ ¹ ew industrial processes and technology		shall be spread over period of 3 years start
Investment in anti- pollution and		from the date of acqursrt of the equipment

environment protecuon technology to be made within 2 years from date of issue of certificate

incurred + a total allowance 125% dunng the hfet such equipment - an enterprise investin polluuon control environmental protec technology Initial +allow amounting to 80°,

investment

and capital allowance

+

capital

allowa

expendit

capital expend incurred -All modenus:

shall enterprises be from customs exemption on produ equipment only

- Corporate tax at the

LOCAL

STRATEGIC

strategic importance

Local

industries

of Should manufacture for the

local market but which of 15% for whole h
ENTERPRISE	needs national interest or is company	
	likely to promote and - Tax exempuon on	
	enhance the econonuc, shareholders dividends for	
	", IndusrnaJ and technoJQIZ:Jc.:J) .YfJ., 7::77.♦ oeveropment 01. xraunuus	
	as a whole	
INOUSTRIAL	- Budding floor space - corporate ta, at the rate	
BUILDING	should not be less than of 15° , for the \\hole hfe	
ENTERPRISE	1000 sqm of the company	
	Includes such -tax exemption on	
	construction operatJons as shareholders drudends for	
	sue, restoration. drains, a penod of IO years	
	access roads, landscaping - exemption from payment	
	and other access works of duty levy and sales tax on scheduled materials and	
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Technology sourcing

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ALL SECTORS	2 900	(.) 51	35	(.) 24	0 24	Š 25	x 19	54	(.) 23	:;; 5	""	• , 5	, 7
BROAD CATEGORIES	194	46	36	17	16	26	25	47	24	3	1	5	3
SM E's DC	167 68	SO 68	38 42	15 19	10 26	26 42	9 1 7	51 73	32 1 7	4	1 1	4	5 6
PIONEER GOVERNMENT JIHeRS	21 74 V ,S	52 39 52	24 24 36	38 58 10	33' 50 28	29 20 <i>LL</i>	48 26 17	67 62 54	19 14 22	0 7 8	0 1 2	24 1 5	10 20 6
IAAJOR SECTORS SUGAR IND. FLOWERS AGRICULTURI: & FISHEIIIES	15 16 23	100 19 39	13 19 26	73 25 35	33 13 44	80 44 35	20 0 13	80 56 52	20 25 22	7 0 0	0 0 4	0 0 4	27 13 2
AGRO 11,OUSTRY EA@ERY IE>E INDUSTRY	04 3 :\$5	73 44 50	34 66 46	25 11 22	41 1 1 19	52 11 29	18 0 22	64 22 52	16 22 30	5 0 7	0 0 1	1 1 0 2	
LE,<, ER PRODUCTS FURNITUPE & WOOD STATIONERY PRINTING	29 54 11 22	38 32 55 73	41 41 73 50	10 24 9 5	3 9 27 18	21 33 36 41	10 7 36 14	55 57 46 68	35 33 18 1 4	0 2 0 9	0 2 0 0	3 0 0 0	3 7 9 9
PLASTIC ?RCDL,CTS STONE, CLAY, (LASS, CONCRET METAL PRODUCTS ELECTRIC/ELECTRONIC EOUI?.	22 E 7 57 23	59 57 65 57	41 57 40 35	5 29 23 17	0 29 23 17	9 43 30 30	18 29 21 34	50 57 56 44	23 29 19 35	0 0 7 4	0 0 4 0	9 0 9 13	0 0 11 4

JEWELLERY HANDICRAFT	27 35	67 49	37 34	0 6	11 14	26 11	22 20	52 40	26 20	4 0	0 0	15 9	7 3
DP.AUGHT!'0.ANSt-:1?	16	56	38	62	31	13	19	81	19	13	0	0	13
COMINIUN,CATION	3	1O 0	67	67	67	67	33	67	0	67	0	67	33
TRANSPORT	37	51	32	32	49	19	22	60	24	5	0	8	3
Mi,,F: ,i:TING & ADVEI'IT	8	75	13	13	50	25	13	5 O	38	0	0	0	0
DATA ?ROCESoING	19	74	53	63	26	37	42	79	21	1 1	0	5	5
susirosss sssv.cas	20	50	20	20	50	10	25	50	1 O	5	5	10	0

