VOLUME - I

Study to Access Research & Development (R&D) in Micro, Small & Medium Manufacturing Enterprises (MSMEs) In India

Supported & Catalyzed by:

GOVERNMENT OF INDIA
Department of Science & Technology
National Science & Technology Management
Information System (NSTMIS)

Conducted by:

NAFEN National Foundation of Indian Engineers

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PREFACE

National Science and Technology Management Information System **(NSTMIS),** Department of Science & Technology, Government of India entrusted National Foundation of Indian Engineers **(NAFEN)** to undertake the study entitled **"Study to Assess Research and Development (R&D) in Micro, Small & Medium Manufacturing Enterprises (MSMEs) in India".**

The study intends to assess the R&D status of MSMEs in India on various factors like Number of R&D Enterprises, R&D Expenditure, Export, R&D Employees, Areas & Benefits under R&D Activities. It also covers other factors like Sources of R&D Input of the Enterprise, Sources of Funds for R&D Activities, Specialized Training for R&D Personnel and any problems encountered while undertaking R&D activities.

Data has been collected from 4896 enterprises spread over 414 clusters covering 11 industrial sectors of Indian economy viz Agriculture Machinery, Automotive, Chemical, Drug & Pharma, Electronics, Gems & Jewelry, Leather, Light Engineering, Scientific Instruments, Machine Tools and Textiles & Garments.

A Local Project Advisory Committee **(LPAC)** was constituted under the chairmanship of Dr. Praveen Arora, Head – NSTMIS, Ministry of Science & Technology, Govt. of India. The members of the LPAC were from Indian Statistical Institute; Department of Scientific & Industrial Research; National Small Industries Corporation Ltd; National Science & Technology Entrepreneurship Development Board; National Research Development Corporation; Small Industries Development Bank of India; Confederation of Indian Pharmaceutical Industry; Ministry of MSME; Milestone Engineering Pvt. Ltd; Badli Industrial Estate Association; Indian Electrical & Electronics Manufacturers' Association; The Automotive Component Manufacturers Association of India.

Detailed structured Questionnaire and Sampling Plan were finalized in the 1st meeting of the LPAC held on 15th December, 2010 at New Delhi under the chairmanship of Dr. Praveen Arora, Head – NSTMIS, Ministry of Science & Technology, Government of India.

The study has been divided into **Two Volumes**, **Volume I : Detailed Report**, which has five sections, **Section - 1:** Overall Findings; **Section - 2:** About the Study which includes Introduction, Objective, Scope, Universe & Sample Size, Methodology, Time Period, Limitations and PI's Observations; **Section - 3:** Detailed Analysis; **Section - 4:** Case Studies; **Section - 5:** Questionnaire and **Volume II : Detailed Calculations** (Annexures).

From the data collected, it is observed that on over all basis, 10.33% enterprises are undertaking R&D activities and spending 0.97% of sales on R&D and employing 11.86% of total employees in R&D activities. 24.51% of R&D enterprises are engaged in exports and exporting 18.58% of sales. It can be inferred from the analysis that MSMEs still possess in India, a low incidence of doing R&D and spend a small proportion of their sales in such activities (less than 1% of sales).

Throughout the working on this study, the main aim had been to collect meaningful and effective information to assess the present day status of Research and Development in MSMEs in manufacturing enterprises in India. We sincerely hope that the results of this study will be useful to all concerned departments, policy planners, decision makers, industry, existing & potential MSME entrepreneurs and various other agencies and trade associations of the country.

New Delhi
31st August, 2012

Dr. P. K. GUPTA
Project Investigator

ACKNOWLEDGEMENTS

At the outset, NAFEN would like to specially thank **Dr. Praveen Arora**, Head, NSTMIS, Department of Science & Technology, Government of India for his guidance and motivation from time to time during the course of this study.

NAFEN is equally grateful to **Prof. Dr. S.S. Handa,** Senior Consultant (Quality Management Sciences), Indian Statistical Institute, New Delhi for his valuable guidance, without which it would not have been possible for NAFEN to complete this study.

NAFEN is also deeply obliged to all the members of the Local Project Advisory Committee (LPAC) and all the respondents for giving their valuable inputs and suggestions for completing the study in time.

We are thankful to all our colleagues working in NAFEN, who helped NAFEN in completing this study within the stipulated time period.

New Delhi
31st August, 2012

Dr. P. K. GUPTA
Project Investigator

LOCAL PROJECT ADVISORY COMMITTEE

A Local Project Advisory Committee (LPAC) was constituted to advice and guide NAFEN from time to time during the execution of the study. The composition of the LPAC was as follows:-

Chairman

Dr. Praveen Arora, Head, NSTMIS, Department of Science & Technology, Govt. of India

Members

Prof. Dr. S.S. Handa, Senior Consultant (Quality Management Sciences), Indian Statistical Institute, New Delhi

Representative of Development Commissioner, Min. of MSME, GoI

Dr. H K Mittal, Advisor & Head – NSTEDB, Department of Science & Technology, Ministry of Science & Technology

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Mr. R K Das, General Manager, Small Industries Development Bank of India

Mr. Sudesh Kumar, Executive Secretary, Confederation of Indian Pharmaceutical Industry

Mr. H S Arora, President, Dyna Plast (India)

Mr. Ravi Sood, Secretary, Badli Industrial Estate Association

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Section – 1
Overall Findings

SECTION -1: OVERALL FINDINGS

With the independence of India in 1947, India adopted planned economy for achieving socialistic pattern of society and passed various industrial policy resolutions from time to time. Government earmarked a special role for micro, small and medium scale industries in the Indian economy. Due protection was accorded to both public & private sectors especially for small scale industries right from 1951 to 1991. In 1991, India opened up the economy and adopted a policy of liberalization, privatization & globalization (LPG). Earlier certain products were reserved for small-scale units for a long time, though the list of products was decreasing due to changes in industrial policies and climate. SMEs always represented the model of socio-economic policies of Government of India which emphasized judicious use of foreign exchange for import of capital goods and inputs; labor intensive mode of production; employment generation; non concentration of diffusion of economic power in the hands of few (as in the case of big houses); discouraging monopolistic practices of production and marketing; and finally effective contribution to foreign exchange earning of the nation with low import-intensive operations. It was also coupled with the policy of de-concentration of industrial activities in few geographical centers.

As a result of liberalization, privatization & globalization, coupled with WTO regime, Indian MSMEs have been passing through a transitional period. With slowing down of economy in India and abroad, particularly USA and European Union (EU) and enhanced competition from China, Taiwan, Korea etc. and a few other low cost centers of production from S E Asian countries , many units have been facing a tough time. Those MSMEs who have strong technological base, international business outlook, competitive spirit and willingness to restructure themselves withstood the present challenges and come out with success and made big contribution to the Indian economy.

The liberalization of economic policies in the last two decades and intensifying market competition tends to be a cause of policy concern for the survival of MSMEs in emerging economies like India as these firms account for large number of industrial units and provide varying employment opportunities.

Given their limited financial and intangible resources, the promotion of R&D among MSMEs has become a very important policy parameter. The present study sponsored and catalyzed by National Science & Technology Management Information System **(NSTMIS), GoI** has been undertaken to assess the current status of R&D in Indian manufacturing MSMEs and also explore status on various other factors that determine the R&D behavior.

Data was collected from 4896 enterprises in 11 industrial sectors speared over 414 clusters in 21 states (177 cities / districts) as the sample size. The major findings of the study on over all basis are:-

1. **Working Enterprises:** Out of 7085 enterprises surveyed, 4896 (69.11%) enterprises were found working, 1593 (22.48%) closed and 596 (8.41%) non-traceable.

2. **Size of the enterprises:** Out of 4896 working enterprises, 4710 (96.20%) are Micro, 174 (3.56%) Small and 12 (0.24%) Medium.

3. **R&D Enterprises:** Out of 4896 working enterprises, 506 (10.33%) enterprises undertaking R&D activities. Size wise: 358 (7.60%) Micro, 138 (79.31%) Small and 10 (83.33%) Medium enterprises

4. **R&D Expenditure & International Comparisons:** It is observed from the study that Indian MSMEs are spending 0.97% of sale turnover on R&D. It is also seen that medium

enterprises are spending more on R&D per enterprise as compared to small and micro. Comparing R&D expenditure as a %age of sales turn over of Indian MSMEs with international data , we find from the report entitled Advancing Technological Innovation Strategies for Small and Medium enterprises in an IT economy, Published by Ministry of Economy, Trade and Industry (METI), Japan that MSMEs in Japan are spending around 1.9% to 3%. Another paper entitled "An Examination of Taiwan's Innovation, Policies and R&D Performance" published by Chung-Hua Institution for Economic Research, Taiwan has reported R&D expenditure to Sales as 5.94% at Hsinchu Science-based Industrial Park. Copennagen Business School in a report entitled "Malaysian Manufacturing Systems of Innovation and Internationalization of R&D" that R&D expenditure for Malaysian MSMEs varies from 0.63% to 0.69% while OECD countries spend 2.33%. In another report published by EU entitled "Overall review of EU Member States and Associated countries", it is observed that EU countries spend on an average around 2.01%. It is also noted that China is spending 1.42% and South Korea 2.19%

International comparison of various countries is summarized below:-

Sr. No.	Country	R&D Expenditure / Sale Turnover		Sample Size	Basis of Defining SMEs	
		%	Ref.	Nos.	Nos. Employees	Ref.
1	China	1.42	www.wlicsmb.org /upimg/soft www.slideshare. net/MIISChina www.siteresourc es.worldbank.org	National Data. No Specific Sample Size Given	Micro < 100 Small < 300 Medium 300 to 2000	www.apec-smeic.org
2	EU Countries	2.01	www.ec.europa. eu/research/inno vation-union/pdf/.../coun try_review.pdf	National Data No Specific Sample Size	Micro < 10 Small < 50 Medium < 250	www.stats.oecd.org/glo ssary
3	India	0.97	NAFEN Study	506	Original Investment in Plant & Machinery	www.eisbc.org/Definitio n_of_Indian_SMEs.asp x
4	Japan	1.9 to 3	www.techmonitor .net/tm/images/3/ 34/03jul_aug_sf6 .pdf	268	<300	www.smeda.org.pk
5	Malaysia	0.63 to 0.69	www.openarchiv e.cbs.dk/.../MSI_ and_internationalization_of_R%2	National Data. No Specific Sample Size Given	<75	www.smeda.org.pk

Sr. No.	Country	R&D Expenditure / Sale Turnover		Sample Size	Basis of Defining SMEs	
		%	Ref.	Nos.	Nos. Employees	Ref.
6	OECD Countries	2.33	www.openarchive.cbs.dk/.../MSI_and_internationalization_of_R%2	National Data. No Specific Sample Size Given	Micro < 10 Small < 50 Medium < 250	www.stats.oecd.org/glossary
7	South Korea	2.19	www.merit.unu.edu	National Data. No Specific Sample Size Given	<300-500	www.repository.library.georgetown.edu
8	Taiwan	5.94	www.ebusinessforum.gr/old/content/downloads/Taiwan.pdf	289	<200	www.moeasmea.gov.tw

5. **Export:** Out of 506 R&D enterprises, 124 (24.51%) are exporting @ 18.58% of sales
6. **Manpower:** 11.86% of total employees are exclusive for R&D activities. R&D female employees are only 12.71 % of male R&D employees
7. **Areas under R&D activities:** Out of 506 R&D enterprises, 390 (77.08%) enterprises reported New Product Development, followed by 352 (69.57%) Improvement in Existing Product as the main areas of R&D activities.
8. **Benefits under R&D:** Out of 506 R&D enterprises, 483 (95.45%) enterprises reported Enhancing Existing Domestic Market Share, followed by 462 (91.30%) Access to New Domestic Market as the benefits under R&D.
9. **Sources of R&D:** Out of 506 R&D enterprises, 447 (88.34%) enterprises reported Customer, followed by 430 (84.98%) Access to Skilled Manpower as the sources of R&D.
10. **Sources of Funds for R&D:** Out of 506 R&D enterprises, 501 (99.01%) enterprises reported Self Financing as the Source of Funds for R&D. 143 (28.26%) reported funds from FIs also.
11. **Training for R&D Personnel:** Out of 506 R&D enterprises, 122 (24.11%) enterprises reported having given specialized training to their R&D personnel.
12. **Problems:** Out of 506 R&D enterprises, 407 (80.43%) enterprises reported Inadequate / inappropriate Infrastructure, followed by 358 (70.75%) funding for R&D as the main problems for undertaking R&D activities
13. **Standards:** It is observed that R&D enterprises are more standard conscious than non R&D enterprises – Out of 506 R&D enterprises, 479 (94.66%) reported having either BIS or ISO or Both standards as compared to 1568 (32.03%) for all the 4896 working enterprises.

