

CHAPTER IX

MAIN FINDINGS AND CONCLUSION

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CHAPTER IX

MAIN FINDINGS AND CONCLUSION

The purpose of this chapter is to synthesise the various aspects of technological development in the small manufacturing enterprises analysed in the foregoing chapters to provide an integrated view of the findings and conclusions.

9.1 Government Policy On Technological Development

The technology policy of the Government of India laid stress on the development of domestic technology and the efficient absorption and adoption of imported technology leading to domestic technological innovations, appropriate to national priorities and resources.

The scientific policy resolution emphasised the need to attain technical competence and self reliance, development of internationally competitive technologies, particularly in the export potential areas and identification of obsolete technology for modernisation of both equipment and technical know-how.

The imports of technologies were channelised into the areas which reinforced indigenous efforts to accelerate economic growth. Foreign collaborations were permitted selectively in the priority areas requiring sophisticated technology, export-oriented and import-substitution manufacturing and also in the industries where there is need for upgradation of technologies so as to meet the domestic and international market requirements efficiently. A chain of national laboratories and research institutes were set up in different parts of the country to cater to the requirements of the Indian industry. The in-house R & D was recognised as one of the important sources of technological development having an advantage of solving problems pertaining to the transfer of technology and in commercialising the results. The Government announced many incentives (mostly fiscal) to encourage the Indian firms to undertake R & D and to use locally developed technology.

a) Technology Policy during the plan period

The technology policy as reflected in the plan documents emphasised the need to establish and strengthen the working of national laboratories and establish an effective link between the generators of the technology and its users. The interaction between the in-house R & D centres and various bodies involved in R & D activities was also emphasised. Many new measures and initiatives were undertaken during

the eighth plan period for further strengthening the in-house R & D.

b) Technology Policy and Industrial Policy Resolutions

The industrial policy resolutions/statements emphasised the need for technological upgradation and modernisation aimed at improving productivity, efficiency and cost effectiveness. New initiatives have been taken to make indigenous technology attractive and also to facilitate its development in large measure, in the national laboratories and the industrial units as well. The NRDC at the apex level and the PTC's at the state level shall act as the liaison agencies/mediators between the industry and research institutions for technology transfer.

c) Utilisation of Institutional Infrastructure

The utilisation of various infrastructural facilities and services by the sample units is found to be low. The selected Small Manufacturing Entrepreneurs depend more on the other non-Governmental industry-oriented agencies for their requirements, particularly in the areas of training and consultancy. However, they make full use of both the fiscal and financial incentives available under the present policy regime.

9.2 The sources of technological development

The sources of technological development in the selected Small Manufacturing Entrepreneurs are many and the units do not depend on any single source. The in-house R & D as an internal source, foreign collaborations among the external sources and visits abroad by the entrepreneurs among the informal sources are prominent. Industry-wise, it is the EE group followed by the ENGG group that have a broad-based technology source.

a) Technology Transfer

The entrepreneur has little choice in respect of the technologies available in the national laboratories. They need modifications for commercialisation. However, they are preferred on the considerations of easy marketing, accessibility, and affordability.

b) In-house R&D

The objectives and the nature of in-house R & D are widely diversified and different across the industry groups. For instance, in the case of CDP group, the concentration is more on process innovation and clinical development, while in the EE and ENGG industries, it is product innovations, model development and process improvement. The R&D efforts also focus on the adoption of imported technology to suit the local

conditions, Import substitution production and design imitation of imported products.

The R & D intensity is found to be relatively high in the units producing import-substitute products, which received technology transfer and units with recognised R & D departments. However, its relationship with the size of the units is not clearly established. Nevertheless, in majority of the selected units, the R & D intensity is in conformity with the national average.

c) Foreign Collaborations

Most of the foreign collaborations are found in the EE group and the agreements relate to technical know-how in the form of drawings and designs. The imports of technology, plant and machinery spares and components are relatively few and are not found in the CDP group.

d) Informal Channels

The informal channels of technological development provide technical knowledge to improve the capabilities of the small manufacturers through information flows from overseas manufacturers and raw-material suppliers, foreign visits etc.

All the formal and informal sources of technological development largely focus not only on new process/product/design/model development, but also on cost reduction, change in the line of activity, quality improvement, product diversification in response to changing marketing and competitive conditions.

9.3 Measurement of Technological Development

The inter-industry correlation matrix of growth variables suggests a high positive correlation between output growth and growth in labour productivity across the board.

a) Behaviour of partial productivities

The partial productivity ratios are rising in a large number of units across the industries accompanied by declining capital intensity of labour, broadly suggesting better utilisation of factor proportions more specifically the labour input resulting in an improved productivity.

No systematic relationship between the behaviour of partial productivity ratios across the units of different sizes is discernible. However, at the disaggregate level, in the EE group, there exists a perceptible positive relationship between the firm size and the partial productivity ratios. The large-sized units have shown better performance than the smaller ones in terms of higher labour and capital productivities.

No discernible relationship is found between the age and the behaviour of partial productivity ratios. However, again in respect of EE group, younger units are found to be more capital intensive than the older and the oldest units.

The units which developed and transferred the technical know-how have higher labour and capital productivity ratios followed by the units with foreign collaborations and the units which won awards; Those units which developed new products, diversified to other lines of activity, achieved cost-reduction and yield improvement experienced a higher labour productivity than those units with no such achievements to their credit.

b) Kendrick's Total Factor Productivity Growth

The TFP in the sample units has improved considerably during the period of study. At the disaggregate level, the EE and ENGG industries are identified with the highest and the lowest TFP growth respectively.

c) The estimates of Cobb-Douglas Production Function

The estimates of Cobb-Douglas Production Function reveal the significant contribution of both labour and capital inputs to output. However, the responsiveness of output to labour is higher than that for capital across the industries. While in CDP group capital is more significant than labour reflecting the capital intensive nature of this industry, in EE group capital is insignificant.

The estimates of returns to scale clearly indicate that all the industry groups have been experiencing increasing returns. However, Tinker's test for statistical significance establishes the same in the CDP and ENGG groups, while the EE group, is subject to constant returns to scale.

9.4 Determinants of Technological Development

The regression results show that the output growth, a single variable explained the phenomenon across the board to the extent of not less than 70 per cent. (The highest being the ENGG group with $\bar{R}^2 = 0.87$). Three more variables including R & D employment which entered the regression equations subsequently have improved the explanatory power to the extent of as high as 95 per cent. Similarly in the units with varied background, again the output growth explains the phenomenon to the extent of more than 60 per cent.

Apart from output growth, R & D employment and R & D expenditure have influenced the TFP growth in the units with varied technological achievements.

When the output growth is excluded from the set of independent variables, it is

R & D expenditure, R & D employment educational background of the promoters, existence of separate facilities for R & D which are found to be influencing TFP.

Since R & D expenditure is considered as an important determinant of TFP growth, it is found to be significantly influenced by R & D employment, new product development, product improvement, age of the units, educational background of the promoters, exporting and cost reduction.

9.5 Effects of Technological Development

I. Direct Effects

Among the direct effects, notable technological achievements, of the surveyed units belong to particularly the EE and ENGG industries include new product development, production of import substitutes and product improvement. However, a majority of the units in the COP group concentrated their technological efforts in achieving quality improvement, increased reliability of the product, diversification of their activities and yield improvement leading to reduced cost of production.

The medium-sized units, the units with low R & D intensity and relatively the young units had a major share in the total number of new products developed. The units which developed new technologies had transferred the technical know-how to other units mostly in the EE group to build-up a net-work of necessary ancillary support.

a) Awards

A sizeable number of the sample units had won many awards for their excellent performance in diversified fields relating to technological development. Most of these units belong to the EE group. They also include units with R & D facilities and the units run by technocrat entrepreneurs. The units which did not have any R & D activity have not won any awards.

b) Distinctive positions

A few of the selected units enjoy many distinctions/status/positions such as nodal agency of the state Government, suppliers to the world bank agencies etc.