Appendix XVI Technology Sourcing

Base of oerceoteoes are the number of organisations as per 2nd column

N HULESALE & KILL I KADE	1 D O	40	4 /	23	ΖЭ	24	14	Зð	ZŎ	ŏ	3	L	1
HO: ELS § ciESTAUR4tHS	24	33	21	4	8	17	8	38	29	13	0	0	0
EDUC. & FIESEAI'ICH UCS.	;:4	38	17	54	SO	8	21	83	8	4	4	4	29
PHOTOGF;A?HY	3	67	33	0	33	0	0	33	0	0	0	0	0
OThE9 SeRVICES	34	35	38	29	29	21	15	59	18	12	0	6	6

						%			
		Roufi	nte h≬a n	tenance			rvlaj or	Maintenance	3
	No of	n-hous	local F	Foreign Exp	Overseas	In-house	Local	Foreign Exp	Overseas
	ora	Staff	Firms	Locally	Maint.	Staff	Firms	Locally	r. ¢aint.
	000	69	30	'1	'\	30.	:,9	7	:,
ALL SECTORS	500	0.5	00.	1.	Υ.				
SROAO CA1EGOI\IES									
t?'l.	194	86	19	2	1	45	51	7	7
SIJ,E'S	167	68	19	2	1	26	44	5	2
DC	68	91	16	3	0	68	54	15	G
PIONEER	21	67	24	10	0	38	43	1 O	10
GOVERNIV'!cNT	74	51	70	0	1	28	80	3	5
OTHERS	375	60	45	2	1	28	68	7	4
MAJOR SECTORS									
SUGAR IND.	15	8 O	27	0	0	60	87	40	13
FLOWERS	16	62	19	0	0	31	44	0	0
AGRICULTURE & FISHERIES	23	65	48	0	4	39	52	13	0
AGRO INDUSTRY	44	82	25	0	0	68	57	9	11
BAKERY	18	50	56	0 .	0	22	61	6	0
TEXTILE INDUSTRY	125	86	19	2	0	42	54	7	3
LEATHER PRODUCTS	29	83	3	7	0	31	48	3	3
FURNITURE & WOOD	54	69	1.5	0	0	15	56	4	0
STATIONERY	11	91	0	9	0	36	64	9	0
PRINTI'\G	22	1 73	14	9	0	27	41	14	0
CHEMICALS & ALLIED PROD.	37	87	i 1	3	0	46	65	8	0
PLASTIC PRODUCTS	22	96	S	0	0	50	5 () 9	0
STONE.CLAY.GLASS.CONCRE. E	7	71	43	0	0	71	2 9) 14	0
III ETAL ?RC DUCTS	57	93	12	5	2	63	4 6	5 9	5
	23	83	9	4	0	61	1 -	3 4	26
	23	85	22		0	1 33	5	6 11	20
HANDICRAFT	35	83	20	3	3	37	5	7 6	9
CONSTRUCTION	23	91	30	0	0	4.8	6	5 13	0
DRAUGHTMANSHIP	16	31	75	0	0	19	8.	1 6	6
COI/il'1U'\ICL.TION	1 3	100) 33	0	3.3	H:(D 10	0 33	3.3
TRANSPOR1	31	7 57	51	0	3	30	7	3 5	8
/i,'.RKE ING & ADVERT	8	63	50	0	0	19	3 5	28 0	
0A1 APROCESSIIsG	1 0	9 53	2 A 2	5	0	3.	7 -	лл Б	1 0
BUSINESS SERVICES	1 2		5 70		0	J .		4 5	U
FINANCIAL SERVICES	1 4	0 ZS			0	U) (5
\\\\\-101 t SLIE & 2 E111\\ 11\" \\alpha	3	5 Z ⁴	4 Bi		0	1 /)	δZ 3	0
HOTELS & RESTAUDAtoo	1		.0 3):, \			24 01	05 10	· 5
HOTELS & RESTAURATIS		24 5) X 4	12 I O		U I	21	63 4	4
DUOTOOD 2014	1	24 5) V (o/ 0		U Å	29	15 0	0
		3 10	J U	0 0		0	67	33 33	33
UII-Sa SERVICES		34 5	59 4	1/3		3	27	62 6	12