14. **Ownership:** Private limited enterprises are R&D conscious – Out of 506 R&D enterprises, 221 (43.68%) R&D enterprises reported ownership pattern as Private Limited, while on the overall basis only 731 (14.93%) reported Private Limited ownership.
15. **Establishment Year:** Out of 506 R&D enterprises, before 1990, 266 (52.57%) were established and after 1990, 240 (47.43%). On the overall basis, out of 4896 working enterprises, 2982 (60.91%) were established before 1990 and 1914 (39.09%) after 1990. This establishes that R&D activities have picked up after 1990
16. **Qualifications:** Science qualified Owner / CEO are more R&D conscious - Out of 506 R&D enterprises, 192 (37.94%) Owners / CEO of R&D enterprises reported their qualifications as Science, while on the overall basis out of 4896 working enterprises only 1476 (30.15%).
17. **Conclusions:** In the end we can conclude that Indian MSMEs are spending at present less on R&D activities as compared with some other countries like Japan, Taiwan, OECD, EU etc. In case Indian MSMEs want to grow and increase their market share, they have to spend more on R&D. On an overall basis, 483 (95.45%) R&D enterprises indicated *"enhancing existing domestic market share"* as the main benefit of R&D. This is also established from all the case studies given in the report wherein 100% enterprises indicated enhancing existing domestic market share as the main R&D benefit. Similarly on an overall basis, 447 (88.34%) R&D enterprises indicated *"customer"* as the main source of R&D where as 90.91% R&D enterprises included in the case studies indicated customer as the main source of R&D.
18. Status on major **R&D parameters** is summarized below:-

Table 1.01
Overall Summary on Major Parameters

A. Sector wise

Sr. No.	Sectors	Clusters (Nos.)	Enterprises Surveyed (Nos.)	Working Enterprises (Sample Size) (Nos.)	% Working Enterprises	R&D Enterprises Nos. (%)	R&D Expenditure % Sale	Export % Sale	R&D Manpower % Total Manpower
1	Agriculture Machinery	64	849	748	88.10	63 (8.42)	0.81	10.35	16.07
2	Automotive	14	222	164	73.87	26 (15.85)	1.02	19.58	11.03
3	Chemical	13	192	154	80.21	23 (14.94)	0.91	13.79	9.67
4	Drug & Pharma	11	168	124	73.81	32 (25.81)	1.01	15.59	15.77
5	Electronics	18	314	212	67.52	47 (22.17)	1.71	21.75	11.96
6	Gems & Jewelry	9	160	107	66.88	6 (5.61)	0.36	14.54	0.00
7	Leather	26	557	365	65.53	34 (9.32)	0.89	20.82	11.84
8	Light Engineering	182	3231	2123	65.71	128 (6.03)	0.59	15.50	13.30
9	Machine Tools	36	633	418	66.03	76 (18.18)	1.47	16.04	9.42
10	Sci-Instruments	2	32	24	75.00	3 (12.50)	0.59	19.18	10.81
11	Textiles & Garments	39	727	457	62.86	68 (14.88)	0.87	24.83	9.57
12	**Total (1-11)**	**414**	**7085**	**4896**	**69.11**	**506 (10.33)**	**0.97**	**18.58**	**11.86**

B. State wise

Sr. No.	Sectors	Clusters (Nos.)	Enterprises Surveyed (Nos.)	Working Enterprises (Sample Size) (Nos.)	% Working Enterprises	R&D Enterprises Nos. (%)	R&D Expenditure % Sale	Export % Sale	R&D Manpower % Total Manpower
1	Andhra Pradesh	33	475	374	78.74	50 (13.37)	0.83	19.43	11.73
2	Bihar	5	95	73	76.84	5 (6.85)	0.86	0.00	12.74
3	Chhatisgarh	2	28	19	67.86	5 (26.32)	1.67	0.00	12.40
4	Delhi	19	314	222	70.70	18 (8.11)	0.99	22.74	10.96
5	Goa	1	13	11	84.62	3 (27.27)	1.22	15.66	14.95
6	Gujarat	49	786	572	72.77	89 (15.56)	0.97	17.89	13.64
7	Haryana	29	543	344	63.35	34 (9.88)	1.06	17.78	8.84
8	Himachal Pradesh	3	50	36	72.00	2 (5.56)	1.92	0.00	24.19
9	Jammu & Kashmir	6	103	64	62.14	1 (1.56)	0.89	0.00	14.29
10	Jharkhand	3	46	33	71.74	2 (6.06)	1.09	0.00	13.45
11	Karnataka	22	351	268	76.35	37 (13.81)	0.98	20.34	11.67
12	Kerala	10	166	116	69.88	4 (3.45)	0.80	20.19	12.88
13	Madhya Pradesh	11	192	138	71.88	19 (13.77)	0.94	22.11	12.06
14	Maharashtra	58	876	680	77.63	82 (12.06)	1.07	16.74	12.24
15	Orissa	13	182	150	82.42	11 (7.33)	0.84	0.00	14.76
16	Punjab	37	896	453	50.56	42 (9.27)	0.84	20.93	10.93
17	Rajasthan	20	378	233	61.64	19 (8.15)	0.52	13.31	10.35
18	Tamil Nadu	31	510	376	73.73	29 (7.71)	1.05	18.96	12.82
19	Uttarakhand	3	50	34	68.00	4 (11.76)	1.65	13.26	12.60
20	Uttar Pradesh	42	736	497	67.53	36 (7.24)	0.91	19.29	8.21
21	West Bengal	17	295	203	68.81	14 (6.90)	1.19	22.96	16.07
22	**Total (1-21)**	**414**	**7085**	**4896**	**69.11**	**506 (10.33)**	**0.97**	**18.58**	**11.86**

Section – 2
About the Study

SECTION -2: ABOUT THE STUDY

2.0 INTRODUCTION

The Micro, Small & Medium .Enterprises (MSMEs) sector is a very important constituent of the Indian economy, contributing significantly to the gross domestic product, manufacturing output, employment and exports. This sector also plays a vital role in nurturing entrepreneurial talents as well as spreading wealth at grass root level. Recognizing the contribution of this sector in promoting balanced and equitable growth in the country, Government of India since independence has laid special emphasis on the growth and progress of this sector.

At the time of independence, the Indian economy was dependent manly on agricultural and cottage industries. Industrial policy of India has undergone sea changes since independence. Government of India enacted first industrial policy resolution in 1948 both for the public sector and private sector and brought out the broad guide lines for the control and regulation of the industrial sector of the independent India. This policy resolution was revisited in 1956 known as Industrial Development Regulation Act (IDRA) 1956. This was with a view to meet the national goal of establishing a *"Socialist Pattern of Society"*. In this resolution, industries were grouped under three broad categories viz Schedule A consisting of 17 major core industries, Schedule B consisting of 12 industries and Schedule C consisting of all other residual industries, the ownership and management of these was left to the initiative of the private sector

To meet the *socio* – economic goals of the country, industrial policy and licensing procedures were modified from time to time in 1970, 1973, 1977, 1980 & 1991.

1991 resolution is very vital since GOI opened up the Indian economy known as liberalization privatization and globalization (LPG) and had the following major aspects:-

- Delicensing of major industries with enhanced investment limits
- Liberal foreign investment allowed.
- Technology up gradation was the prime concern that is Indian Goods must be produced to the latest cost effective competitive technologies.
- Doing away with the MRTP Act.
- Special status for Small and Tiny enterprises in order to infuse more vitality and growth to SSIs.
- Concept of cluster development was brought in

A cluster has been defined as a manufacturing hub in a sector targeted geographical concentration of minimum 100 micro and / or small & medium enterprises (MSMEs), making same and similar items / products. In other words, a cluster of MSMEs is a concentration of economic enterprises, producing a typical same or similar products or a complementary range of products within an identified geographical area. The location of such enterprises spans over a few surrounding areas spread over few k.ms. Thus a cluster of MSMEs, hereafter referred to as "cluster", is identified by the 'product' that the various enterprises produce in the cluster and the 'place' where the enterprises are located.

In 2000, GoI brought out special industrial policy resolutions for small scale sector particularly to define micro, small & medium enterprises and the last applicable Act was passed in 2006. MSMEs were defined as follows:-

Before 2006

Size of Enterprise	Initial Investment ceiling in Plant and Machinery for manufacturing enterprises
Micro	Up to Rs. 25 lakh
Small	Above Rs. 25 lakh & up to Rs. 1 crore
Medium	Not defined

After 2006

Size of Enterprise	Initial Investment ceiling in Plant and Machinery for manufacturing enterprises
Micro	Up to Rs. 25 lakh
Small	Above Rs. 25 lakh & up to Rs. 5 crore
Medium	Above Rs. 5 crore & up to Rs. 10 crore

It will be seen from the above that due to the enhancement of investment ceilings in MSMED Act - 2006, many medium enterprises came in the category of small enterprises and similarly many small enterprises in micro enterprises. This Act also defined for the first time the investment limits for the medium enterprises

The recently announced National Manufacturing Policy (NMP) offers a series of fiscal incentives, including tax sops, especially for small and medium enterprises (SME). However, the incentives would be given on a case-to-case basis depending on the preparedness of a particular state that wants to attract industry and make it a manufacturing hub. It also states that if a particular state government aggregates the land for creating National Investment and Manufacturing Zone then the fiscal incentives meant for the zones would be given to them. It will give them an enabling framework. Under this policy, 7 new zones will be developed in the states of Gujarat, Haryana, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh.

2.1 OBJECTIVE

The objective of the study is:-

To Access Research & Development (R&D) in Micro, Small & Medium Manufacturing Enterprises (MSMEs) in India

2.2 SCOPE

Study covered the following scope of work:-

A Industrial Sectors

Agriculture Machinery, Automotive, Chemical, Drug & Pharma, Electronics, Gems & Jewelry, Leather, Light Engineering, Scientific Instruments, Machine Tools and Textiles & Garments.

B States

Andhra Pradesh, Bihar, Chhatisgarh, Delhi, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Uttarakhand & West Bengal

C Clusters

414 clusters were identified keeping in view the above industrial sectors and states.

2.3 UNIVERSE & SAMPLE SIZE

Sample size had been decided based on the following parameters:-

- For 250 enterprises as universe in a cluster, 12 enterprises were taken as sample.
- Computerized random numbers were generated.
- Double the sample size numbers were generated to take care of any closed or non-traceable enterprises.
- For universe, size of the enterprises as Micro, Small and Medium estimated from sample configuration.

Detailed computations for arriving at the sample size are given in **Annexure A** at the end of this section 2. In line with these computations, following sample size emerged state wise and sector wise:-

State wise Break-up

(Figures in Numbers)

Sr. No.	State	Clusters	Universe	Sample
1	Andhra Pradesh	33	7782	374
2	Bihar	5	1514	73
3	Chhattisgarh	2	403	19
4	Delhi	19	4607	222
5	Goa	1	239	11
6	Gujarat	49	11912	572
7	Haryana	29	7157	344
8	Himachal Pradesh	3	754	36
9	Jammu & Kashmir	6	1334	64
10	Jharkhand	3	695	33
11	Karnataka	22	5572	268
12	Kerala	10	2413	116
13	Maharashtra	58	14179	680
14	Madhya Pradesh	11	2867	138
15	Orissa	13	3131	150
16	Punjab	37	9446	453
17	Rajasthan	20	4865	233
18	Tamil Nadu	31	7840	376
19	Uttar Pradesh	42	10364	497
20	Uttarakhand	3	725	34
21	West Bengal	17	4229	203
22	**Grand Total**	**414**	**102028**	**4896**

Sector wise Break-up

(Figures in Numbers)

Sr. No.	Sector	Clusters	Universe	Sample
1	Agricultural Machinery	64	15556	748
2	Automotive	14	3417	164
3	Chemical	13	3236	154
4	Drug & Pharma	11	2610	124
5	Electronics	18	4393	212
6	Gems & Jewelry	9	2222	107
7	Leather	26	7591	365
8	Light Engineering	182	44218	2123
9	Machine Tools	36	8751	418
10	Scientific Instruments	2	489	24
11	Textiles & Garments	39	9545	457
12	**Grand Total**	**414**	**102028**	**4896**

2.4 METHODOLOGY

Following methodology was adopted:-

i. Studied various details of clusters and other MSMEs data published by the Ministry of Micro, Small & Medium Enterprises, GOI from time to time and other related agencies
ii. 1st meeting of the Local Project Advisory Committee (LPAC) was held on 15th December, 2010 to finalize the questionnaire and sampling plan.
iii. Questionnaire was also hosted online on NAFEN website www.nafenindia.com
iv. Finalized questionnaire as approved in the meeting was pilot tested with seven enterprises at New Delhi
v. After pilot testing, the questionnaire was mailed to relevant MSME Associations & Enterprises.
vi. Visited various enterprises in clusters for data collection.
vii. Fortnightly progress reports were submitted to the department both cluster wise and units wise.
viii. Mid term review meeting was held at New Delhi on 28th Sept, 2011, wherein data collected from 5 states by that time was presented.
ix. Data feeding and internal re-checking.
x. Data analysis.
xi. Draft report.
xii. 3rd & final LPAC meeting was held on -----, to finalize the draft report.
xiii. Final Report

2.5 TIME PERIOD

The study was completed in 24 months' time from 1st September, 2010

2.6 LIMITATIONS

- ► Intention of this study was not to have any inter-enterprise comparisons. In view of this, the status has been analyzed on overall basis
- ► No separate validation of data was possible by NAFEN. Report has been prepared based on the data collected from the respondents.
- ► Utmost care, which is humanly possible, has been taken to ensure that the data feeding and analysis is correct.
- ► Many respondents were reluctant to give data particularly on Section – 2 of the questionnaire

2.7 PRINCIPAL INVESTIGATOR'S (PI's) OBSERVATIONS

Based on the meetings held with various respondents during data collection, following are the major observations of the Principal Investigator (PI):-

- Inspite of some constraints faced by Indian MSMEs, they halve many positives like:-
  - ► Developed / designed good products & processes
  - ► Made a niche for themselves especially in sectors like Automotive, Electronics, Machine Tools & Drugs & Pharma
  - ► Have entrepreneurial qualities and aspire to be world class
  - ► Flexible in work & operations
  - ► Cost competitive in their area of operations
- Lack of Co-operation during data collection due to fear of leakage of information
- No separate R&D department or R&D employees in many enterprises
- Non availability of soft loans / cheap finance
- Cumbersome procedures for patenting and loans
- Inadequate infrastructural facilities
- Lack of employee motivation and skill enhancement
- Preference for full time employees
- Severe financial crunch

Annexure A

STATE WISE SAMPLE SIZE COMPUTATIONS

After number of meetings and discussions between Department, NAFEN and Prof. Dr. S S Handa, Statistical expert, it was decided that most important aspect of the study is the timely collection of basic data.