II. Indirect Effect

a) Growth in aggregate employment, capital and output

Among the indirect effects, the growth of the units, in terms of aggregate employment, capital and output, more strikingly the employment is perceptible.

b) Export Performance

The exporting units have improved their export performance both in absolute and relative terms. The exports include a wide-range of products mostly belonging to CDP group.

c) Promotion of other units

A few of the sample units with varied technical characteristics had promoted other units to enjoy the backward linkages which are independently managed by their family members.

d) Diversification of activities

Some of the sample units have diversified their activities into related and unrelated areas with a view to develop full-range of products of all models and capacities. Industry-wise, the CDP group of units have diversified their activities either because of entry of substitutes in the market or lack of demand for the products.

9.6 Entrepreneurial perceptions, prescriptions and practices

a) Perceptions & Prescriptions

The small business lack upto date information on several issues such as trends in the technological developments, efforts made by the national laboratories, public policy programmes, schemes, marketing opportunities abroad etc. They need access to continuous technology information with market intelligence. Most of this information gathering and analysis has to be done at the firm level but in view of the costs involved in this activity, there is also an important role for specialised institutions, including technology agencies and the consultancy organisations. Small firms need supporting net-work of institutions for information, technical assistance, quality control and R & D.

More importantly, there should be an attitudinal change in the functioning of bureaucracy, Government organisations, funding agencies and other organisations in favour of the Small Scale Industries.

b) Practices

A large number of sample units in order to improve their technical capabilities and update their technical knowledge are taking several measures within their capacities inspite of several constraints they are facing. These include subscription to technical journals, maintenance of documentation, deputing the technical staff to seminars, workshops, conferences, sending employees abroad for learning the state of art

technology. Some of the sample units conduct seminars symposia and hold discussions, arrange lectures in their relevant areas, by inviting professionals, Government officials and other eminent persons in the field. The other measures include publication of in-house journal, contacting embassies for trade relations, offering incentives to the employees for their contribution to innovative ideas for technological excellence and other welfare activities which promote the overall labour-management relations.

9.7 Conclusion

What comes out strikingly from the analysis made in the foregoing chapters is that technological development in one form or the other is taking place in the small manufacturing enterprises. The entrepreneurs have realised the imperative need for acquiring and upgrading the technical base of their units. Evidences also show conscious and rigorous efforts of the entrepreneurs to this effect, inspite of many constraints. This is more conspicuous in units run by technocrats.

The policy initiatives announced by the Government from time to time have no doubt helped the process of technological development in the small scale sector though not to the extent desired. Even though, a large number of national laboratories and other institutions which are well-equipped and well-staffed, are working for technological development, their impact on industry in general and Small Scale Sector in particular has been extremely limited. The low utilisation of the research efforts and services of these institutions by the selected small manufacturing enterprises is a testimony to this phenomenon. Further, lack of effective linkage between the laboratories and the industry on one hand, poor co-ordinated effort among the national laboratories and institutes on the otherhand and absence of interface between the Government and the industry has created wide communication gap between the generators of technology and its users.

What is therefore required is strengthening and full utilisation of the existing and available infrastructural facilities and resources for pre-determined requirements of the industry, more specifically the Small Scale Sector. This goes without saying that there is no need for creating new institutions.

The need of the hour is to render timely and efficient service to the small entrepreneur to enable him to compete not only in the domestic markets, but also internationally.

Finance should not become a bottleneck for acquiring technical know-how. As emerged from the study, most of the R & D efforts and technology development strategies adopted by the selected units are self-financed. If only, the finance is adequate, perhaps the small entrepreneurs would have shown much better results in

the area of technological development.

The funding agencies should realise the importance of this vital aspect and come forward generously to help all the deserving cases. Towards this end, commercial banks and other financial institutions should strengthen their evaluation system and credit rating cells which will go a long-way in promoting technological development in this priority sector.

Above all, there should be an attitudinal change in the bureaucracy, Government, and the bank officials towards the small manufacturer. What the entrepreneur needs is the minimum interference by the Government, simplified procedures and formalities.

On the part of the entrepreneur, continuous efforts have to be directed towards product designing, rather than reverse engineering or import-substitution production. Identification of new materials, new markets and innovation of new processes is the order of the day. It is necessary for them to realise the fact that technological development is not a one-shot affair. It is a continuous and demands conscious efforts. More importantly manufacturing technologies when widely developed and used, enable the manufacturing firms to compete better through reduced costs, increased quality, reduced manufacturing lead-time, reduced time to market and increased product variety.

Taking advantage of the present liberal policy environment, the small entrepreneur should face the challenges posed by the opening up of the Indian economy to the multinationals and foreign investors both internally and externally.

ANNEXURES

ANNEXURE I
QUESTIONNAIRE

**TECHNOLOGICAL DEVELOPMENT IN
SMALL MANUFACTURING ENTERPRISES
AN ANALYSIS OF ITS DETERMINANTS AND EFFECTS**

Reference Year -1989-90

- A. *IDENTIFICATION DATA:*
1. Name of the unit :
 2. Postal Address :
with Pincode & Phone No.
 3. Date of establishment :
 4. Date of Registration :
 5. Registered with :
 - i. Commissioner of Industries
 - ii. DIC
 - iii. DGTD
 - iv. NSIC
 - v. An Industry Association
(please specify)
 - vi. DSIR
 - vii. Any other
(please specify)
 6. Status of the unit :
 - i. Independent SSI
 - ii. Ancillary
(please specify)
 - iii. Approved/Preferential
Vendor/Supplier.
(please specify)
 - iv. NRI Unit
 - v. 100% export oriented unit
 - vi. Joint venture/Joint sector
 - vii. Co-operative
 - viii. Any other
(please specify)

Line of activity	Change in the line of if any	Year of Change	Reason for Change
i. Manufacturing			
ii. Job-Work			
iii. Job-cum- Manufacturing			

- Type of Organisation : i. Proprietary
 ii. Partnership
 iii. Private Limited
 vi. Public Limited
 (Please specify)

Production Activity

(please specify the following)

Sl. No.	Items of Manufacture of	Year/s mfrs.	Customers	Capacity Licensed instlo.	Type of Competition		
					*D.M.	I.M.	
Present: (1985-86 to 1990)					Quality	Quality	Other
					Price	Price	MSIs
					Technolo	Technology	LSIs
					Any other	Any	MNCs
							F.cos.
							Anyother

Previous:

* D.M. - Domestic Market I.M. - International Market

B. Back Ground of the entrepreneur:

1. Status of the Entrepreneur :
 - i. Managing Partner
 - ii. Managing Director
 - iii. Chief Executive
 - iv. Any other
(please specify)
2. Age in completed years:
3. Educational Qualifications:
 - i. B.A./B.Sc./B.Com.,
 - ii. M.A./M.Sc/ M.Com.,
 - iii. B.EyB.Tech/ M.E/ M.Tech
 - iv. Diploma
(please specify)
 - V. Anyother
(please specigy)
4. Previous occupation of the entrepreneur before entering into this venture

5. Experience in the present:

line of activity.

6. Training of the entrepreneur prior to/subsequent to the entry into the present liwa.of activity, (please specify the following)

Status & Year	Nature of Training where trained	Duration	Organisation	Expd. Rs.	Remarks
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C. Technological development Strategies

(i) Technology and Technology Management

i. Please provide the details of the type and sources of technology being used in your production activity.

Product No.	Type of Techgy.	Source of Techgy.	Year of Acquin.	Amt. Spent Rs.	Remarks
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2. Whom do you approach for technological guidance in the course of production?