APPENDIX)(VII Routine and Major Maintenance

						%			
			Mii	nor Repair			Major F	Repair	
	No of	In-house	Local	Foreign Exp	Overseas	In-hous	Local	Foreign Exp	Overseas
	org.	Staff	Firms	Locally	Rep.	Staff	Firms	Locally	Rep.
ALL SECTORS	900	60	36	2	1	27	64	10	9
BROAD CATEGORIES									
EPZ	194	78	20	2	2	36	57	14	15
SME'S	167	56	25	2	1	17	56	7	4
DC	68	84	30	1	4	57	65	1 5	10
PIONEER	21	62	19	10	5	33	43	19	24
GOVERNMENT	74	46	64	1	0	22	81	4	10
OTHERS	375	51	46	1	0	23	69	9	8
MAJOR SECTORS									
SUGAR IND.	15	80	20	0	0	47	93	33	27
FLOWERS	16	50	25	0	0	13	44	0	0
AGRICULTURE & FISHERIES	23	74	26	0	0	35	74	13	0
AGRO NDUSTRY	44	82	27	0	2	68	61	5	9
8AKERY	18	39	50	0	0	22	67	0	0
TEXTILE INDUSTRY	125	78	20	2	0	33	66	15	10
LEATHER PRODUCTS	29	69	3	3	0	17	52	7	0
FURNITURE & WOOD	54	67	22	2	0	11	69	6	0
STATIONERY	11	55	73	0	0	18	36	27	0
PRINTING	22	55	23	5	5	27	41	27	5
CHEMICALS & ALLIED PROD.	37	76	22	3	3	35	73	11	3
PLASTIC PRODUCTS	22	82	23	0	0	46	36	18	14
STONE, CLAY, GLASS, CONCRETE	7	86	29	0	0	57	43	29	0
METAL PRODUCTS	57	84	19	2	2	47	58	14	9
	23	78	26	4	0	39	52	0	44
IEWELLERY	27	63	33	7	7	11	37	15	44
	35	63	34	2	0	40	57	11	14
	22	03	27	0	0	40	70	22	13
	23	24	75	0	0	44	60	22	0
	0	31	15	0	0	19	09	0	100
	3	100	33	0	33	07	33	33	00
	37	54	54	5	3	30	73	5	5
MARKETING & ADVERT	8	13	88	0	0	0	88	0	13
DATAPROCESSING	19	48	37	5	0	32	63	11	26
BUSINESS SERVICES	20	20	65	5	0	0	80	5	0
FINANCIAL SERVICES	33	12	85	3	0	6	76	3	6
WHOLESALE & RETAIL TRADE	156	52	41	1	1	20	60	8	8
HOTELS & RESTAURANTS	24	58	25	0	0	21	71	0	0
EDUC. & REASEARCH INS.	24	50	63	0	0	17	67	4	13
PHOTOGRAPHY	3	67	33	0	0	67	67	33	33
OTHER SERVICES	34	50	44	0	3	18	56	3	15
APPENDIX XVIII Min	or a	nd Maj	or	Repairs					