For each state, number of clusters were listed and cluster wise variations noted. However, total number of units in the cluster were computed and average number of units per cluster were taken for selection of sample for the study. Depending upon average number of units in a cluster, while determining the sample size various factors were considered like:-

I. What should be the sample size
II. Should it be a fixed percentage of number of units in the cluster, like wise

As mentioned earlier, the basic objective of the study was to have optimum size of the sample which should have sound statistical basis

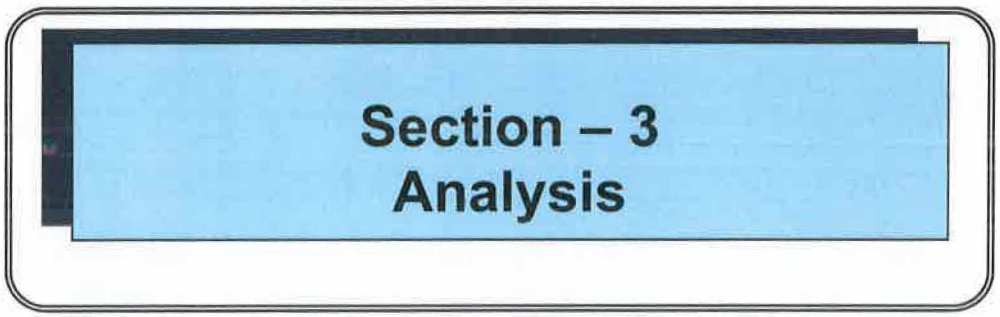
95% confidence level means that one can be 95% certain and confidence interval (also called margin of error) is the plus or minus figure usually reported in news paper or television poll results.

Problem was if sample size is very large, it becomes difficult to cover all the number of units in the limited time schedule or small sample size may result in the increase in error component

Taking into consideration all the aspects, it was agreed that a confidence level of 95% and confidence interval of (±) 5 will be taken for computing the sample size for the study. On the basis of this technique, the sample size was decided and state wise break-up is given below:-

Sr. No.	States	Total Number of Clusters	Total Number of Units in Clusters	Average Number of Units in Cluster	Sample Size CL=95%, CI= (±) 5 www.surveystem.com - Sample Size Calculator (Units)	Sample Size / Cluster (Units)
1	Andhra Pradesh	33	7788	236	366	11.09
2	Delhi	19	4624	243	355	18.68
3	Gujarat	49	11926	243	372	7.59
4	Haryana	29	7163	247	365	12.59
5	Kerala	10	2413	241	332	33.20
6	Karnataka	22	5575	253	359	16.32
7	Madhya Pradesh	11	2871	261	339	30.82
8	Maharashtra	58	14174	244	374	6.45
9	Orissa	13	3126	240	342	26.31
10	Punjab	37	9447	255	369	9.97
11	Rajasthan	20	4856	243	356	17.80
12	Tamil Nadu	31	7840	253	366	11.81
13	Uttar Pradesh	42	10361	247	370	8.81
14	West Bengal	17	4220	248	352	20.71
15	**Total**	**391**	**96384**	**247**	**5017**	**12.83**
			Say	**250**		**12**

Having decided sample size, it was ensured that units should be selected from total number of units in all the clusters in random manner. Computer generated pseudo random numbers were used for selection of sample units to give a wide representation to all the clusters in the state. Finally, based on sample size data collected, various output indices were developed to meet the objective of the study.


Section – 3
Analysis

SECTION -3: ANALYSIS

3.0 INTRODUCTION

Micro, Small and Medium enterprises (MSMEs) have been recognized as vital components of our economy and major contributors to employment generation, bulk of the industrial base, exports , GDP and a major source of capital goods in the form of inputs to heavy industries. However, the biggest problem plaguing our MSMEs is inadequate demand, along with technological, financial and marketing weaknesses, all of which lead to a shortage of working capital. In fact, lack of adequate and timely finance is the root cause of sickness in the small scale sector.

In the ongoing globalization process of our markets, the role of technological capabilities has become critical for MSMEs survival and growth. The disappearance of import barriers that once protected national markets and the introduction of product patent regime have vastly expanded the strategic role of technology in the evolving competitive environment of national markets. While the large firms are well positioned to face these globalizing competitive challenges with their better strategic asset bundle, the resource-starved micro, small and medium enterprises (MSMEs) are expected to be at greater risks.

It is no longer feasible for SMEs in emerging economy like India to use the competitive strategy of reverse engineering and innovative cost-effective processes to survive under the new technology policy regime. They also cannot take refuge in policy protection as current economic openness policies saw the removal of many special treatments to SMEs in industrial policies like exemption from price controls, product reservation, preference in government procurement etc. Therefore, MSMEs are required to develop or acquire necessary competitive resources like new technologies to compete with large national firms, foreign firms and cheap imports. Rapidly changing consumer preferences, shorter product life cycle and growing quality consciousness clearly call for MSMEs to upgrade their technological assets.

3.1 DETAILED ANALYSIS

Through this study, the current status of R&D activites in Indian MSMEs has been analyzed in this section as given below in the 11 identified industrial sectors spread over 21 states in 414 clusters:-

Table - 3.1.1
Overall Distribution of Universe & Sample Enterprises -- State & Size wise

(Figures in Numbers)

Sr. No	State	Cluster	Universe	Sample	Size of Enterprises					
					Micro		Small		Medium	
					Sample	Universe	Sample	Universe	Sample	Universe
1.	Andhra Pradesh	33	7782	374	362	7539 (96.88)	10	201 (2.58)	2	42 (0.54)
2.	Bihar	5	1514	73	70	1452 (95.90)	3	62 (4.10)	0	0 (0.00)
3.	Chhattisgarh	2	403	19	19	403 (100.00)	0	0 (0.00)	0	0 (0.00)
4.	Delhi	19	4607	222	211	4374 (94.94)	9	190 (4.12)	2	43 (0.93)
5.	Goa	1	239	11	9	196 (82.01)	2	43 (17.99)	0	0 (0.00)
6.	Gujarat	49	11912	572	556	11561 (97.05)	13	290 (2.43)	3	61 (0.51)
7.	Haryana	29	7157	344	331	6886 (96.21)	13	271 (3.79)	0	0 (0.00)
8.	Himachal Pradesh	3	754	36	35	733 (97.21)	1	21 (2.79)	0	0 (0.00)
9.	Jammu & Kashmir	6	1334	64	61	1269 (95.13)	3	65 (4.87)	0	0 (0.00)
10.	Jharkhand	3	695	33	31	654 (94.10)	1	21 (3.02)	1	20 (2.88)
11.	Karnataka	22	5572	268	257	5337 (95.78)	11	235 (4.22)	0	0 (0.00)
12.	Kerala	10	2413	116	110	2288 (94.82)	6	125 (5.18)	0	0 (0.00)
13.	Maharashtra	58	14179	680	653	13623 (96.08)	26	539 (3.80)	1	17 (0.12)
14.	Madhya Pradesh	11	2867	138	131	2732 (95.29)	7	135 (4.71)	0	0 (0.00)
15.	Orissa	13	3131	150	145	3030 (96.77)	5	101 (3.23)	0	0 (0.00)
16.	Punjab	37	9446	453	435	9067 (95.99)	15	320 (3.39)	3	59 (0.62)
17.	Rajasthan	20	4865	233	222	4639 (95.35)	11	226 (4.65)	0	0 (0.00)
18.	Tamil Nadu	31	7840	376	362	7548 (96.28)	14	292 (3.72)	0	0 (0.00)
19.	Uttarakhand	3	725	34	33	704 (97.10)	1	21 (2.90)	0	0 (0.00)
20.	Uttar Pradesh	42	10364	497	480	10013 (96.61)	17	351 (3.39)	0	0 (0.00)
21.	West Bengal	17	4229	203	197	4107 (97.12)	6	122 (2.88)	0	0 (0.00)
22	**Grand Total**	**414**	**102028**	**4896**	**4710**	**98155 (96.20)**	**174**	**3631 (3.56)**	**12**	**242 (0.24)**

For details please refer Volume-II Annexure-1A (Pages 76-82)

Note: Figure in brackets ( ) indicates %age.
Size wise universe worked from sample estimation

OBSERVATIONS

- On overall basis, 96.20% enterprises are Micro, 3.56% Small & 0.24% Medium
- Maximum enterprises, 13.90% are in Maharashtra, followed by 11.68% in Gujarat

Table - 3.1.2
Overall Distribution of Universe & Sample Enterprises -- Sector & Size wise

(Figures in Numbers)

Sr. No	Sector	Cluster	Universe	Sample	Size of Enterprises					
					Micro		Small		Medium	
					Sample	Universe	Sample	Universe	Sample	Universe
1	Agricultural Machinery	64	15556	748	715	14856 (95.50)	32	679 (4.36)	1	21 (0.13)
2	Automotive	14	3417	164	155	3224 (94.35)	7	152 (4.45)	2	41 (1.20)
3	Chemical	13	3236	154	147	3079 (95.15)	7	157 (4.85)	0	0 (0.00)
4	Drug & Pharma	11	2610	124	113	2389 (91.53)	8	165 (6.32)	3	56 (2.15)
5	Electronics	18	4393	212	203	4208 (95.79)	6	121 (2.75)	3	64 (1.46)
6	Gems & Jewelry	9	2222	107	102	2121 (95.45)	5	101 (4.55)	0	0 (0.00)
7	Leather	26	7591	365	346	7214 (95.03)	18	361 (4.76)	1	16 (0.21)
8	Light Engineering	182	44218	2123	2075	43220 (97.74)	48	998 (2.26)	0	0 (0.00)
9	Machine Tools	36	8751	418	400	8382 (95.78)	17	347 (3.97)	1	22 (0.25)
10	Scientific Instruments	2	489	24	22	452 (92.43)	2	37 (7.57)	0	0 (0.00)
11	Textiles & Garments	39	9545	457	432	9010 (94.39)	24	513 (5.37)	1	22 (0.23)
12	**Grand Total**	**414**	**102028**	**4896**	**4710**	**98155 (96.20)**	**174**	**3631 (3.56)**	**12**	**242 (0.24)**

For details please refer Volume-II Annexure-1B (Pages 83-85)

Note: Figure in brackets ( ) indicates %age.
Size wise universe worked from sample estimation

OBSERVATION

- Maximum enterprises, 43.34% are in Light Engineering sector, followed by Agriculture Machinery 15.25%.