(Please specify the following)

Source of guidance	Nature of Guidance	Amount Spent Rs.	Remarks
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Internal:

- a. Entrepreneur himself .
- b. Production Incharge
- c. Shop-floor People

External:

- d. Customers
- e. Parent Unit
- f. Govt. Orgn.
- g. In-House R & D
- h. Pvt. Consultants
- i. Others (pl. specity)

3. Please furnish the following details concerning the assessment of your technological performance

Frequency of Assessment	Assessed by	Basis of Assessment	Amount Spent Rs.	Remarks
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4. Do you have any schemes of incentives to encourage the participation of production people in the task of technological development? Yes/No

5. If Yes please specify the following:

Types of incentives	Year of introduction	Amount Spent Rs.	Basis of incentive	No. and category of persons
Monitory	Non-Monitory			

ii. Imports and Collaborations

i. Do you import? Yes/No

2. If yes, please furnish the following particulars

Sl.	Item Year	Exporting Country	Quantity & Value	Mode of payment	Description of imports	E.R.S if any (pl. specify)
I.	Raw Materials & spares					
II.	Technical Know how					
III.	Plant & equipment					
IV.	Drawings and Designs					
V.	Licence to use know-					
VI.	Patent rights					
VII.	. Any other (pi. specify)					

3. If no, what are the reasons?

- i. Needed requirements are indigenously available
- ii. Parent unit / Customers supply
- iii. Expensive to import/collaborate
- iv. Too many procedural formalities
- v. Difficult to contact

- vi. Nature of production activity does not require any imports/ collaboration
- vii. Legal restrictions imposed by the government
- viii. Small size requirements make imports unfeasible
- ix. Any other (please specify)

4. Do you have coteboration with any foreign country/company/MNC? Yes/No.

5 If Yas Ptaase furnish the details as below

Sl. No.	Nature of Collaboratio	Duration	Collaborator s	Description of Collaboration	Mode of payment and amount paid
i. Finance					
ii. Technical					
iii. Marketing					
iv. Training of personnel					
v. Any other (pi. specify)					

6. What are the compelling/motivating forces which made you go in for imports/collaboration please indicate from the given below in order of preference.

- i. Acute competetion in the market
- ii. Your close competitors in the market have gone for imports/collaboration
- iii. To enter a new market/introduce new producis/new processes
- iv. To improve the market share - domestic/international
- v. To compete effectively in terms of quality and cost in the export market
- vi. To save on cost and avoid delays
- vii. Superior technological know-how of the collaborator
- viii. Reputation associated with the exporter/collaborator
- ix. To meet the needs of modernisation/expansion/diversification
- x. Technology required is not widely available in the country
- xi. Indigenous technology is not upto mark.
- xii. To strengthen in-house technological capabilities
- xiii. Favourable government policy (please specify)
- xiv. Any other (please specify)

7. At whose initiative / information have you gone in for imports/collaboration?

- i. On your own
- ii. Industry association
- iii. Parent units/customers
- iv. Government Organisation
- v. Trade fairs/exhibitions
- vi. Advertisements in journals etc.
- vii. Exporter himself

- viii. Consultancy organization
- ix. Any other (please specify)

8. What is the status of the exporter/collaborator

- i. Govt. organisation/Laboratories
- ii. MNCs
- iii. S.S.Units
- iv. L.S. Units
- v. Any other (please specify)

9. Did imports/collaboration necessitate any training of personnel? Yes / No.

10. If yes please specify the following

Nature of training	No. of persons trained & category	Duration and year	Organisation trained	Amount spent	Remarks
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11. Prior to the decision of importing/collaborating please specify the efforts made

Sl. No.	Efforts made	purpose visited	Country	Time spent	Amt. Spent	Remarks
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i. Personal visit abroad

ii. Participated in internation

-/national trade fairs/
conventions/seminars etc.

iii. Correspondence through consultants

iv. Any other (pi. specify)

12. Please furnish the details of cost incurred on imports/collaborations/indigenous transfer of technology.

year-wise	Nature of	cost in Rs.	Amount	REMARKS
1985-86 to 1990	Direct cost	Indirect	Rs.	

(iii) Research and Development

1. Do you have a separate R & D dept.? Yes/No.

2. If Yes, please indicate the purpose of setting in order of preference

- i. Internal R & D is cheaper than external acquisition
- ii. To save on time and cost
- iii. To facilitate modification of imported contents to suit the local needs
- iv. To improve the existing products/designs/processes/methods of production
- v. To develop new products/designs/processes/components/spares,
- vi. To improve the quality of production
- vii. To facilitate the usage of substitute Raw Materials
- viii. To gain specialisation in particular technology
- ix. To control the effects of pollution
- x. To save on consumption of energy/labour/raw materials and thereof reduce the production cost
- xi. Any other (pl. specify)

3. If no, please specify the reasons for not setting up a separate R & D Dept.

i. Required R & D is obtained from

Source	Name of the organisation	Benefits obtained	year	Amt. spent Rs.	Remarks
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a. Parent units

b. Customers

c. National Laboratories

d. Industry Associations

e. Universities/IITs

f. Private consultants

g. Any other (pl. specify)

ii. It is expensive

iii. Inadequate/lack of technical personnel

iv. Products and production methods are standardised and therefore no need of R & D work

v. Any other (please specify)

4. If you have a separate R & D dept. is it recognised? Yes/No

5. If yes, please specify the following

Year of Duration recognition/renewal	Recognised by	Benefits of recognition	Facilities availed	Value in Rs.	Amt. if any spent	Remark
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6. Please specify your R & D activities/achievements.

Nature of activity	Achievement	No. involved	Time spent Hrs.	Amt. Spent Rs.	Implemen- tation	Remarks
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7. Have you supplied the know-how developed in your unit to others? Yes/No.

8. If yes, please specify the following

Year of transfer	Type of know-how transferred	To whom transfers	Value of transfer	Ramarks
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9. How are your R & D activities financed? please specify the following

Source Name	Year	Amount Rs.	Remarks
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i. Own funds

ii. Commercial Banks

iii. Financial institutions

iv. Any other (pi. specify)

10. Please specify the investment made in R & D activities year-wise

<u>Year</u>	<u>Amt. invested Rs.</u>	<u>Purpose</u>
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1985-86

1986-87

1987-88

1988-89

1989-90

11. Do you possess any patent rights? Yes/No.

12. If yes, please specify the following

Nature of patent	Duration	Amount spent Rs.	Remarks
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Product-wise Turnover / Sales in Domestic and International market

Product/s No.	MKtS Commencement	Year of Commencement	1985-86	1986-87	1987-88	1988-89	Remarks
			Qty. Value	Qty. Value	Qty. Value	Qty. Value	

Total

Expenditure/Cost on inputs

Materials	Year of Commencement	Year of Commencement	1985-86	1986-87	1987-88	1988-89	Remarks
			Qty. Value	Qty. Value	Qty. Value	Qty. Value	

Total

Energy	Year of Commencement	Year of Commencement	1985-86	1986-87	1987-88	1988-89	Remarks
			Qty. Value	Qty. Value	Qty. Value	Qty. Value	

-
- a) Cost
 - b) Oil
 - c) Power
 - d) Any other
(pl. specify)

Total

3. No. of persons employed and expenditure on remuneration p.a/p.m

Materials	Year Commencement	Year Commencement	1985-86	1986-87	1987-88	1988-89	Remarks
			Qty. Value	Qty. Value	Qty. Value	Qty. Value	

-
- i) Managerial
 - ii)
 - iii) Supervisors
 - iv) Production
 - v) R&D
 - vi) Q. C.

Total

Contd.