				%			
	No of org.	No r easons	Lack of I ocal	Lack of Local Spare	High Cost of Spare	Foreign Exp. Expensive	Long Downtimes
			competence	Parts	Parts		
ALL SECTORS	900	23	30	40	32	13	12
BROAD CATEGORIES							
EPZ	194	23					
SME'S	167	14					
			35	51	32	16	12
DC	68	23	29	50	46	17	16
PIONEER	21	14	23	45	29	13	7
			38	57	29	29	1 O
GOVERNIVENT	74	19	28	41	23	2	22
OTHERS	375	29	30	28	29	$_{1}$ \cup	8
MAJOR SECTORS							
SUGAR IND	15	20	4 O	27	33	27	7
FLOWERS	16	38	19	6	13	6	0
		22	30	30	2.5	0	13
AG RICULTURE & FISHERIES	23	21	32	50	20	9	10
	V A	-, 🔶	_ ,\	• • •	- ,	"∖, ∢	•
······································	-,						

AGRO INDUSTRY	44				4),	18	14
iYI,Y:nu (ND\JSTRY	125	22	36	50	39	19	14
LEATHER PRODUCTS	29	3	35	62	31	1 O	14
FURNITURE & WOOD	54	22	30	37	44	9	20
STATIONERY	11	18	9	64	18	18	18
PRINTING	22	9	55	64	36	41	14
CHEMICALS & ALLIED PROD.	37	38	27	35	30	8	3
PLASTIC PRODUCTS	22	32	23	46	36	23	9
STONE.CLAY.GLASS.CONCRETE	7	29	0	43	14	29	14
METAL PRODUCTS	57	25	23	44	37	21	12
ELECTRIC/ELECTRONIC EQUIP.	23	17	30	65	39	9	4
JEWELLERY	27	4	48	74	26	15	11
HANDICRAFT	35	29	34	43	26	6	11
CONSTRUCTION	23	9	52	65	44	30	22
DRAUGHTMANSHIP	16	38	6	0	13	0	6
COMMUNICATION	3	33	67	67	0	0	0
TRANSPORT	37	41	30	30	27	8	19
MARKETING & ADVERT	8	38	63	38	13	13	25
DATAPROCESSING	19	26	26	42	42	0	11
BUSINESS SERVICES	20	25	45	15	35	0	0
FINANCIAL SERVICES	33	46	24	9	18	0	3
WHOLESALE & RETAIL TRADE	156	25	30	29	24	12	8
HOTELS & RESTAURANTS	24	25	17	42	38	8	0
EDUC. & REASEARCH INS.	24	8	42	3/I	1\2	%	'2i
PHOTOGRAPHY	3	33	33	67	0	33	0
OTHER SERVICES	34	18	27	44	38	15	21

APPENDIX XIX Concern for Major & Minor Maintenance Problems

Base of precentages are the number of organisations as per 2nd column

%										
			Trainin	g to Opei	rators					
	No of	In-house by	In-house by	External	Overseas	Overseas				
	org.	own personnel	ext. trainers	training	Com. Spon	Manuf. Spon.				
ALL SECTORS	900	63	17	12	3	2				
BROAD CATEGORIES										
EPZ	194	76	14	5	-e-	3				
SME'S	167	64	1 O	6	3	1				
DC	68	87	28	6	1	3				
PIONEER	21	62	5	5	5	0				
GOVERNMENT	74	47	22	30	7	4				
OTHERS	375	56	20	16	2	2				
MAJOR SECTORS										
SUGAR IND.	15	80	27	53	7	7				
FLOWERS	16	38	0	0	0	0				
AGRICULTURE & FISHERIES	23	6.5	• 13	13	4	0				
AGRO INDUSTRY	44	82	16	7	5	7				
BAKERY	18	61	11	0	0	0				
TEXTILE INDUSTRY	125	80	14	6	3	2				
LEATHER PRODUCTS	29	76	10	0	0	0				
FURNITURE & WOOD	54	61	7	9 7	4	2				
STATIONERY	11	4.6	55	0	9	9				
PRINTING	22	10	27	9	5	14				
CHEMICALS & ALLIED PROD	37	87	16	11	3	3				
PLASTIC PRODUCTS	22	77	18	0	5	0				
STONE CLAY GLASS CONCRETE	7	86	29	0	0	0				
METAL PRODUCTS	57	79	12	7	0	0				
	23	83	30	Д	9	0				
JEWELLERY	23	67	15	19	0	4				
HANDICRAFT	35	7 /	14	3	Û	0				
CONSTRUCTION	23	74	22	22	0	0 4				
DRAUGHTMANSHIP	16	4 A	13	25	0	0				
COMMUNICATION	3	23	33	0	0	0				
TRANSPORT	37	65	32	24	3	0				
MARKETING & ADVERT	8	50	25	0	0	0				
DATAPROCESSING	19	47	0	11	5	0				
BUSINESS SERVICES	20	50	20	10	0	0				
FINANCIAL SERVICES	20	4.2	20	30	6	0				
WHOLESALE & RETAIL TRADE	156	72 53	27	15	2	5				
HOTELS & RESTAURANTS	27	30	2 J A	0	0	0				
EDUIC & REASEARCH INS	24 ОЛ	2 C C C	12	1 3	0	4				
PHOTOGRAPHY	24	53 67	10	53 10	5 S 0	<u> </u>				
OTHER SERVICES	с 2 Л	50	1 5	55 27	с С	Q				
	. <u>т</u> . ,			<u> </u>	0	9				
APPENDIX XX Training	LO	perators								