Figure - 3.1.2
Break-up of Micro, Small & Medium Enterprises

Figure in brackets ( ) indicate %age

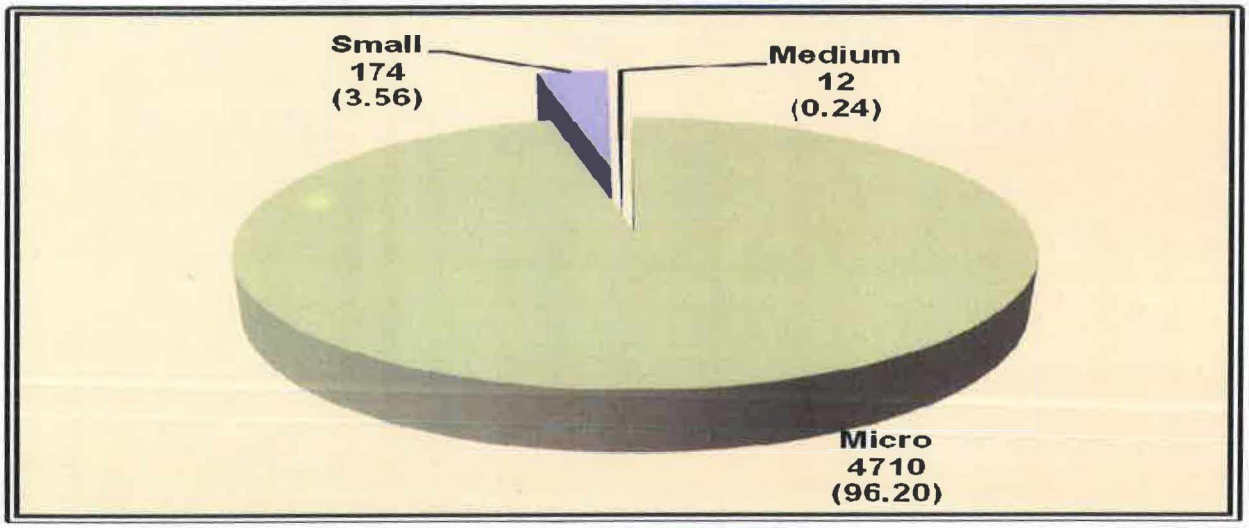


Table - 3.1.3
Overall Distribution of Clusters -- Sector & State wise

(Figures in Numbers)

Sr. No	Sector \ State	Andhra Pradesh	Bihar	Chhattisgarh	Delhi	Goa	Gujarat	Haryana	Himachal Pradesh	Jammu & Kashmir	Jharkhand	Karnataka	Kerala	Maharashtra	Madhya Pradesh	Orissa	Punjab	Rajasthan	Tamil Nadu	Uttar Pradesh	Uttarakhand	West Bengal	Total
1	Agriculture Machinery	6	1	0	1	0	2	3	1	2	0	6	1	13	1	7	6	4	5	3	1	1	64
2	Automotive	0	0	0	1	0	1	2	0	0	1	0	0	4	1	0	2	0	1	1	0	0	14
3	Chemical	0	0	0	2	0	3	0	0	0	0	0	0	3	0	0	0	1	0	4	0	0	13
4	Drug & Pharma	1	0	0	0	1	3	0	0	0	0	0	0	4	1	1	0	0	0	0	0	0	11
5	Electronics	1	0	0	3	0	3	2	0	0	0	1	0	2	0	0	1	0	1	3	0	1	18
6	Gems & Jewelry	2	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	9
7	Leather	1	2	0	0	0	0	5	0	1	0	3	0	0	1	0	7	0	3	3	0	0	26
8	Light Engineering	16	2	0	9	0	23	11	1	3	2	6	9	22	5	5	14	10	13	20	1	10	182
9	Machine Tools	2	0	2	1	0	4	3	1	0	0	1	0	7	0	0	5	3	2	3	1	1	36
10	Scientific Instruments	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2
11	Textiles & Garments	4	0	0	2	0	6	2	0	0	0	5	0	3	2	0	2	1	5	5	0	2	39
12	**Grand Total**	33	**5**	**2**	**19**	**1**	**49**	**29**	**3**	**6**	**3**	**22**	**10**	**58**	**11**	**13**	**37**	**20**	**31**	**42**	**3**	**17**	**414**

Source Table R-47 & R-48 Page 203 to 28, 3rd All India Census of Small Scale Industries (2001-2002), Edition August 2004, Published by Development Commissioner, Ministry of SSI, GoI

For details please refer Volume-II Annexure-1A, 1B & 1C (Pages 76-110)

OBSERVATION

- State wise maximum clusters 58 (14.01%) are in Maharashtra, followed by 49 (11.84%) in Gujarat.
- Sector wise maximum clusters 182 (43.96%) are in Light Engineering, followed by 64 (15.46%) in Agriculture Machinery.

Table - 3.1.4
State wise Distribution of Working / Closed / Non-traceable Enterprises

(Figures in Numbers)

Sr. No	State	Cluster	Enterprises Surveyed	Working Enterprises (Sample Size)	Closed Enterprises	Non-traceable Enterprises
1	Andhra Pradesh	33	475	374 (78.74)	53 (11.16)	48 (10.11)
2	Bihar	5	95	73 (76.84)	13 (13.68)	9 (9.47)
3	Chhatisgarh	2	28	19 (67.86)	7 (25.00)	2 (7.14)
4	Delhi	19	314	222 (70.70)	78 (24.84)	14 (4.46)
5	Goa	1	13	11 (84.62)	2 (15.38)	0 (0.00)
6	Gujarat	49	786	572 (72.77)	144 (18.32)	70 (8.91)
7	Haryana	29	543	344 (63.35)	164 (30.20)	35 (6.45)
8	HP	3	50	36 (72.00)	9 (18.00)	5 (10.00)
9	J&K	6	103	64 (62.14)	17 (16.50)	22 (21.36)
10	Jharkhand	3	46	33 (71.74)	10 (21.74)	3 (6.52)
11	Karnataka	22	351	268 (76.35)	52 (14.81)	31 (8.83)
12	Kerala	10	166	116 (69.88)	33 (19.88)	17 (10.24)
13	Madhya Pradesh	11	192	138 (71.88)	38 (19.79)	16 (8.33)
14	Maharashtra	58	876	680 (77.63)	126 (14.38)	70 (7.99)
15	Orissa	13	182	150 (82.42)	19 (10.44)	13 (7.14)
16	Punjab	37	896	453 (50.56)	363 (40.51)	80 (8.93)
17	Rajasthan	20	378	233 (61.64)	121 (32.01)	24 (6.35)
18	Tamil Nadu	31	510	376 (73.73)	86 (16.86)	48 (9.41)
19	Uttarakhand	3	50	34 (68.00)	11 (22.00)	5 (10.00)
20	Uttar Pradesh	42	736	497 (67.53)	189 (25.68)	50 (6.79)
21	West Bengal	17	295	203 (68.81)	58 (19.66)	34 (11.53)
22	**Grand Total**	**414**	**7085**	**4896 (69.11)**	**1593 (22.48)**	**596 (8.41)**

For details please refer Volume-II Annexure-2 (Pages 111-113)

Note: Figure in brackets ( ) indicates %age.

OBSERVATIONS

- On overall basis, 69.11% enterprises were found Working, 22.48% Closed and 8.41% Non-traceable.
- Working enterprises %age in states varies from 84.62% (Goa) to 50.56% (Punjab)

Table - 3.1.5
Sector wise Distribution of Working / Closed / Non-traceable Enterprises

(Figures in Numbers)

Sr. No	Sector	Cluster	Enterprises Surveyed	Working Enterprises (Sample Size)	Closed Enterprises	Non-traceable Enterprises
1	Agriculture Machinery	64	849	748 (88.10)	45 (5.30)	56 (6.60)
2	Automotive	14	222	164 (73.87)	44 (19.82)	14 (6.31)
3	Chemical	13	192	154 (80.21)	31 (16.15)	7 (3.65)
4	Drug & Pharma	11	168	124 (73.81)	32 (19.05)	12 (7.14)
5	Electronics	18	314	212 (67.52)	78 (24.84)	24 (7.64)
6	Gems & Jewelry	9	160	107 (66.88)	43 (26.88)	10 (6.25)
7	Leather	26	557	365 (65.53)	143 (25.67)	49 (8.80)
8	Light Engineering	182	3231	2123 (65.71)	803 (24.85)	305 (9.44)
9	Machine Tools	36	633	418 (66.03)	162 (25.59)	53 (8.37)
10	Sci-Instruments	2	32	24 (75.00)	5 (15.63)	3 (9.38))
11	Textiles & Garments	39	727	457 (62.86)	207 (28.47)	63 (8.67)
12	**Grand Total**	**414**	**7085**	**4896 (69.11)**	**1593 (22.48)**	**596 (8.41)**

For details please refer Volume-II Annexure-2 (Pages 111-113)

Note: Figure in brackets ( ) indicates %age.

OBSERVATION

- Sector wise maximum 88.10% enterprises were found working in Agriculture Machinery, followed by 80.21% in Chemical.

Figure - 3.1.5
Overall Break-up of Working / Closed / Non-traceable Enterprises

Figure in brackets ( ) indicate %age

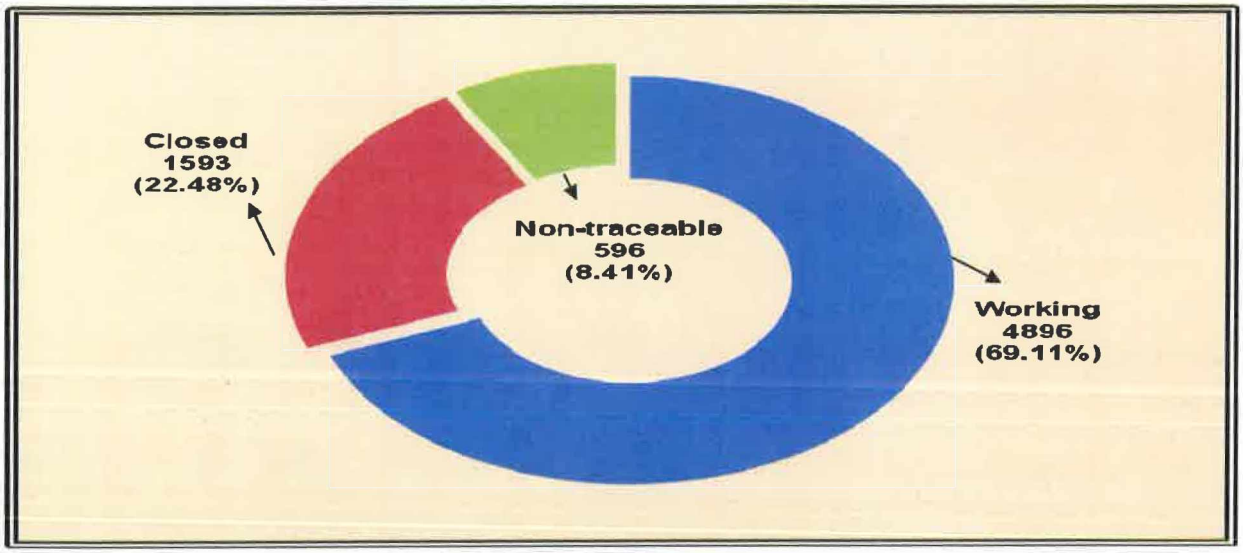


Table - 3.1.6
State & Size wise Break-up of Enterprises Undertaking R&D Activities

(Figures in Numbers)

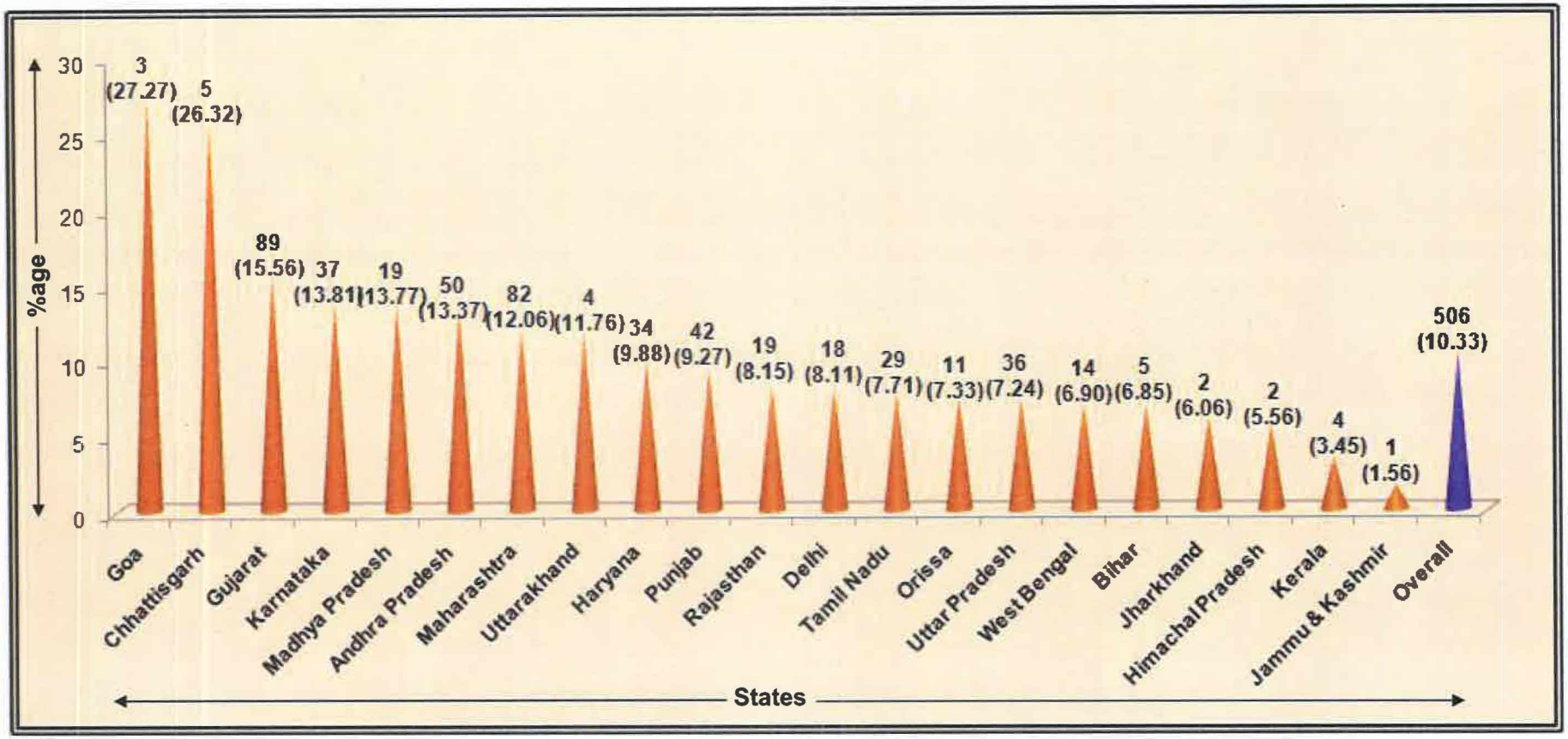
Sr. No.	State	Cluster	Sample Size				Enterprises having R&D			
			Total	Micro	Small	Medium	Total	Micro	Small	Medium
1	AP	33	374	362	10	2	50 (13.37)	41 (11.33)	8 (80.00)	1 (50.00)
2	Bihar	5	73	70	3	0	5 (6.85)	3 (4.29)	2 (66.67)	0 (0.00)
3	Chhattisgarh	2	19	19	0	0	5 (26.32)	5 (26.32)	0 (0.00)	0 (0.00)
4	Delhi	19	222	211	8	2	18 (8.11)	9 (4.27)	7 (87.50)	2 (100.00)
5	Goa	1	11	9	2	0	3 (27.27)	1 (11.11)	2 (100.00)	0 (0.00)
6	Gujarat	49	572	556	13	3	89 (15.56)	75 (13.49)	12 (92.31)	2 (66.67)
7	Haryana	29	344	331	13	0	34 (9.88)	22 (6.65)	12 (92.31)	0 (0.00)
8	HP	3	36	35	1	0	2 (5.56)	2 (5.71)	0 (0.00)	0 (0.00)
9	J&K	6	64	61	3	0	1 (1.56)	0 (0.00)	1 (33.33)	0 (0.00)
10	Jharkhand	3	33	31	1	1	2 (6.06)	1 (3.23)	0 (0.00)	1 (100.00)
11	Karnataka	22	268	257	11	0	37 (13.81)	28 (10.89)	9 (81.82)	0 (0.00)
12	Kerala	10	116	110	6	0	4 (3.45)	3 (2.73)	1 (16.67)	0 (0.00)
13	MP	11	138	131	7	0	19 (13.77)	13 (9.92)	6 (85.71)	0 (0.00)
14	Maharashtra	58	680	653	26	1	82 (12.06)	56 (8.58)	25 (96.15)	1 (100.00)
15	Orissa	13	150	145	5	0	11 (7.33)	7 (4.83)	4 (80.00)	0 (0.00)
16	Punjab	37	453	435	15	3	42 (9.27)	26 (5.98)	13 (86.67)	3 (100.00)
17	Rajasthan	20	233	222	12	0	19 (8.15)	7 (3.15)	12 (100.00)	0 (0.00)
18	Tamil Nadu	31	376	362	14	0	29 (7.71)	21 (5.80)	8 (57.14)	0 (0.00)
19	UP	42	497	480	17	0	36 (7.24)	24 (5.00)	12 (70.59)	0 (0.00)
20	Uttarakhand	3	34	33	1	0	4 (11.76)	4 (12.12)	0 (0.00)	0 (0.00)
21	West Bengal	17	203	197	6	0	14 (6.90)	10 (5.08)	4 (66.67)	0 (0.00)
22	**Grand Total**	**414**	**4896**	**4710**	**174**	**12**	**506 (10.33)**	**358 (7.60)**	**138 (79.31)**	**10 (83.33)**