13. Irrespective of technological development strategy accepted by you please specify the consequences of technological development/change that has taken place in your unit.

Nature of improvement change	Results of improvement/change	Description
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i. Reduced input consumption

Raw Materials

Labour

Energy

ii. Reduced prod. Time

iii. Improved quality

iv. Increased output

v. Any other

(Please specify)

14. As small scale industrialist please specify the difficulties if any faced by you prior to/ process of/subsequent to imports/collaboration.

<u>Nature of difficulty</u>	<u>Description</u>
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i. Organisational

ii. Managerial

iii. Implementational

iv. Payment

v. Any other (any other)

15. Please specify the following if you have availed any facilities extended by the government towards the promotion of Technological Development

SI. No	Type of facility	Value Rs.	Year	Organisation offering the facility	If not availed reasons	Remarks
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16. As a technocrat operating in the small scale sector can you suggest any policy changes that can be brought about by the Govt. in its capacity as a policy maker/promoter/regulator for the technological development of this priority sector,?

PRODUCT WISE PRODUCTION & VALUE DETAILS

Product/s	Year of	1985-86	1986-87	1987-88	1988-89	Remarks
		Qty. Value	Qty. Value	Qty. Value	Qty. Value	

Total

Other details	Year of Commencement	1985-86	1986-87	1987-88	1988-89	Remarks
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i. Av.No.
of workers
days

ii. No. of
shifts

iii. No. of
Hrs. per
shifts

iv. O.T(Hrs)

Total

Capital employed

I. Fixed Assets

Name of the Asset	Yr. of original acquisition and value Rs.	Yr. of Additions and value Rs.	Replacement value as on	Expected life of Asset	Depreciation Actual	Remarks Permitted
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i) Land

ii) Buildings

iii) Pl. & Mach.

a) Imported

b) Indigenous

c) Others (Pl. specify)

Total

v) R & D Equipment

a) Imported

b) indigenous

vi) Q.C & Test Equipment

a) Imported

b) Indigenous

Total

Total of fixed assets:

2. Current Assets

i) Cash

ii) Inventories

iii) Misc. Assets

Total Assets

iv. Quality control and testing

i. Do you have separate dept./separate personnel for quality control? Yes/No.

ii. If yes please specify the following

Year of estbling	Purpose	No. of persons involved	Remarks
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iii. In the absence of internal facilities for Q.C. and testing whom do you depend upon for these services.

Name of the orgn. & location	Nature of service	Amt. Spent Rs.	Remarks
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iv. Do you face the problem of rejections in the process of production? Yes/No,

v. If yes please specify the following.

Year wise	Rejections Internal %	Rejected by External %	Basis of Rejections	Treatment of Rejection	Time spent Hrs.	Amt. spent Rs.
1985-86						
1986-87						
1987-88						
1988-89						

Note : Rejections as a percentage of total value of production and in quantity

ANNEXURE II
LIST OF SURVEYED UNITS

S.No	Name	Year of Establishment	Location
1.	Archana Electronics	1982	Padmarao nagar
2.	Anushya Electronics	1981	Gandhi nagar
3.	Annapurna Electronics	1981	Jeedimetla
4.	Anukampa	1978	Sanat nagar
5.	Avanti kopp electricals	1987	Bonthapally
6.	AMI sanag micromation	1987	Basheerbagh
7.	Arco	1988	Kushaiguda
8.	Active Electronics	1981	Marredpally
9.	Armour Pharmaceuticals	1987	Kukatpally
10.	Akin labs	1975	Ramanthapur
11.	Bull power systems	1985	Punjagutta
12.	Bhagyanagar laboratories	1974	Balanagar
13.	Biochemicals and synthetic products	1943	Sanatnagar
14.	Borewell Hydreq	1975	Kushaiguda
15.	Consys	1985	Sanjeevareddy
16.	Controls and schematics	1971	Nacharam
17.	Cosmic engineering	1982	Kushaiguda
18.	Datla Electronics	1985	Sanatnagar
19.	Duke Arnics	1978	Kushaiguda
20.	Du bon laboratories	1985	Kukatpally
21.	Deccan Phytochemicals	1981	Secunderabad
22.	Detective Devices	1981	Balanagar
23.	Electroflo Batteries	1977	Kattedan
24.	Electronics Components and Devices	1970	Ferozguda
25.	Elico	1960	Sanatnagar
26.	Electro Magnetic Devices	1973	Kushaiguda
27.	Epsilon Electronic equipment and components	1976	Kushaiguda
28.	Espi Industries and Chemicals	1979	Uppal
29.	Grow more chemicals	1980	Secunderabad
30.	Gland pharma	1978	Ameerpet
31.	Gasolec Appliances	1983	Balanagar
32.	Hyderabad Electrics and Electronics	1977	Balanagar

33. Hytronics Enterprises	1976	Kushaiguda
34. Hytronics Private Ltd	1986	Kushaiguda
35. Hi-Tech optic Instruments	1985	Nacharam
36. Integrated Geo instruments and Services	1981	Tarnaka
37. Integrated Installments and Systems	1985	Padmaraonagar
38. Integrated Data Systems	1981	Punjaguta
39. Instruments Techniques	1963	Balanagar
40. Instruments and controls	1987	Balanagar
41. Ideal engineers	1969	Balanagar
42. Jayashree Industries	1971	Bholakpur
43. Kwality Electricais	1966	Himayatnagar
44. Kadevi Engineering Company	1964	Kushaiguda
45. Kaivalli Electronics	1983	SainiKpuri
46. Kalpana Chemicals	1975	Nacharam
47. Kobashi Machine Tools	1985	Balanagar
48. Kabsons Gas Equipment	1981	Balanagar
49. Lata Engineering company	1981	Balanagar
50. Mac Mohan Pharmaceuticals	1979	Jeedimetla
51. Micro Techniques	1981	Vikrampuri
52. Micro Technology products	1976	Balanagar
53. Medha Vision	1984	Kushaiguda
54. Medchal Chemicals and Pharmaceuticals	1985	Secunderabad
55. Monarch Pharmaceuticals	1984	Gandhinagar
56. Micro Torr Vaccuim systems	1976	Bholarpur
57. Mekins Agro products	1978	Somajiguda
58. NVK Engineers	1986	Jeedimetla
59. Optomech Enginteers	1983	Kukatpally
60. Potentio meters	1985	Vikrampuri
61. Pacific Electronics	1980	Secunderabad
62. Power packs	1985.	Bollarum
63. Pragati Chemical Industries	1974	Nacharam
64. Prabhava organics	1986	Bollaram
65. P.E. Engineers	1982	Balanagar
66. Premier Industries	1970	Sanatnagar

67.	Primus kabsons	1985	Balanagar
68.	Precision Electronics Manufacturing Co.	1972	Kavadiguda
69.	Prasad Drugs	1985	Bollaram
70.	Qualicare Pharmaceuticals	1987	Punjagutta
71.	Renewable energy systems	1985	Jeedimetla
72.	Radiant cables	1959	Sanatnagar
73.	Remote Sensing Instruments	1983	Kukatpally
74.	South Eastern Equipment Company	1973	Nacharam
75.	S.D. Rubber products	1977	Jeedimetla
76.	Steuerung anlage	1982	Amberpet
77.	Scanave electronics	1983	Sanjeeva Reddy nagar
78.	Servo medha drives	1984	Nacharam
79.	Speck systems	1982	Kushaiguda
80.	Sirveen controls	1983	Tarnaka
81.	S. G . Manufacturing	1960	Gandhinagar
82.	Synthokem	1978	Sanatnagar
83.	Sridevi chemicals	1976	Nacharam
84.	SGR Chemicals	1987	Balanagar
85.	Sonali castings	1978	Jeedimetla
86.	Su deepwell pumps	1982	Balanagar
87.	Scientific engineering house	1949	Sanatnagar
88.	Suri Engineers	1972	Nacharam
89.	S.K. Machine tools	1975	Balanagar
90.	Thermo Electronics	1985	Habsiguda
91.	Thermo pads	1978	Jeedimetla
92.	Team engineers	1982	Nallakunta
93.	Transducers and controls	1980	Balanagar
94.	Taurus chemicals	1987	Miyapur
95.	Triton laboratories	1985	Ashoknagar
96.	Vamsa electronics	1987	Ameerpet
97.	Vinyl Chemicals	1985	Yellareddyguda
98.	Veer Chemee & Aromatics	1979	Balanagar
99.	Vani Chemicals	1976	Ameerpet
100.	Vasanth Chemicals	1978	Begumpet