Base of percentages are the number of organisations as per 2nd column

				%		
			Training f	to Technic	cal Staff	
	No of	in-house by	In-house by	External	Overseas	Overseas
	org.	own personnel	ext. trainers	training	Com. Spon.	Manuf. Spon.
ALL SECTORS	900	44	21	23	12	5
BROAD CATEGORIES						
EPZ	194	- 49	23	14	13	7
SME'S	167	34	7	7	4	2
DC	68	65	32	33	1 2	6
PIONEER	21	48	29	29	29	5
GOVERNMENT	74	45	30	62	30	11
OTHERS	375	43	22	25	1 O	4
MAJOR SECTORS						
SUGAR IND.	15	47	60	60	27	13
FLOWERS	16	31	6	0	6	0
AGRICULTURE & FISHERIES	23	44	26	35	26	4
AGRO INDUSTRY	44	52	2.5	34	16	11
BAKE-RY	18	39	17	0	0	0
TEXTILE INDUSTRY	12.5	47	2.8	19	10	10
LEATHER PRODUCTS	29	28	10	7	0	0
FURNITURE & WOOD	54	32	7	7	2	0
STATIONERY	11	36	4.6	18	9	0
PRINTING	22	40	18	9	18	9
CHEMICALS & ALLIED PROD.	37	73	24	19	11	3
PLASTIC PRODUCTS	22	36	14	18	5	0
STONE CLAY GLASS CONCRETE	7	57	14	29	0	0
METAL PRODUCTS	57	51	1 2	19	9	4
ELECTRIC/ELECTRONIC FQUIP.	23	70	4.8	22	26	0
JEWELLERY	23	4.8	22	19	1 1	Д
HANDICRAFT	35	43	11	10	6	т О
CONSTRUCTION	23	61	9	3.0	22	9
DRAUGHTMANSHIP	16	69	19	50	13	6
COMMUNICATION	3	100	33	100	100	67
TRANSPORT	37	43	22	38	14	3
MARKETING & ADVERT	8	38	25	13	0	0
DATAPROCESSING	19	53	42	47	53	11
BUSINESS SERVICES	20	35	20	25	5	0
FINANCIAL SERVICES	23	33	18	20	9	0
WHOLESALE & RETAIL TRADE	156	42	- 22	19	14	6
HOTELS & RESTAURANTS	24	50	12	Δ	0	0
EDUC. & REASEARCH INS.	24	1 C	13	т Д 6	13	R
PHOTOGRAPHY	3	+2 67	-1-2- 0	10	22	0
OTHER SERVICES	34	32	15	27	21	12
OTHER SERVICES	34	32	15	27	21	12