For details please refer Volume-II Annexure-3 (Pages 114-116)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.6
State wise Break-up of Enterprises Undertaking R&D Activities

Figure in brackets ( ) indicate %age



OBSERVATIONS

- On overall basis 10.33% enterprises are undertaking R&D activities.
- State wise %age of enterprises undertaking R&D activities, varies from 1.56% to 27.27%, maximum 27.27% in Goa, followed by 26.32% in Chhatisgarh & lowest in J&K (1.56%).

Table - 3.1.7
Sector & Size wise Break-up of Enterprises Undertaking R&D Activities

(Figures in Numbers)

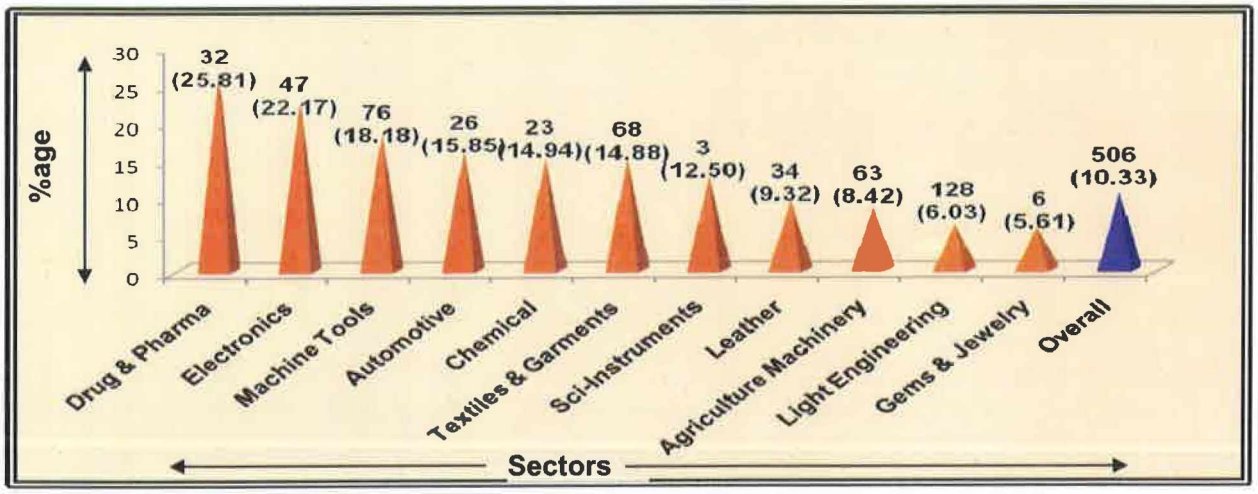
Sr. No	Sector	Cluster	Sample Size				Enterprises having R&D			
			Total	Micro	Small	Medium	Total	Micro	Small	Medium
1	Agriculture Machinery	64	748	715	32	1	63 (8.42)	37 (5.17)	25 (78.13)	1 (100.00)
2	Automotive	14	164	155	7	2	26 (15.85)	17 (10.97)	7 (100.00)	2 (100.00)
3	Chemical	13	154	147	7	0	23 (14.94)	16 (10.88)	7 (100.00)	0 (0.00)
4	Drug & Pharma	11	124	113	8	3	32 (25.81)	22 (19.47)	8 (100.00)	2 (66.67)
5	Electronics	18	212	203	6	3	47 (22.17)	39 (19.21)	6 (100.00)	2 (66.67)
6	Gems & Jewelry	9	107	102	5	0	6 (5.61)	2 (1.96)	4 (80.00)	0 (0.00)
7	Leather	26	365	346	18	1	34 (9.32)	17 (4.91)	16 (88.89)	1 (100.00)
8	Light Engineering	182	2123	2075	48	0	128 (6.03)	101 (4.87)	27 (56.25)	0 (0.00)
9	Machine Tools	36	418	400	17	1	76 (18.18)	59 (14.75)	16 (94.12)	1 (100.00)
10	Sci-Instruments	2	24	22	2	0	3 (12.50)	1 (4.55)	2 (100.00)	0 (0.00)
11	Textiles & Garments	39	457	432	24	1	68 (14.88)	47 (10.88)	20 (83.33)	1 (100.00)
12	**Grand Total**	**414**	**4896**	**4710**	**174**	**12**	**506 (10.33)**	**358 (7.60)**	**138 (79.31)**	**10 (83.33)**

For details please refer Volume-II Annexure-3 (Pages 114-116)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.7
Sector wise Break-up of Enterprises Undertaking R&D Activities

Figure in brackets ( ) indicate %age



OBSERVATION

- Sector wise, maximum 25.81% enterprises are undertaking R&D activities in Drug & Pharma sector, followed by 22.17% in Electronics.

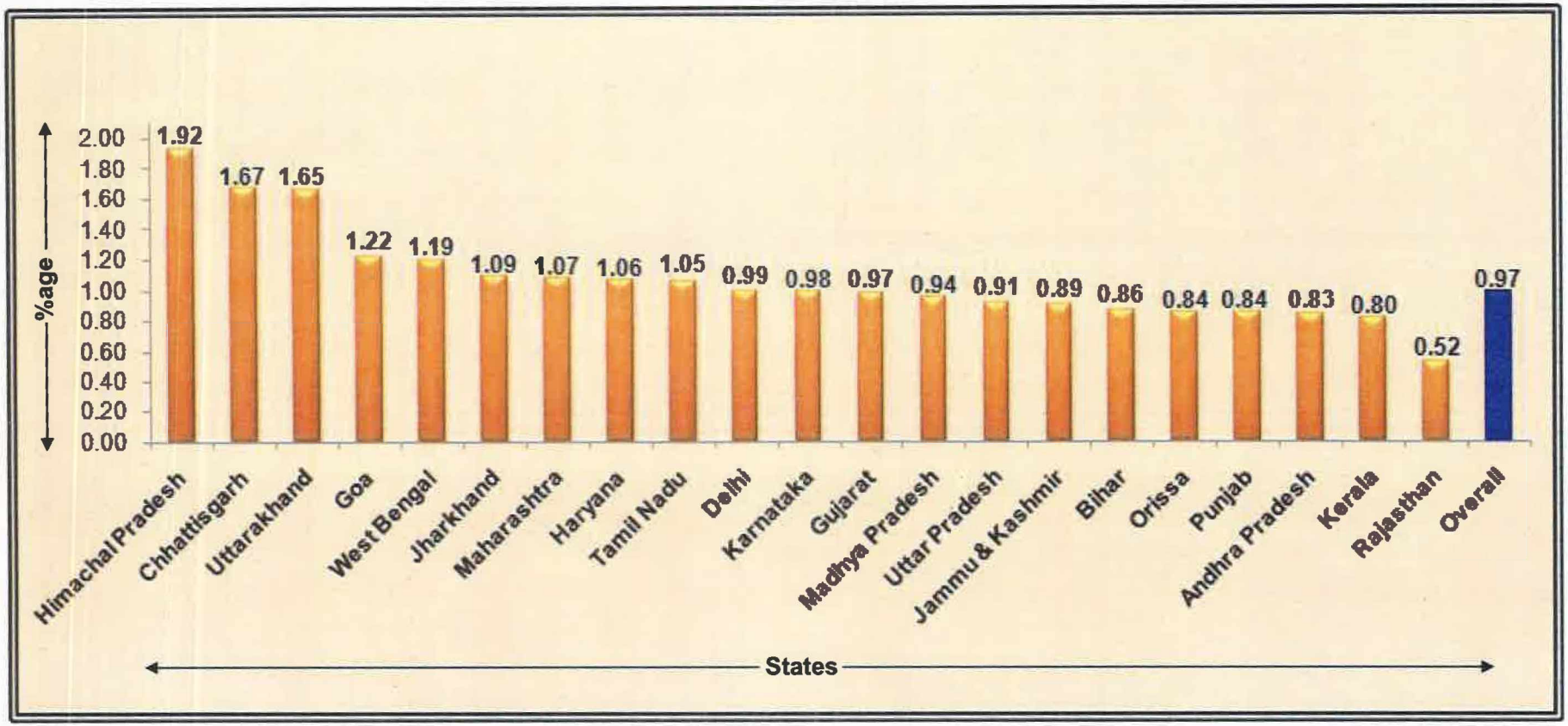
Table - 3.1.8
State wise Break-up of Expenditure incurred for R&D Activities