ANNEXURE III

REDEFINING SUNLIGHT

Solar Photovoltaic systems convert sunlight into electrical energy and the resultant energy is stored in a battery. SPV systems form the basic raw-material for a range of solar voltaic products. The SPV products are mainly used in remote areas and off-shore rigs as supplying power from conventional sources is not economically viable due to high cost of setting up transmission infrastructure and unusually high transmission and distribution losses in India.

The demand potential for SPV products is high as only 84 per cent of villages have access to electricity. The demand for Solar Voltaic Products is primarily driven by the Indian Government and other agencies like State Electricity Board and Dept. of Telecommunications. The Government has created Ministry of Non-Conventional Energy Sources and also set-up Indian Renewable Energy Development Agency (IREDA) to promote the use of non-conventional energy. It is even allowing 100 per cent depreciation for con-conventional energy systems and also imposed import duty of 70 per cent on them to discourage imports. As for IREDA, it provides loans at concessional interest rates to manufacturers as well as purchasers.

The Indian Government is playing a dynamic role in developing non-conventional energy sector in terms of financial support and policy directives.

One of the sample units is g manufacturing a range of solar voltaic products like micro-power plants used to generate power in remote rural areas and off-shore oil rigs, solar lanterns, solar water pumps, solar equipment for railway signalling, solar power packs for rural radio telephones and solar street lights.

ANNEXURE - IV
LIST OF ACTIVITIES OF NATIONAL RESEARCH
DEVELOPMENT CORPORATION

The NRDC was established in 1953 under section 25 of the Indian Companies Act, to develop and commercially exploit indigenous know-how, inventions, patents and processes emanating from various R & D institutions in the country. Designed to forge links between Research and industry and serve as a catalyst for technology transfer.

The NRDC finances projects which aim at import substitution, exploitation of untapped resources, utilisation of industrial wastes, establishment of the hi-tech industries, creation of job opportunities etc.

Functions of the NRDC

1. Development and Transfer Of Indigenous Technologies
 - a) Technology licensing
 - b) Technology development
 - i) Joint technology development with R & D institutions
 - ii) Joint technology development with Industry
 - iii) Soft loans to industry/entrepreneurs as risk finance for technology development
 - iv) Equity participation in commercial plants based on indigenous technologies as risk finance for commercialisation.
2. Development and Promotion of Rural Technologies
3. Promotion of Export of Technology
4. Invention Promotion Programme
 - i) Prize awards for meritorious inventions
 - ii) Financial Assistance for the fabrication and testing of models or prototypes of inventions or new ideas
 - iii) Assistance for patenting inventive ideas
 - iv) Assistance to inventors to commercialize their inventions
 - v) To bring out publication to foster the spirit of inventivity and to keep inventors informed about the latest developments.
5. Informatics for Technology Transfer
 - i) Preparation and updating of project reports/profiles on indigenous technologies
 - ii) Financial assistance in patenting
 - iii) Training programmes for entrepreneurs on technology transfer and patent system
 - iv) Exhibitions, workshops, get-togethers, publication of informative journals and magazines.

ANNEXURE V

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH

SCHEMES/SUPPORT FACILITIES FOR TECHNOLOGY DEVELOPMENT

The DSIR is engaged in Technology promotion, development, utilisation and Transfer. The DSIR programmes are pursued through three different groups viz.

1. Research and Development by Industry (RDI)
 - i. In-house R & D in industry
 - ii. Scientific and Industrial Research Organisations
 - iii. Fiscal incentives for scientific research
2. Programme aimed at Technological Self Reliance (PATSER)
 - i. Technology absorption and adaptation
 - ii. Talented Indian engineers and scientists scheme
 - iii. Indigenous development of capital goods
3. Scheme to enhance the efficacy of Transfer of Technology (SEETOT)
 - i. National register of foreign collaborations
 - ii. Industrial technology transfer and trading in technology
 - iii. Promotion and support to consultancy services including consultancy development centre and linkages with inter-national organisations.

The DSIR has launched a scheme for "Promotion of Industrial Research in Industry" during the 7th Five Year Plan Period with the following aims and objectives.

- 1) Promotion of interaction between National laboratories, educational institutions and the industry through organising and supporting workshops/seminars/get-togethers.
- 2) Bringing out publications on the various activities and achievements of the in-house R & D units.
- 3) Facilitating quick retrieval and analysis of activities of in-house R & D centres.
- 4) Bringing closer interaction between the DSIR and in-house R & D centres.

To provide recognition to the efforts of the industry towards innovative research and TD. The DSIR has instituted the following annual awards in 1987.

- 1) Four awards for in-house R & D units for their outstanding achievements in the field of industrial research one each for
 - a) Chemical and allied sectors

- b) Electrical and Electronics sectors
 - c) Mechanical and automotive sector
 - d) Metallurgical and other process industries sector.
- 2) One award for Best Efforts made by the industry for successful commercialisation of public funded R & D. The award is common to all sectors.

The awards will be in the form of medals or shields along with citations given to industrial R & D units for a particular year. In assessing the performance, notable achievements related to a selected successfully completed projects/technologies commercialised by the applicant firm would be taken into account.

All industrial in-house R & D units having valid recognition with the DSIR, N.Delhi are eligible for consideration.

The DSIR schemes for R & D

1. National Register of foreign collaborations (NRFC)
 - i. Analysis of import technologies from financial, economic, legal and technological angles
 - ii. unpackaging and studying technological components to avoid repetitive import of the same technologies
2. Technology absorption and adaptation scheme (TAAS)
 - i. Support and promote measures for absorption of imported technologies
 - ii. Adaptation of products and processes relevant to domestic requirements as well as exports
3. Transfer and trading in technology (TATT)
 - i. Collection and dissemination of technology trade information
 - ii. Guidance, support and linkages with agencies engaged in transfer and trading activities in technologies at national and international levels
 - iii. Support for SSI for technological issues with reference to specific export requirements
 - iv. Participation and support for technology market surveys, trade fairs and exhibitions, pre-feasibility studies, project reports etc.
4. Consultancy development centre (CDC)

Set up with the support of various consultancy organisations and associations such as FIEO, NACE and ACE.

- i. Encourage and support the technological activities including collection and dissemination of information/data of consultancy organisations,
- ii. Support the availability of consultancy services to SSS on preferential terms,
- iii. Support to build up infrastructural facilities etc. for pilot studies and for

commercialisation of indigenous know-how.

5. Consultancy development assistance (CDA)

- i. Encourage and recognise the performance and activities of consultancy organizations.
- ii. Provision of awards to consultants
- iii. Participation *pi* in seminars, workshops, trade fairs, conferences, exhibitions etc.

ANNEXURE VI

A. FINANCIAL ASSISTANCE FOR TECHNOLOGICAL DEVELOPMENT ***I. FINANCIAL INSTITUTIONS AT NATIONAL LEVEL***

1) Industrial Development Bank of India (IDBI).

a) Schemes of assistance.