APPENDIX XXI Training to Technical staff

				%		
		Train	ing to Admini	strative a	and Clerical	Staff
	No of	n-house by	In-house by	External	Overseas	Overseas
	org.	own personnel	ext. trainers	training	Com. Spon	Manuf. Spon.
ALL SECTORS	900	49	15	23	2	1
BROAD CATEGORIES						
EPZ	194	57	10	17	2	0
SME'S	167	30	4	8	1	2
DC	68	64	22	28	4	0
PIONEER	21	33	0	14	5	0
GOVERNMENT	74	45	15	43	1	0
OTHERS	375	53	22	29	2	1
MAJOR SECTORS						
SUGAR IND.	15	60	60	60	0	0
FLOWERS	16	19	13	13	0	0
AGRICULTURE & FISHERIES	23	44	. 22	30	0	0
AGRO INDUSTRY	44	57	18	36	5	0
BAKERY	18	33	0	0	0	0
TEXTILE INDUSTRY	125	58	11	17	2	1
LEATHER PRODUCTS	29	35	3	21	3	0
FURNITURE & WOOD	54	26	6	9	2	2
STATIONERY	11	64	9	9	0	0
PRINTING	22.	55	14	14	0	5
CHEMICALS & ALLIED PROD.	37	68	22	27	3	0
PLASTIC PRODUCTS	22	59	5	14	0	0
STONE, CLAY, GLASS, CONCRETE	7	57	14	29	0	0
METAL PRODUCTS	57	46	7	12	0	0
ELECTRIC/ELECTRONIC EQUIP.	23	61	13	22	9	0
JEWELLERY	27	56	11	22	0	0
HANDICRAFT	35	40	9	14	0	0
CONSTRUCTION	23	48	17	30	4	0
DRAUGHTMANSHIP	16	31	19	63	0	0
COMMUNICATION	3	33	67	33	33	0
TRANSPORT	37	6 O	30	30	5	0
MARKETING & ADVERT	8	5 O	25	25	0	0
DATAPROCESSING	19	47	0	21	11	0
BUSINESS SERVICES	20	55	30	50	0	0
FINANCIAL SERVICES	33	55	33	33	9	0
WHOLESALE & RETAIL TRADE	156	51	21	26	1	1
HOTELS & RESTAURANTS	24	38	4	8	0	0
EDUC. & REASEARCH INS.	24	46	21	33	0	0
PHOTOGRAPHY	3	100	0	0	0	0
OTHER SERVICES	34	53	6	27	3	3

APPENDIX XXII Training to Administrative & Clerical staff

_	-								
1	r	2	1	1	7	1	1		\sim
1	I	и	"	I	1	1	I	I	м

	%								
		Training to Middle Management							
	No of	In-house by	In-house bi	External	Overseas	Overseas			
	org.	own personne	ext. trainer	training	om. Spon	Manu f . Spon.			
ALL SECTORS	900	30	16	28	13	4			
BROAD CATEGORIES									
ED7	101	20	11	2.4	9	5			
SME'S	167	10	7	6	2	0			
	68	19	17	30	2	0			
PIONEER	21	10	10	10	20	10			
GOVERNMENT	21 7.4	19	19	57	29	7			
OTHERS	375	2 /	21	34	15	7			
OTTIERS	575	50	21	54	10	4			
MAJOR SECTORS									
SUGAR IND.	15	53	67	73	13	7			
FLOWERS	16	6	19	19	13	6			
AGRICULTURE & FISHEPIES	23	22	30	52	26	13			
AGRO INDUSTRY	44	43	25	32	21	7			
BAKERY	18	22	0	11	0	0			
TEXTILE INDUSTRY	125	38	12	29	6	4			
LEATHER PRODUCTS	29	24	0	1 O	7	0			
FURNITURE & '!.'OOD	54	20	11	4	2	0			
STATIONERY	11	46	9	27	9	0			
PRINTING	22	27	14	27	9	0			
CHEMICALS & ALLIED PrIOD.	37	49	11	30	24	14			
PLPSTIC PRODUCTS	22	55	0	9	0	0			
S, 'I!:,CLAY,GLASS,CO&CrIET	7	43	14	43	14	14			
METAL PRODUCTS	57	28	12	i9	7	4			
ELECTRIC/ELECTRONIC EQUIP.	23	35	26	30	39	4			
JEWELLErIY	27	30	4	15	19	11			
HAI, DICRAFT	35	26	9	9	0	3			
CONSTRUCTION	23	39	13	39	13	4			
DRAUGHTMANSHIP	16	13	13	31	13	0			
COMMUNICATION	3	33	33	67	67	33			
TRANSPORT	37	19	30	46	27	0			
MARKETING & ADVERT	8	25	13	25	0	0			
DATAPROCESSING	19	16	32	32	32	16			
BUSINESS SERVICES	20	45	35	35	20	0			
FINANCII', L SErIVICES	33	21	27	36	18	0			
WHOLESALE & RETILL TRADE	156	31	19	36	17	6			
HOTELS & RES Lt, URAI-HS	24	29	8	17	4	0			
EDUC. & REASEARCH I,S.	24	33	25	29	17	4			
PHOTOGRAPHY	3	67	33	0	0	0			
OTH::rI ØERVICØS	34	32	12	27	12	3			
APPEfIDIX XXIII Tra:	ining	to Middle	e Managen	nent					