Sr. No.	State	Sample Data															Universe Data			
		Universe	Sample	Sample R&D Enterprises	R&D Ent	Universe / Sample	Projected R&D Universe	Sale (Rs. Lakhs)			Total (3 Years) (Rs. Lakhs)	R&D Expenditure (RS. Lakhs)			Total (3 Years) (Rs. Lakhs)	R&D / Sales	Total Sale (3 Years)	Total R&D (3 Years)	Average Annual Sale	Average Annual R&D
		No.	No.	No.	%	%	No.	2007-2008	2008-2009	2009-2010		2007-2008	2008-2009	2009-2010		%	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
1	AP	7782	374	50	13.37	20.81	1036	11123.83	12696.35	13942.72	37762.89	94.52	109.30	108.78	312.60	0.83	786394.27	6535.61	262131.42	2178.54
2	Bihar	1514	73	5	6.85	20.74	103	1192.75	1333.11	1449.17	3975.03	10.02	10.07	13.97	34.05	0.86	81785.61	700.74	27261.87	233.58
3	Chhattisgarh	403	19	5	26.32	21.21	103	995.99	1137.96	1224.40	3358.36	18.79	19.07	18.18	56.04	1.67	72560.40	1196.31	24186.80	398.77
4	Delhi	4607	222	19	8.56	20.75	397	3349.12	4499.85	4873.37	12722.34	42.07	39.14	45.00	126.22	0.99	289191.13	2673.28	96397.04	891.09
5	Goa	239	11	3	27.27	21.73	65	594.07	671.93	800.01	2066.00	7.76	8.66	8.80	25.23	1.22	44513.38	544.54	14837.79	181.51
6	Gujarat	11912	572	89	15.56	20.83	1883	19636.93	21967.54	23986.22	65590.70	208.03	209.52	220.20	637.75	0.97	1381926.67	13416.81	460642.22	4472.27
7	Haryana	7157	344	34	9.88	20.81	717	5722.30	6200.93	6723.20	18646.43	61.77	68.97	67.08	197.82	1.06	457710.24	4200.33	152570.08	1400.11
8	HP	754	36	2	5.56	20.94	42	486.35	521.18	612.11	1619.64	9.83	11.45	9.78	31.06	1.92	34290.94	654.97	11430.31	218.32
9	J&K	1334	64	1	1.56	20.84	23	316.14	321.48	346.98	984.60	2.25	2.76	3.76	8.78	0.89	22645.80	201.93	7548.60	67.31
10	Jharkhand	695	33	2	6.06	21.06	41	439.54	561.04	620.14	1620.72	5.90	5.61	6.20	17.71	1.09	32811.94	358.76	10937.31	119.59
11	Karnataka	5572	268	37	13.81	20.79	776	7972.37	8954.27	9456.28	26382.91	90.54	83.64	85.06	259.25	0.98	552949.33	5438.99	184316.44	1813.00
12	Kerala	2413	116	4	3.45	20.80	82	817.94	958.75	1020.22	2796.92	7.78	7.00	7.51	22.29	0.80	57428.52	459.10	19142.84	153.03
13	MP	2867	138	19	13.77	20.78	388	4046.73	4494.87	4555.50	13097.10	41.70	39.26	42.24	123.20	0.94	267801.87	2509.25	89267.29	836.42
14	Maharashtra	14179	680	82	12.06	20.85	1717	18528.05	20178.62	22116.14	60822.80	212.30	203.34	236.60	652.24	1.07	1260455.89	13595.04	420151.96	4531.68
15	Orissa	3131	150	11	7.33	20.87	227	2104.64	2189.02	2406.22	6699.89	18.97	18.57	18.78	56.32	0.84	138469.56	1175.08	46156.52	391.69
16	Punjab	9446	453	42	9.27	20.85	879	8916.90	8471.97	9445.92	26834.79	67.18	75.55	82.98	225.71	0.84	541371.08	4713.60	180457.03	1571.20
17	Rajasthan	4865	233	18	7.73	20.88	373	4706.09	4967.01	5412.80	15085.90	28.87	27.36	22.44	78.67	0.52	249124.80	1610.13	83041.60	536.71
18	Tamil Nadu	7840	376	29	7.71	20.85	610	5962.20	6575.95	6814.92	19353.07	72.07	61.23	70.54	203.84	1.05	405304.53	4292.57	135101.51	1430.86
19	UP	10364	497	36	7.24	20.85	746	7575.63	7978.78	8699.96	24254.37	64.25	73.59	82.83	220.67	0.91	506578.00	4618.30	168859.33	1539.43
20	Uttarakhand	725	34	4	11.76	21.32	89	778.46	865.01	939.78	2583.25	11.95	12.24	18.34	42.53	1.65	58537.52	975.07	19512.51	325.02
21	West Bengal	4229	203	14	6.90	20.83	286	2811.24	3009.27	3120.16	8940.66	35.56	35.06	35.58	106.20	1.19	183001.60	2128.89	61000.53	709.63
22	**Grand Total**	**102028**	**4896**	**506**	**10.33**	**20.84**	**10584**	**108077.27**	**118554.90**	**128566.22**	**355198.39**	**1112.12**	**1121.39**	**1204.67**	**3438.18**	**0.97**	**7424853.08**	**71999.31**	**2474951.03**	**23999.77**

For details please refer Volume-II Annexure-4A (Pages 117-125)

Figure - 3.1.8
State wise R&D Expenditure / Sale Turnover

(Figure in %age)



OBSERVATION

- On overall basis, enterprises undertaking R&D activities are spending 0.97% on R&D as a %age of sales, amounting to Rs. Lakhs 23999.77 annual average for the projected R&D universe.
- State wise Himachal Pradesh spending maximum (1.92%) of sales on R&D, followed by Chhatisgarh (1.67%)

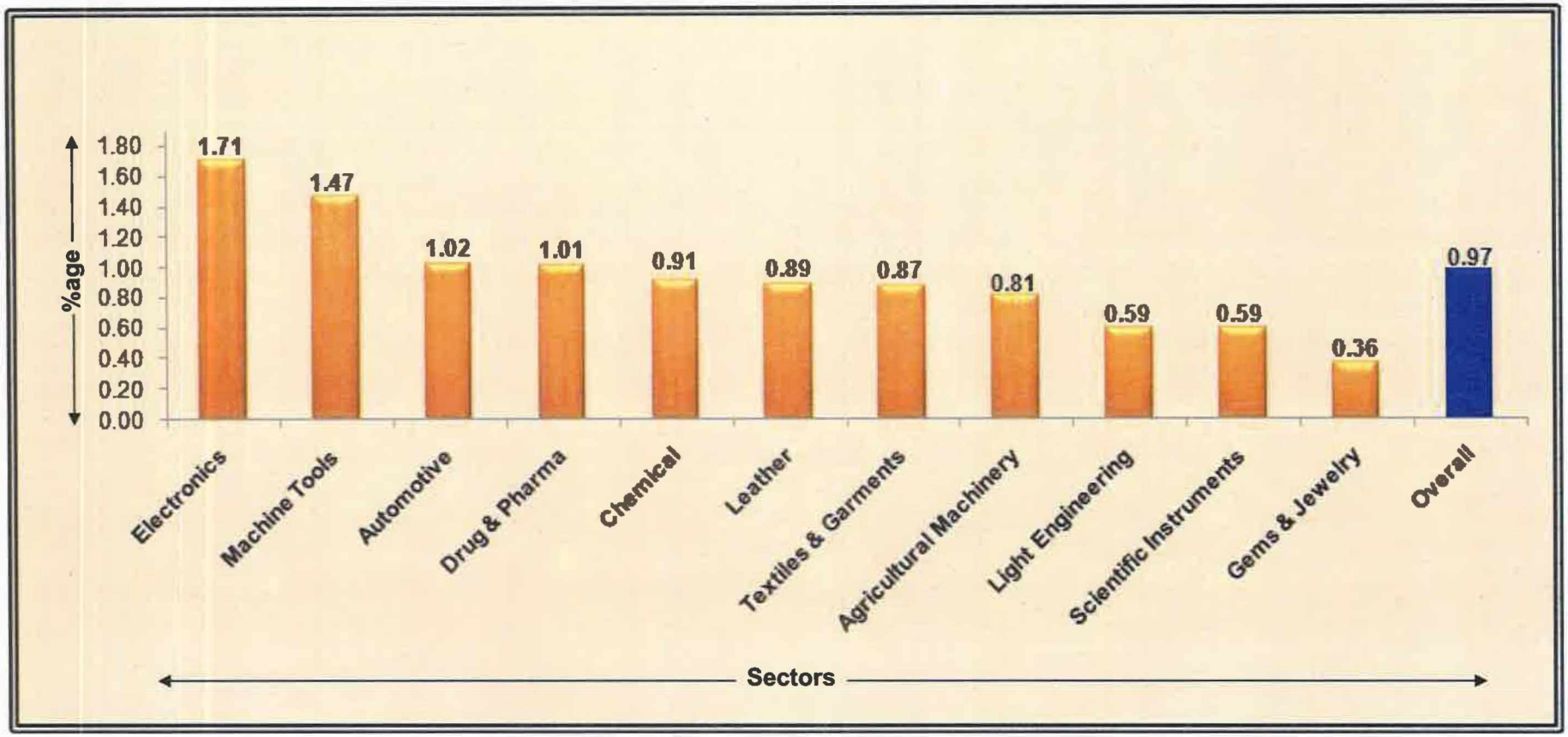
Table - 3.1.9
Sector wise Break-up of Expenditure incurred for R&D Activities

Sr. No.	Sector	Universe	Sample Data														Universe Data			
			Sample	Sample R&D Enterprises	R&D Enterprises %	Universe / Sample	Projected R&D Universe	Sale (Rs. Lakhs)			Total (3 Years) (Rs. Lakhs)	R&D Expenditure (RS. Lakhs)			Total (3 Years) (Rs. Lakhs)	R&D / Sales	Total Sale (3 Years)	Total R&D (3 Years)	Average Annual Sale	Average Annual R&D
		No.	No.	No.	%	%	No.	2007-2008	2008-2009	2009-2010		2007-2008	2008-2009	2009-2010		%	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
1	Agricultural Machinery	15556	748	63	8.42	20.80	1324	11749.09	12521.66	13031.04	37301.79	96.87	96.47	107.22	300.56	0.81	789102.39	6368.38	263034.13	2122.79
2	Automotive	3417	164	26	15.85	20.84	551	5832.83	6453.81	7018.94	19305.58	59.36	64.73	72.51	196.60	1.02	409197.97	4151.61	136399.32	1383.87
3	Chemical	3236	154	23	14.94	21.01	497	5726.10	5809.86	6306.18	17842.14	46.09	53.84	63.33	163.25	0.91	382305.10	3499.88	127435.03	1166.63
4	Drug & Pharma	2610	124	32	25.81	21.05	672	7363.31	8179.85	9470.33	25013.50	75.85	83.89	93.43	253.17	1.01	521136.69	5267.03	173712.23	1755.68
5	Electronics	4393	212	47	22.17	20.72	984	10318.83	10950.71	11949.66	33219.20	191.98	185.99	189.98	567.95	1.71	693524.20	11860.22	231174.73	3953.41
6	Gems & Jewelry	2222	107	6	5.61	20.77	118	1425.55	1615.05	1721.93	4762.53	6.10	6.38	4.78	17.26	0.36	93352.36	349.30	31117.45	116.43
7	Leather	7591	365	34	9.32	20.80	693	7576.29	8247.90	8284.03	24108.22	74.42	66.04	74.18	214.64	0.89	490723.24	4389.96	163574.41	1463.32
8	Light Engineering	44218	2123	128	6.03	20.83	2660	27005.78	31854.22	35524.12	94384.12	184.68	190.11	182.27	557.06	0.59	1961854.39	11569.88	653951.46	3856.63
9	Machine Tools	8751	418	76	18.18	20.94	1592	15722.03	16518.73	18798.91	51039.66	240.91	237.88	273.75	752.54	1.47	1067931.83	15740.42	355977.28	5246.81
10	Scientific Instruments	489	24	3	12.50	20.38	57	501.09	544.14	596.68	1641.91	3.78	1.31	4.60	9.69	0.59	31120.70	182.71	10373.57	60.90
11	Textiles & Garments	9545	457	68	14.88	20.89	1436	14856.37	15858.96	15864.41	46579.74	132.09	134.75	138.62	405.46	0.87	984604.21	8619.91	328201.40	2873.30
12	**Grand Total**	**102028**	**4896**	**506**	**10.33**	**20.84**	**10584**	**108077.27**	**118554.90**	**128566.22**	**355198.39**	**1112.12**	**1121.39**	**1204.67**	**3438.18**	**0.97**	**7424853.08**	**71999.31**	**2474951.03**	**23999.77**

For details please refer Volume-II Annexure-4B (Pages 126-129)

Figure - 3.1.9
Sector wise R&D Expenditure / Sale Turnover

(Figure in %age)



OBSERVATION

- Sector wise maximum (1.71%) of sales spent on R&D in Electronics sector, followed by (1.47%) in Machine Tools.