- i) Project finance.
- ii) Modernisation Assistance.
- iii) Technical Development Fund.
- iv) Technology upgradation.
- v) Energy conservation.
- vi) Equipment Finance/refinance.

b) Promotional Activities

- i) Technical consultancy.
- ii) Technical assistance.
- iii) Entrepreneurship Development.
- iv) Venture capital.

As a principal financial institution, coordinates the activities of the institutions engaged in financing, promoting or developing industry.

Assistance can be direct, refinance or consortium basis, need based and selective.

By and large preference is given to projects based on indigenous technology, employment oriented, export oriented, import substitution, leading to improvement in quality, productivity, cost reduction, energy saving, new products/designs etc.

2) Small Industries Development Bank Of India (SIDBI)

a) Schemes of Assistance

- i) Modernisation,
- ii) Technology upgradation.

- iii) Quality control.
- iv) Rehabilitation.
- v) Export promotion.
- vi) Entrepreneurial Development.

As a wholly owned subsidiary IDBI, since 1990, is functioning as the principal financial institution for promotion, financing and development of S.S.S and also coordinates the functions of other institutions engaged in similar activities. Operates through SFCS, SIDCS, Commercial banks, co-operative and Regional Rural Banks. Direct assistance is also offered.

3) Industrial Finance Corporation Of India (IFCI)

a) Project Financing schemes

- i) Technology upgradation.
- ii) Renewable energy systems.
- iii) Modernisation.
- iv) Risk capital and Technology finance through RCTC*

b) Promotional services

- i) Consultancy subsidy.
- ii) Interest subsidy.
- iii) Entrepreneurship Development.

First and the oldest National level Development Bank (1948) to assist new industrial projects, expansion, diversification, renovation, modernisation, sponsored R & D etc.

Assistance is both direct and indirect under modernisation, units envisaging upgradation of technology, export orientation, import substitution, anti-pollution measures, energy saving, conservation of scarce raw-materials etc can avail the facility Interest subsidy for Quality control and adoption of

indigenous technology which is not already exploited.

B. TRAINING AND CONSULTANCY SERVICES

Institutions/Services rendered

1.NISIET

- a) Training.
- b) Research.
- c) Consultancy.
- d) Preparation of feasibility reports.
- e) Modernisation of SSIs.
- f) Product and project identification.
- g) Revival of sick units.
- h) Identification of sources of technology.

2. THE DSIR

- a) Consultancy Development centre (CDC)
collection and Dissemination of information/data of consultancy organisations is its main objective.
- b) Consultancy Development and promotion Assistance scheme(CDPAS)
Provision of awards to consultants, participation in overseas seminars/workshops/conferences/ trade fairs/exhibitions etc.
- c) Registration of consultation and Referral services scheme (RCRSS)
To help the consultants and users of consultants for effective utilisation of consultancy services.

Functioning since 1962 as an autonomous society under GOI. Training is the main activity. Consultancy promotion division of the DSIR maintains links with consulting associations, R & D organisations for the development of human resources. Like training of professionals providing necessary incentives, arranging training abroad etc.

ANNEXURE VI (Contd.)

FISCAL INCENTIVES

Nature of Incentives	Remarks
1. Income-Tax Relief	For Recognised in-house R & D units
1. Revenue expenditure on scientific research related to business.	Under section 35 (1) (i) of the Income-tax Act, 1961, full deduction can be availed.
2. Capital Expenditure on scientific research related to business.	Under section 35(2) of the Income-Tax Act, 1961 ,full deduction is allowed from the income of the year in which the expenditure has been incurred.
3. Contributions made to scientific and Industrial research organisations approved by DSIR like universities, NTs, IIMs and equivalent institutions	As notified under section 35 (1) (ii) (iii) of the Income Tax Act 1961, qualify for total exemptions from Income-tax.
II. Weighted Tax Deduction	
1. For sponsored research in approved national laboratories functioning under ICAR, ICMR & CSIR.	Administered by DSIR in accordance with section 35 (2 AA) of the Income Tax Act, 1961, upto 125 per cent as weighted tax deduction introduced by the finance bill 1993-94.
III. Accelerated Depreciation Allowance	
1. For plant and machinery installed in the accounting year relevant to the assessment year, for manufacture/ production of goods based on indigenous technology developed in recognised in-house R & D units, SIROS, Government and National laboratories.	As per rule 5(2) of the Income-Tax rules, 1st April 1987, Depreciation allowance at a higher rate of 40% is allowed, on the basis of a certificate issued by DSIR on plant and machinery relating to environment protection and pollution control depreciation is admissible at 100% of capital cost under the I.T. rules.
IV. Exemption from Drugs (Prices Control) Order, 1987	
For production of Bulk drugs based on process developed through indigenous R & D, and also for the	As per 1989, based on the certificate issued by DISR, all recognised in-house R & D units

processes developed by National laboratories and acquired and actually used by the manufacturers

and SIRO's are eligible for exemption from DPCO for a period of 5 years.

V. Awards *

For R & D efforts in industry, recognition is provided for innovative research and Technological development.

In-house R & D units having valid recognition are eligible for competing for the national awards by DSIR, implemented since 1988.

VI. Liberal Import Facilities

Any equipment, Components, raw-materials etc. needed for R & D, technology upgradation, improvements in the manufacturing process, introduction of new products, processes, developing substitutes for imported items etc. can be imported liberally under the open-general license (OGL).

Only recognised in-house R & D units were eligible for such facility since 1973. Now this facility has been absorbed in the liberalised trade policies announced by the Government in 1991

VII Others

1. International R & D Collaborations

For R & D Collaborations between companies/institutions in India and those in other countries.

Scheme Implemented by DSIR

Recognised in-house R & D units and SIRO's are eligible to apply for permission financial assistance to a limited extent is also considered.

2. For Technology development and Technology absorption programmes taken up by in-house R & D units and SIRO's on their own or in collaboration with national laboratories, IITs, universities etc.

Financial support is extended by DSIR under the schemes of Research and Development by Industry (RDI), and programme Aimed at Technological Self Reliance (PATSIIR) and scheme to enhance the efficacy of Transfer of Technology (SEETOT).

3. A Recognised In-house R & D unit can obtain recognition from universities as an approved centre for conducting research leading to award of degree/diploma.

4. Recognised in-house R & D units enjoy a great deal of credibility for obtaining financial assistance for R & D from any institution.

VII Other Benefits Provided by DSIR

- i)** Remittance of foreign exchange
for deputing experts to attend international symposia and seminars, exhibitions, tradefairs, international R & D collaborations.
- ii)** Engagement of foreign experts
for R & D and for maintainee/
commissioning of imported R & D
equipment requiring expertise.
- iii)** Allotment of special
controlled materials for R&D

* Apart from DSIR's National Awards, awards are also given by FICCI, HMA, Institution of Engineers, Hyderabad Exhibition Society AIMO, industry association etc. for best inventions, best import substitutes, Best entrepreneurship, Best TD, Best in R & D for commercialising public funded R&D etc.

ANNEXURE VII
NRDC - LICENSING OF PROCESSES

I TERMS & CONDITIONS

1. Lumpsum premium is payable before entering into agreement which is not normally refundable.
2. Royalty is payable bi-annually, after starting production, on ex-factory sale price, excluding duties and taxes for the period stipulated.
3. After the expiry of the paid period no royalty is payable to NRDC and the licensee is free to use the know-how for any length of time.
4. As per the policy of the corporation, exclusive or zonal exclusive license is not granted.

II. After executing the agreement, NRDC will request the concerned Institute / laboratory to release the process details to the licensee.

III. The licensee may go either personally or send him authorised representative to the Institute/ laboratory on the date(s) suggested by the laboratory/ Institute to receive the know-how.