Training

	%							
	Training to Top Management							
	No of	In-house by	p @-house by	External	Overseas	Overseas		
	org.	own perso	ext. trainers	training	om. Spon	Manuf. Spon.		
ALL SECTORS	900	19	12	26	18	6		
BROAD CATEGORIES								
EPZ	194	25	7	.12	13	6		
SME'S	167	13	7	10	4	2		
DC	68	28	15	30	29	10		
PIONEER	21	14	10	10	14	5		
GOVERNMENT	74	12	10	49	24	4		
OTHERS	375	18	16	32	23	6		
MAJOR SECTORS								
SUG."-R IND.	15	40	73	67	40	20		
FLOWERS	16	6	13	19	19	13		
AGRICULTURE & FISHERIES	23	9	17	35	44	9		
AGRO NDUSTRY	44	14	16	36	27	7		
BAKERY	18	17	0	11	0	0		
TEXTILE INDUSTRY	125	23	8	26	8	6		
LEATHER Pi'.ODUCTS	29	14	3	14	7	0		
FURNITURE & WOOD	54	13	9	7	4	4		
STATIONERY	11	L5	9	18	0	9		
PRINTIf,JG	22	9	9	27	14	9		
CHEMICALS & />LLIED PROD.	37	35	8	16	35	11		
PL,< ::;.,.IC PRODUCTS	22	41	0	18	5	0		
STE,CLAY,GLASS,CONCRE	7	29	0	29	14	0		
METAL PRODUCTS	57	19	12	21	12	5		
ELECTRIC/ELECTROF, IC EC.UIP.	23	17	4	22	35	9		
JEWELLERY	27	30	0	15	:06	11		
HANDICRAFT	35	20	6	14	3	3		
CONSTRUCTIOf,J	23	13	0	30	35	17		
DRAUGHTMANSH!P	16	19	13	31	13	6		
co∲.r,1UNICATfON	3	0	33	33	67	33		
TRANSPOR1	37	8	16	32	32	3		
MARKETING & ADVERT	8	13	13	25	25	0		
DATAPROC	19	11	16	37	26	11		
BUSIF !: SS SERVICES	20	30	25	30	30	0		
FINAI\CIAL SERVICES	33	21	15	27	24	3		
WHOLESALE & PETA:L TRAD::	156	15	17	35	20	7		
HOT::LS & i'.':S+;;;u;:.r,:;;;-s	24	17	8	17	17	0		
EDUC. & REASEARCH I:,S.	24	13	13	33	29	4		
PTOFOGEXPICY:S	334	33	3 73	207	15	ē		

APPENDIX XXIV Training to Top Management

Base of percer.tages ere the number of organisations as per 2nd column