Table - 3.1.10
Sector & Size wise Break-up of Expenditure incurred for R&D Activities

Sr. No.	Sector	Cluster	Sample (Nos.)				Enterprises Undertaking R&D (Nos.)				R&D Enterprises % of Sample Size to Size				R&D Enterprises % In Total Sample				R&D Expenditure % Sales			
			Mi	Sm	Me	Total	Mi	Sm	Me	Total	Mi	Sm	Me	Overall	Mi	Sm	Me	Overall %	Mi	Sm	Me	Overall %
1	Agricultural Machinery	64	715	32	1	748	37	25	1	63	5.17	78.13	100.00	8.42	4.95	3.34	0.13	8.42	0.69	0.85	0.97	0.81
2	Automotive	14	155	7	2	164	17	7	2	26	10.97	100.00	100.00	15.85	10.37	4.27	1.22	15.85	0.99	1.07	1.05	1.02
3	Chemical	13	147	7	0	154	16	7	0	23	10.88	100.00	0.00	1.00	10.39	4.55	0.00	14.94	0.95	0.82	0.00	0.91
4	Drug & Pharma	11	113	8	3	124	22	8	2	32	19.47	100.00	66.67	25.81	17.74	6.45	1.61	25.81	0.91	1.31	0.83	1.01
5	Electronics	18	203	6	3	212	39	6	2	47	19.21	100.00	66.67	22.17	18.40	2.83	0.94	22.17	1.69	2.01	1.00	1.71
6	Gems & Jewelry	9	102	5	0	107	2	4	0	6	1.96	80.00	0.00	1.00	1.87	3.74	0.00	5.61	0.42	0.34	0.00	0.36
7	Leather	26	346	18	1	365	17	16	1	34	4.91	88.89	100.00	9.32	4.66	4.38	0.27	9.32	1.10	0.69	0.99	0.89
8	Light Engineering	182	2075	48	0	2123	101	27	0	128	4.87	56.25	0.00	1.00	4.76	1.27	0.00	6.03	0.55	0.77	0.00	0.59
9	Machine Tools	36	400	17	1	418	59	16	1	76	14.75	94.12	100.00	18.18	14.11	3.83	0.24	18.18	1.51	1.39	1.72	1.47
10	Scientific Instruments	2	22	2	0	24	1	2	0	3	4.55	100.00	0.00	1.00	4.17	8.33	0.00	12.50	0.56	0.60	0.00	0.59
11	Textiles & Garments	39	432	24	1	457	47	20	1	68	10.88	83.33	100.00	14.88	10.28	4.38	0.22	14.88	0.87	0.85	1.05	0.87
12	**Grand Total**	**414**	**4710**	**174**	**12**	**4896**	**358**	**138**	**10**	**506**	**7.60**	**79.31**	**83.33**	**10.33**	**7.31**	**2.82**	**0.20**	**10.33**	**0.97**	**0.96**	**1.10**	**0.97**

Sr. No.	Sector	R&D Expenditure for Sample (Rs. Lakhs) (3 Years)				Universe / Sample				Overall Sale for Sample (Rs. Lakhs) (3 Years)				Average Annual Sale (Rs. Lakhs) for Sample			
		Mi	Sm	Me	Overall Total	Mi	Sm	Me	Overall Ratio	Mi	Sm	Me	Total	Mi	Sm	Me	Total
1	Agricultural Machinery	80.74	193.66	26.16	300.56	20.78	21.22	21.00	20.80	11720.12	22895.60	2686.07	37301.79	3906.71	7631.87	895.36	12433.93
2	Automotive	121.86	51.40	23.34	196.60	20.80	21.71	20.50	20.84	12289.09	4790.92	2225.57	19305.58	4096.36	1596.97	741.86	6435.19
3	Chemical	120.59	42.66	0.00	163.25	20.95	22.43	0.00	21.01	12657.87	5184.27	0.00	17842.14	4219.29	1728.09	0.00	5947.38
4	Drug & Pharma	137.04	92.00	24.13	253.17	21.14	20.63	18.67	21.05	15074.72	7039.14	2899.64	25013.50	5024.91	2346.38	966.55	8337.83
5	Electronics	437.27	94.37	36.31	567.95	20.73	20.17	21.33	20.72	25931.38	4692.36	2595.46	33219.20	8643.79	1564.12	865.15	11073.07
6	Gems & Jewelry	5.82	11.44	0.00	17.26	20.79	20.20	0.00	20.77	1376.22	3386.31	0.00	4762.53	458.74	1128.77	0.00	1587.51
7	Leather	122.12	82.42	10.10	214.64	20.85	20.06	16.00	20.8	11111.08	11979.68	1017.46	24108.22	3703.69	3993.23	339.15	8036.07
8	Light Engineering	423.11	133.95	0.00	557.06	20.83	20.79	0.00	20.83	77068.01	17316.11	0.00	94384.12	25689.34	5772.04	0.00	31461.37
9	Machine Tools	564.98	176.52	18.05	752.54	20.96	20.41	22.00	20.94	37295.18	12693.97	1050.51	51039.66	12431.73	4231.32	350.17	17013.22
10	Scientific Instruments	2.63	7.06	0.00	9.69	20.55	18.50	0.00	20.38	466.07	1175.84	0.00	1641.91	155.36	391.95	0.00	547.30
11	Textiles & Garments	288.21	106.05	11.20	405.46	20.86	21.38	22.00	20.89	33099.55	12408.98	1071.21	46579.74	11033.18	4136.33	357.07	15526.58
12	**Grand Total**	**2304.37**	**991.53**	**149.29**	**3438.18**	**20.84**	**20.87**	**20.17**	**20.84**	**238089.29**	**103563.18**	**13545.92**	**355198.39**	**79363.10**	**34521.06**	**4515.31**	**118399.46**

Continue ----→

Sr. No.	Sector	Average Annual R&D Expenditure (Rs. Lakhs) for Sample				Average Annual R&D Expenditure (Rs. Lakhs) for Universe				Average Annual R&D Expenditure (Rs. Lakhs) Per Enterprise for Sample			
		Mi	Sm	Me	Total	Mi	Sm	Me	Total	Mi	Sm	Me	Total
1	Agricultural Machinery	26.91	64.55	8.72	100.19	564.26	1374.82	183.71	2122.79	0.73	2.58	8.72	1.59
2	Automotive	40.62	17.13	7.78	65.53	848.91	374.96	160.01	1383.88	2.39	2.45	3.89	2.52
3	Chemical	40.20	14.22	0.00	54.42	842.68	323.95	0.00	1166.63	2.51	2.03	0.00	2.37
4	Drug & Pharma	45.68	30.67	8.04	84.39	965.68	639.65	150.35	1755.68	2.08	3.83	4.02	2.64
5	Electronics	145.76	31.46	12.10	189.32	3051.54	634.48	267.39	3953.41	3.74	5.24	6.05	4.03
6	Gems & Jewelry	1.94	3.81	0.00	5.75	40.33	76.10	0.00	116.43	0.97	0.95	0.00	0.96
7	Leather	40.71	27.47	3.37	71.55	852.72	551.73	58.87	1463.32	2.39	1.72	3.37	2.10
8	Light Engineering	141.04	44.65	0.00	185.69	2928.35	928.27	0.00	3856.62	1.40	1.65	0.00	1.45
9	Machine Tools	188.33	58.84	6.02	253.18	3947.33	1167.11	132.37	5246.80	3.19	3.68	6.02	3.33
10	Scientific Instruments	0.88	2.35	0.00	3.23	18.01	42.89	0.00	60.90	0.88	1.18	0.00	1.08
11	Textiles & Garments	96.07	35.35	3.73	135.15	2035.39	755.78	82.13	2873.31	2.04	1.77	3.73	1.99
12	**Grand Total**	**768.12**	**330.51**	**49.76**	**1148.40**	**16095.19**	**6869.75**	**1034.83**	**23999.77**	**2.15**	**2.39**	**4.98**	**2.27**

For details please refer Volume-II Annexure-4A & Annexure 4B (Pages 117-129)

OBSERVATION

- On overall basis, medium size enterprises are spending more on R&D as compared to small and micro.

Figure - 3.1.10
Sector & Size wise Average Annual R&D

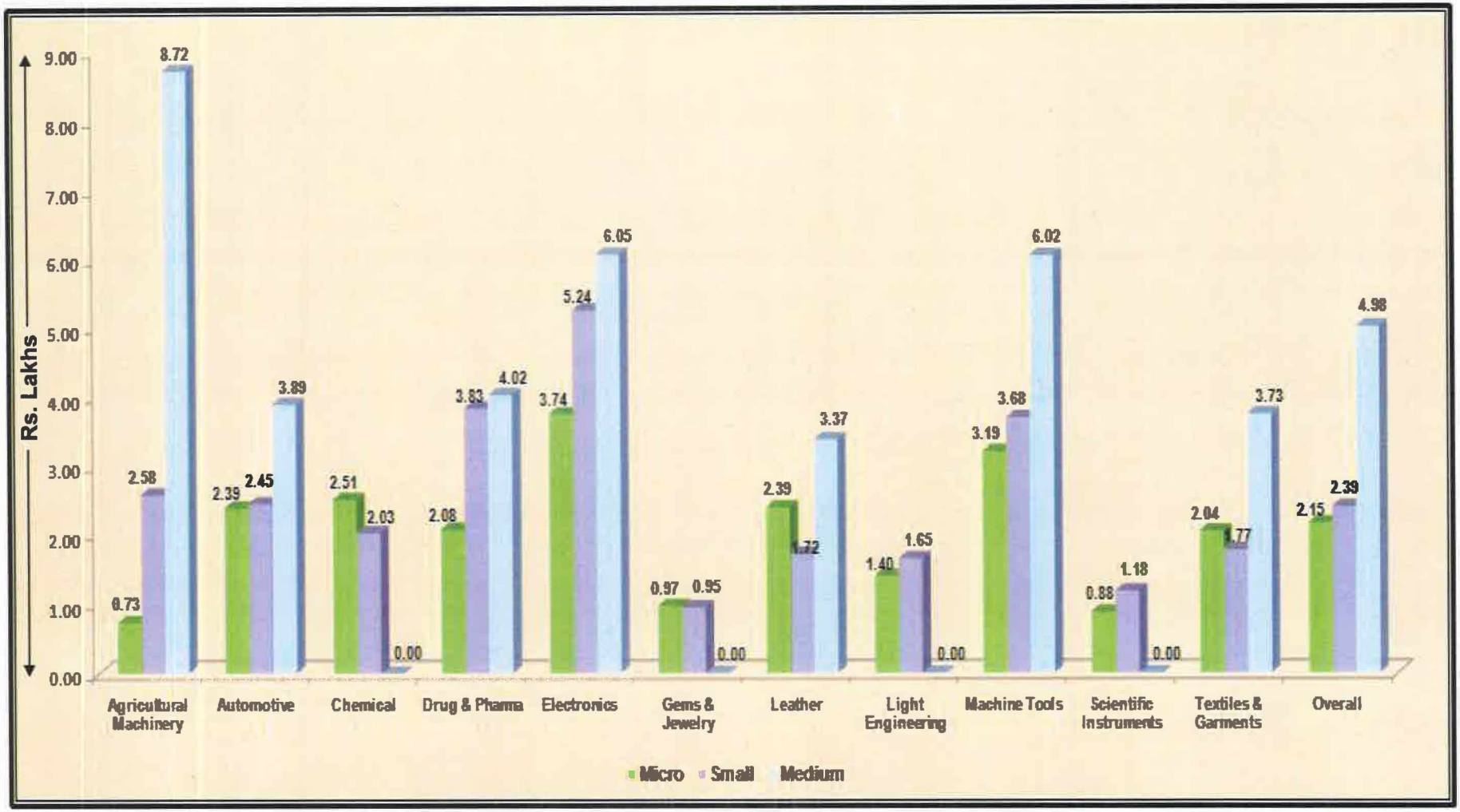


Table - 3.1.10 A
Expenditure on R&D by Industry Groups

Sr. No.	Industry Group (Manufacturing)	No. of R&D Units	R&D Expenditure (RS. Lakhs)			R&D Exp. as % of Sale Turnover (STO)		
			2007-2008	2008-2009	2009-2010	2007-2008	2008-2009	2009-2010
1	Basic Metals	20	34.65	25.73	26.37	0.88	0.55	0.51
2	Chemical and Chemical Products	23	46.08	53.84	63.33	0.80	0.93	1.00
3	Computer, Electronics and Optical Products	53	197.10	194.00	202.61	1.69	1.55	1.49
4	Drug & Pharmaceuticals	32	36.31	43.12	43.44	0.98	0.96	0.92
5	Electrical Equipment	25	107.94	108.37	95.71	0.66	0.68	0.60
6	Fabricated Metal Products	74	52.66	53.22	60.24	0.71	0.60	0.48
7	Jewelry	20	74.44	66.03	74.18	1.18	1.07	1.08
8	Leather and Related Products	34	294.11	287.24	328.15	0.98	0.80	0.90
9	Machinery & Equipment	124	48.70	53.91	60.44	1.21	1.12	1.18
10	Motor Vehicles, Trailers and Semi-Trailers	22	6.50	8.34	10.11	0.99	1.02	1.04
11	Paper and Paper Products	4	71.83	78.90	87.13	0.68	0.71	0.76
12	Rubber and Plastic Products	4	6.64	8.67	7.59	0.79	0.90	0.69
13	Textiles	17	33.78	30.95	31.71	0.94	0.75	0.81
14	Wearing Apparel	51	98.33	106.82	109.96	0.87	0.91	0.92
15	Wood and Wood Products	3	3.05	2.25	3.70	0.40	0.23	0.38
16	**Total**	**506**	**1112.12**	**1121.39**	**1204.67**	**1.03**	**0.95**	**0.94**

Table - 3.1.11
Last 3 Years Export (Rs. Lakhs) for Enterprises Undertaking R&D Activities