IV. The know-how / process details will be given only at the concerned laboratory / Institute & not at NRDC.

V. Under the agreement, licensee will get the following:

- i. The right to use the know-how/patent as developed.
- ii. The laboratory/Institute will give the available data on the process as collected by it.
- iii. The laboratory/institute will demonstrate the process on scale at which it is developed.
- iv. The laboratory/ Institute will train the licensee or his representatives for a specified time on how to use the process/ know how.
- v. While normally/detailed design engineering, fabrication, erection and commissioning have to be done by the licensee, in some cases the laboratory/ institute can set up the plant on a turn-key basis for which the charges will be separate and will have to be negotiated with the institute/laboratory by the licensee. NRDC also undertakes turn-key projects on selected processes.

- vi. Should the licensee encounter any difficulty in getting prescribed yield or quality of the products, the concerned scientist will assist the licensee for which the licensee will have to pay as per the rules of the institute/laboratory concerned.
 - vii. The licensee is entitled for any improvements that the institute/ laboratory might do on the process during the period of the agreement with or without additional payment.
 - viii. NRDC will recommend to the appropriate authority for getting imported equipment, imported raw materials scarce indigenous raw materials controlled by the Government if any, required in the process.
- VI. Samples/photographs, if any, required for inspection may be obtained directly from the concerned institute/laboratory.
- VII. Before entering into agreement with NRDC, the customer is advised to consult the concerned laboratory/institute.
- VIII. If the customer is satisfied with the process & the terms are acceptable, formal application should be made and then NRDC sends a formal offer along with a copy of the draft agreement.

After the formal order, premium has to be paid by a Bank draft drawn in favour of NRDC, N. Delhi, and other documents. On receipt of the draft, two copies of agreement will be sent to the customer for execution.

As soon as the executed agreement is received by NRDC, the laboratory/institute will be instructed by NRDC to release the process. Generally all the licensers are issued only on non-exclusive basis. It implies manufacture and sales in India by more than one party. The No. of license, to be issued will be decided by the corporation from time to time depending upon the Installed capacity and demand of the particular product.

ANNEXURE VIII

RECOGNITION TO IN-HOUSE R & D UNITS

A scheme for granting recognition to in-house R & D units in industrial sector and private or public funded R & D laboratories was being operated by the Department of science and Technology, GOI, N. Delhi from 1973. This activity is now dealt by the Department of scientific and Industrial Research, Ministry of Science and Technology. One of the objects of this scheme is to provide liberalised import facilities to recognised R & D units forequipping their laboratories with equipment, components, raw-materials etc., necessary to carry out R & D work in order to update the technology and effecting improvements in the manufacturing process, introducing new products, processes, developing substitutes for imported items, etc.

Definition of R & D for the purpose of Recognition

R & D would include effort for import substitution, export promotion etc, process/ product/design improvements, development of new technologies, design and engineering, testing and analysis related to these efforts, development of new products or discovering new methods of analysis, productivity research for increased efficiency in use of resources, capital equipment and materials, fuel efficiency, recycling of wastes and research for efficient use of scarce materials etc.

Activities not considered under R & D for Recognition

Market research, work and methods study, operational and management research, testing and analysis of routine nature for operational process control, quality control and maintenance of day to day production, maintenance of plant etc.

Requirements for getting Recognition

The R & D activities are expected to be separate from routine activities of the firm such as production and quality control etc. It is not necessary that all R & D activities are segregated and located in a separate building. It is appreciated that In-House R & D activities are likely to be intermingled with the activities (elated to the manufacture in the factory and part of the production equipment and infrastructure would be utilised to carry out certain aspects of the R & D programme. However, the firms are required to maintain separate account for their R & D activity. The In-House R & D units would have atleast some staff exclusively engaged in R & D and there would be a full time

manager for the R & D who would have direct access to the M.D or to the BODs depending on the size of the unit.

R & D units seeking recognition should have well defined R & D programmes and Basic infrastructure is to be built up for understading these programmes.

Import Facilities For R & D Activities

All the recognized R & D units/laboratories and institutions could import their full requirements of technical and professional equipment, raw-materials, components, spares or other items on open-general license subject to actual user conditions. Equipment/materials imported for R & D should not be used for commercial production or sold. It will not be necessary to obtain industrial license for import of capital goods required for R & D purposes.

As per the Import and Export policy 1985-88, In-House R & D units recognised by the DSIR which have, been in existence for past three years during which they have made substantial investment in R & D work, are eligible to import know-How, design, consultancy etc. upto a value of Rs. one crore.

ANNEXURE IX
TESTING FOR DIFFERENCE IN PROPORTION

1) Using Two-Tail Test $H_0 = P_1 = P_2$ (null Hypothesis)

$H_1 = P_1 \neq P_2$ (Alternate Hypothesis)

2) Using One-Tail-Test $H_0 = P_1 = P_2$

$H_1 = P_2 > P_1$

$P_1 = P_2$ means factor intensities have not changed or
 factor intensities have are same.

$P_1 \neq P_2$ means factor intensities are different

$P_1 = K/L$ at the beginning of the study period

$P_2 = K/L$ at the end of the study period

$$P_2 = \frac{n_1 p_1 + n_2 p_2}{n_1 + n_2} \quad \text{Where } n_1 \text{ and } n_2 \text{ are no: of observations}$$

$$q = 1 - P$$

$$Z = \frac{P_1 - P_2}{pq (1/n_1 + 1/n_2)}$$

If computed Z is greater than 1.96 we reject H_0 in Two-Tail -Test and if it is greater than 1.65 we reject H_0 in one-Tail-Test.

ANNEXURE X

Cobb-Douglas Production Function

Testing of Returns to Scale for Statistical Significance Tintner's Test

$\beta_1 + \beta_2 = 1$ Constant Returns $\beta_1 =$ Coefficient of labour

$\beta_1 + \beta_2 = >1$ Increasing Returns $\beta_2 =$ Coefficient of capital

$\beta_1 + \beta_2 = <1$ Decreasing Returns

$\epsilon e1^2$ = Sum of squared residuals from unrestricted form

$\epsilon e2^2$ = Sum of squared residuals from restricted form

$$\text{(computed 7) } F^* = \frac{\epsilon e2^2 - \epsilon e1^2}{\epsilon e2^2} (n - k)$$

Implication : If (Computed) F^* value is less than table value H_0 is not rejected
where

H_0 = null hypothesis according to which $(\beta_1 + \beta_2) = 1$.

H_1 = alternative Hypothesis according to which $(\beta_1 + \beta_2) \neq 1$.

or if H_0 is not rejected the industry is subject to constant returns to scale.

ANNEXURE XI
NEW PRODUCTS DEVELOPED IN THE SAMPLE UNITS
EE GROUP

1. Sealed lead acid batteries.
2. Lithium batteries for defence.
3. Solar photovoltaic systems.
4. Generation grid turbines.
5. On-line voltage stabilizer.
6. STD locks, Burglar Alarm Motion detector.
7. Component and LCR meters development.
8. Metal casing detector.
9. Security Alarm System.
10. Water level controllers.
11. Ruggedised computer with built in air-cooling.
12. Rechargeable Nickel cadmium cells & special batteries.
13. Electronics motor starters, power factor controllers.
14. Developed instrumentation cables used in transmission of signals by ONGC.
15. Component development Backward integration.
16. Distance temperature recorder of different models & vibrating machine.
18. Stepper motors used by instrumentation manufacturers, Textile mills, spinning mills.
19. Full range of head lamps to tail lamps for APSRTC.
20. X-ray baggage inspection & dynamic breaking resistors.
21. Smart - XI - ASM.
22. Solar panel controller - Micro - Processor based automatic control systems.
23. First solid state electricity meter plant in south Asia.
24. Spectra-500 Low cost image processing system.
25. New model wooden switches with high esthetic value.

CDP GROUP

1. Cheelated Micro Nutrients.
2. Nickel Hydroxide, Nickel Nitrate.
3. Medicated creams, tooth pastes, liquids.
4. Nutrients for poultry & human beings.

ENGG GROUP

1. Opto mechanical equipment for machine tool industry.
2. Electro-optical mechanical instruments.
3. Simple projector-cum-rectifier for keral land use board photographic & sensing products.
4. Tooling for manufacturing of castings.
5. Augmented satellite launch vehicle whose original model was made by Wind tunnel model for ASLV & PSLV for ISRO.
6. Step-way recorder for BHEL. Special purpose equipment for VSP.
7. Rolling machines, cutting & pressing Tools jigs & fixtures.
8. Night-vision instrument devices for defence.
9. Developed control panel to be used along with motor, Developed pumps.
10. Spit fire – LPG based industrial tooling kit which handles numerous heat-maintenance jobs like soldering, shrinking, hardening, melting, glazing and annealing in workshops factories, Gems & Jewellery industries, refrigeration engineering.

ANNEXURE XII

IMPORT SUBSTITUTE PRODUCTS

EE

Medical electronics equipment like ultra-sonic medical equipment, Di-electro florosis, cordless electronics equipment, ultrasonic timer technique.

Test equipment/chambers for different quality/ process control tests.

Mini-Variable auto transformer to ECIL.

Thermal batteries for defence, lithium battery systems for defence- Different models conductive elastimer electro static discharge. All conductive related products used in space, mining, explosives, petrochemical industries and all electronics industries rechargeable nichel cadmium cells-different models.

Power utilities distribution flow level and control instruments Temperature detectors and thermo couples for temperature detectors and thermo couples for temperature measurement. Electronic analytical instruments. Hi-Tech products like Micro processor based uv spectro photometer, polarographic analyser and many others.

STDR (speed, time, Distance recorder) fitted in railway engines (acts like a Black Box in an aircraft).

Voice frequency transformers, loading coils, way-station equipment-Electronics and Tele communication equipment-special Lamps for industrial, Navy defence, railways etc.

Electrical items for diesel locomotives drum motor for ECIL.

Professional antennae systems especially for defence (with CAT approvals).

Electronics visual interpretation systems i.e. Image analyser and dual densitometer, spectra - 500 - a powerful image display processor.

Control equipment for diesel loco motives (4 products are import substitutes) Type-pep series-wire-wound resistors.

CDP

Substitution of imported raw-materials.

Mud-chemicals used in oil drilling, Chrome lignite.

Nickel Hydroxide, saponane, Ammonium Bromide, Nickel Nitrate for batteries.

Ethopabate-BP veterinary poultry mainly and metochlopramide HCL for humans.

ENGG

Pre-setter-opto-mechanical equipment for machine tool industry in India
Multispectral interactive data analysis system, colour composite printer and enlarger, erator fish and shrimp culture optical pantograph.

CNC machining of critical items like aerofil profile, 3-D profile etc.

Special purpose machines and tools for BHEL and vizag steel plant.

Surveying instruments High precision.

Thermo Chambers, Vaccum furnaces, Vaccum systems.

Manipulators and special bearings pulleys.

Gas-related high-risk products.

ANNEXURE XIII**PRODUCT DETAILS OF AWARD WINNING UNITS*****BEST PRODUCT INVENTION AWARDS*****a. EE Group**

- 1) Metal casing Detector
- 2) Burglar Alarm motion Detector
- 3) Smart XT-ASM
- 4) Solar Photo Voltaic Systems (Unspecified)
- 5) Professional Electronics components (unspecified)

b. ENGG Group

- 1) LPG related products (unspecified)

BEST EXPORT PERFORMANCE

- 1) Agricultural implements (unspecified)
- 2) LPG related products.
- 3) Diaminostil Bene Disulphonic acid
(Powder form) used for making whiteners.

COMMERCIALISING OF PUBLIC FUNDED R&D

- 1) Non-conventional energy using systems/Products.

NATIONAL AWARD FOR R&D EXCELLENCE

- 1) Solar photo voltaic systems.

BEST IMPORT SUBSTITUTE AWARDS**a. EE Group**

- 1) Conductive elastimer
Electro-Static-Discharge.
- 2) Micro-Processor based UV Spectro photometer, Polargraphic analyser etc.
- 3) Precision wire-wound resistor's, Type-pep Series
- 4) Special Type of antenna for Defence
- 5) High frequency receiving systems
- 6) High Frequency Dipol antenna
- 7) Electronic Components for Defence

b. ENGG Group

1. Vacuum related products for Defence such as furnaces systems etc.

BEST TD IN R & D

- 1) Water Quality analyser
- 2) UV-VIs Spectrophotometer
- 3) LPG related products.

EXCELLENCE IN QUALITY

- 1) UPS upto 90KVA
- 2) Temperature controls, Relays for refrigerators, thermostate, Filters etc
- 3) Professional electronics equipment (unspecified.)

ANNEXURE XIV (a)

THE DETAILS OF EXPORTS BY THE SAMPLE UNITS

RANGE OF EXPORTS	DIRECTION OF EXPORTS
Power supplies, computers (Hard and Software), solid state motor starters Instrumentation, Temperature detectors, Measuring Instruments, electronics and Telecommunication equipment, Electrical, switcher, Cables, powerflow items.	Srilanka, South Africa, Singapore, Bangladesh, Nepal, Pakistan, Malasia, Japan, Saudi Arabia, Middle East countries.
Anti Biotics, Powder injectives, Trimethoprim, Intermedites, fine chemicals, Dried Aluminium Hydroxide, Sulpha methaxyzol, Anti T.B, paracetamol, G.G. ether. Di-amino stil bene Disulphonic acid powder, oil drilling chemicals, Analgin etc.	U.S.A. Europe, S.E.Asia, Ghana, Belgium, Germany, Nepal, Spain, Holland, Taiwan, Vietnam, Bangladesh Singapore, Hong-kong, Africa, Italy, Australia, Canada, Korea, Russia, Nigeria.
Remote sensing equipment, gas related equipment, rice mill machinery, Agricultural implements Borewell, special bearings, bearings, manipulators, vacuum related products for defence.	Rome, UNFAO, Australia, Sweden, U.S.A, U.K, Italy, France, E.E.C, African Countries, Thailand, Japan.

ANNEXURE XIV (b)
THE DETAILS OF RANGE OF IMPORTS

Range of Imports	Countries
I.Cs, Transfusers, Compressors Controls. Higher capacity component ponents, special purpose alloy, Teflon heating and coating element, element, ceramics & cermet com positions, displays, connectors, Batteries, Cathod-ray Tubes, Bred Boards, Nickel, Cadmium cells, PVC Resin, Microprocessors, Sen sors, Semi-conductor devices, Tungsten rods, Dument wires, Contacts laminates, photographic films, Potentiometers, Capacitors, Diodes etc.	U.S.A., Germany, Japan Italy, Singapore, U.K., Korea, Polland, Hong-kong, Taiwan, Belgium, Brazil, Spain, Switzerland.
Chemicals, chloroform, Additives, Trimythyoxy, Benzol, Iodine, oxytha zine, Hydroxil, Arnine sulphate, prodophynus roots,	Japan, Europe, Italy, Spain, Korea, U.S.A. U.K, Germany, China, france, Hongkong, Holland.
Lenses, filters, components, optics, Titanium columbium, Alluminium special alloys, fibre glass cloth, optical glass, image intensified tube, fall bearings, Graphite heating elements, motors etc.	Japan, U.S.S, Germany, France, U.K.Sweden, Nigeria, Denmark.

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