Sr. No.	Sector	Sample Data												Universe Data					
		2007-2008		2008-2009		2009-2010		Total Sale	Total Export	Export / Sale (%)	Sample R&D Ent. (Nos.)	Export Sample Ent. (Nos.)	% Export Enterprises.	Projected Export Universe Nos.	Universe / Sample	Total Sale (3 Years)	Total Export (3 Years)	Average Annual Sale	Average Annual Export
		Rs. Lakhs		Rs. Lakhs		Rs. Lakhs		Rs. Lakhs	Rs. Lakhs							Rs. Lakhs	Rs. Lakhs	Rs. Lakhs	Rs. Lakhs
		Sale	Export	Sale	Export	Sale	Export												
1	Agricultural Machinery	783.58	87.33	858.02	87.88	860.16	83.63	2501.76	258.84	10.35	63	4	6.35	81	20.25	50351.74	5209.04	16783.91	1736.35
2	Automotive	1638.36	343.02	1854.43	373.72	2057.81	369.94	5550.60	1086.68	19.58	26	8	30.77	171	21.38	118644.07	23227.81	39548.02	7742.60
3	Chemical	1489.32	210.81	1607.73	210.36	1757.95	248.39	4855.00	669.57	13.79	23	6	26.09	128	21.33	103573.27	14284.17	34524.42	4761.39
4	Drug & Pharma	3141.42	485.79	3485.96	565.03	3974.42	602.48	10601.80	1653.30	15.59	32	12	37.50	258	21.48	227689.43	35507.09	75896.48	11835.70
5	Electronics	3254.10	778.59	3551.24	739.07	3811.06	791.76	10616.40	2309.42	21.75	47	14	29.79	289	20.64	219152.83	47673.02	73050.94	15891.01
6	Gems & Jewelry	1016.24	152.35	1158.98	175.79	1236.66	167.89	3411.88	496.03	14.54	6	4	66.67	80	19.89	67870.82	9867.28	22623.61	3289.09
7	Leather	2319.51	478.13	2433.44	436.09	2417.00	578.48	7169.95	1492.70	20.82	34	10	29.41	205	20.54	147299.45	30666.03	49099.82	10222.01
8	Light Engineering	4589.45	853.50	5332.56	851.95	5961.76	756.67	15883.77	2462.12	15.50	128	18	14.06	372	20.69	328659.49	50945.03	109553.16	16981.68
9	Machine Tools	4206.19	607.19	4663.16	715.30	5221.79	937.83	14091.13	2260.31	16.04	76	18	23.68	383	21.28	299877.00	48102.32	99959.00	16034.11
10	Scientific Instruments	501.09	105.70	544.14	101.99	596.68	107.17	1641.91	314.86	19.18	3	3	100.00	57	19.00	31196.29	5982.34	10398.76	1994.11
11	Textiles & Garments	6346.80	1554.05	6444.74	1666.40	6083.24	1467.07	18874.78	4687.52	24.83	68	27	39.71	581	21.52	406157.30	100868.43	135385.77	33622.81
12	**Grand Total**	**29286.06**	**5656.46**	**31934.40**	**5923.59**	**33978.53**	**6111.30**	**95198.98**	**17691.35**	**18.58**	**506**	**124**	**24.51**	**2605**	**21.01**	**2000129.01**	**371695.05**	**666709.67**	**123898.35**

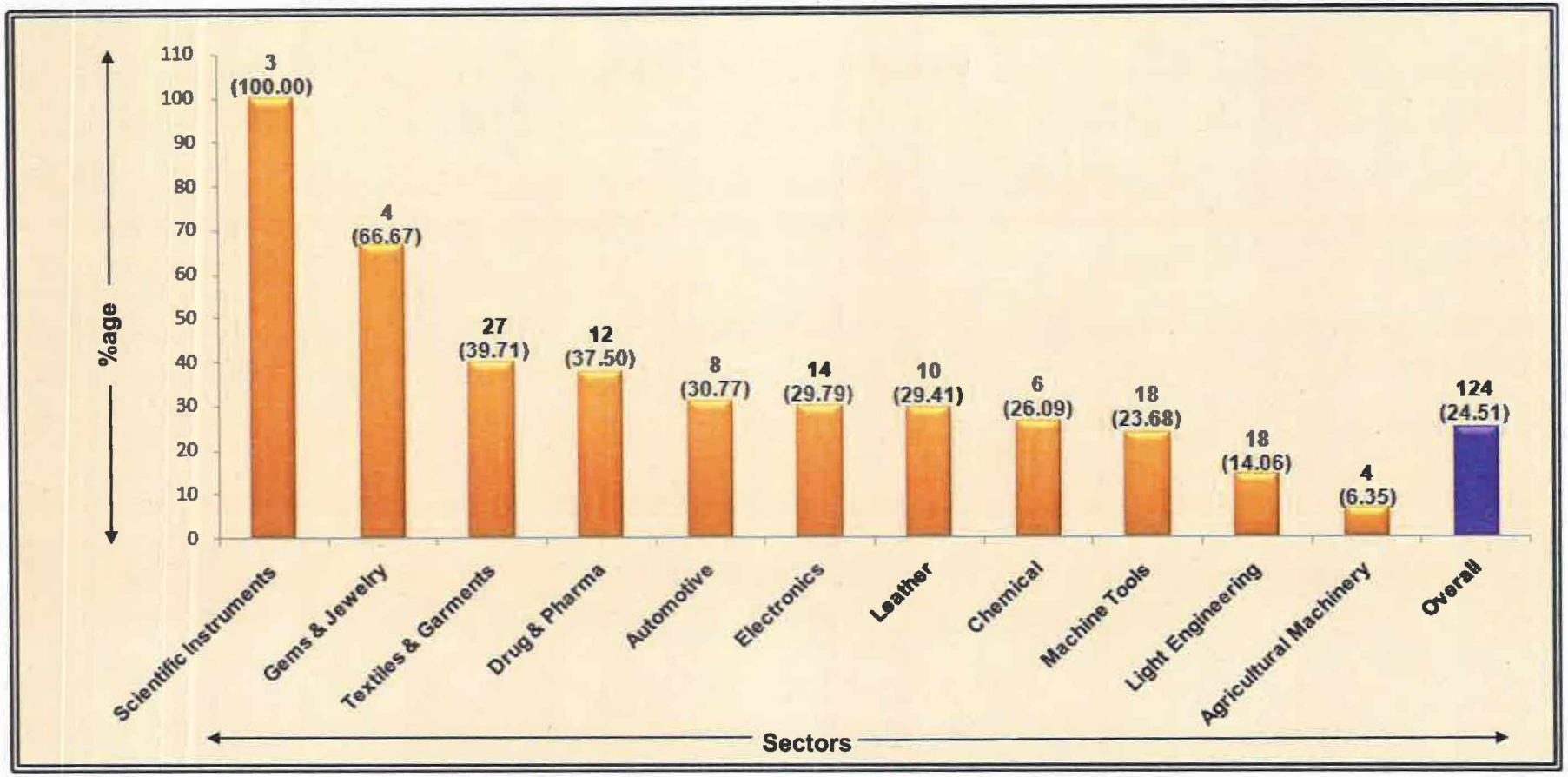
For details please refer Volume-II Annexure-5A & Annexure -5B (Pages 130-140)

OBSERVATION

- On overall basis, 24.51% R&D enterprises exporting @ 18.58% of sales, totaling to an annual average value of Rs. Lakhs 123898.35 for the projected export universe.

Figure - 3.1.11 A
Sector wise R&D Exporting Enterprises

Figure in brackets ( ) indicates %age

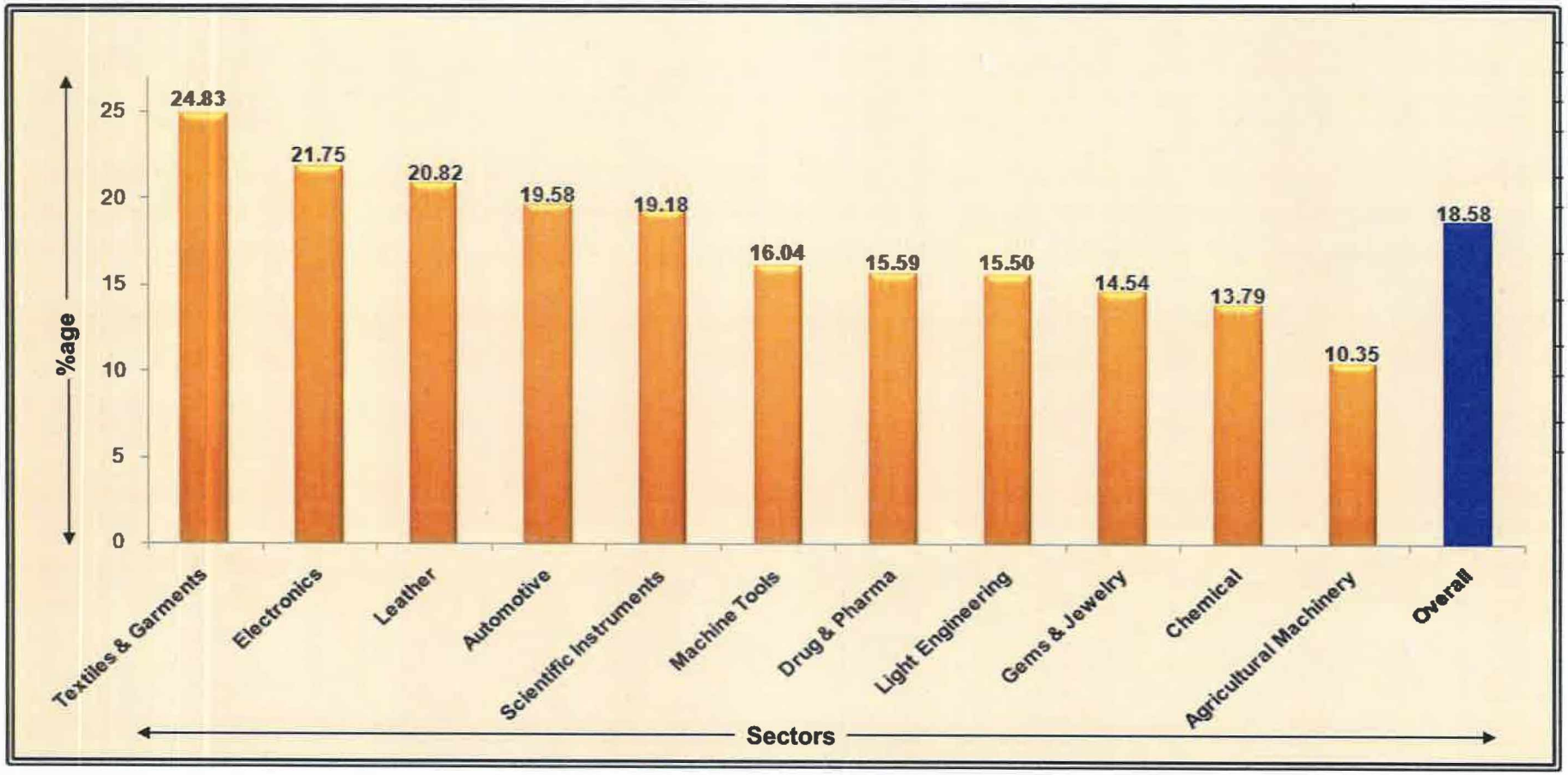


OBSERVATION

- On overall basis, out of 506 R&D enterprises, 124 (24.51%) are exporting.

Figure - 3.1.11 B
Sector wise Percentage of Export / Sale of R&D Enterprises

(Figure in %age)



OBSERVATION

- On overall basis, R&D enterprises are exporting @ 18.58% of sales.

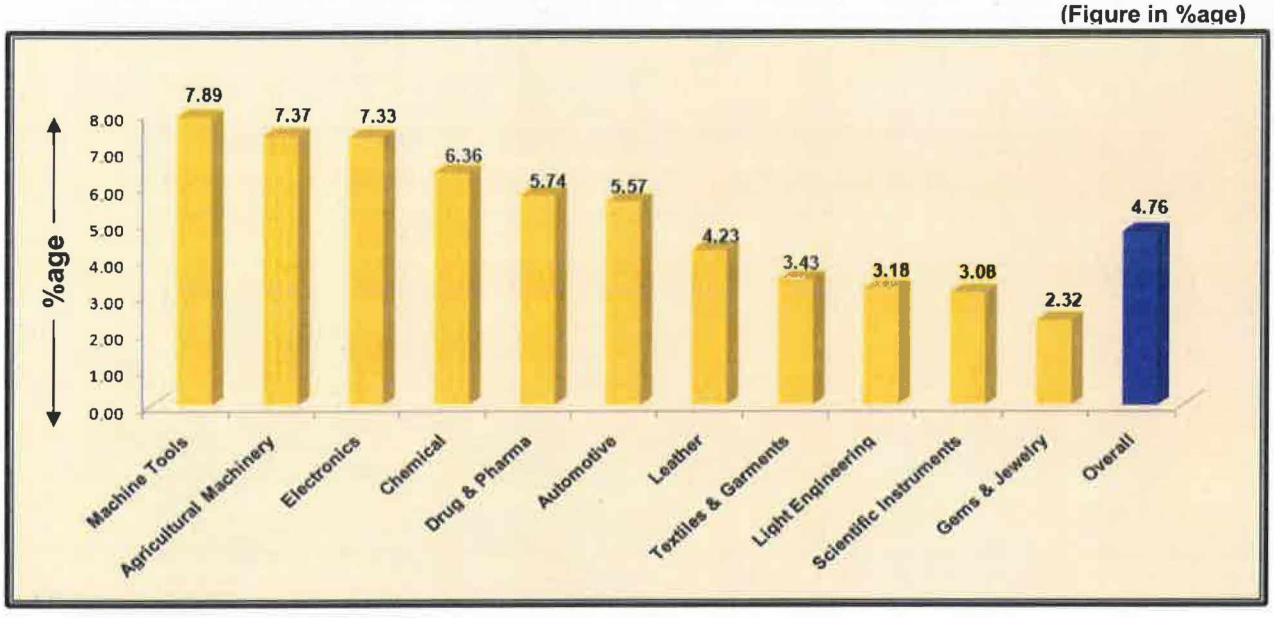
Table 3.1.11 C
Sector wise Percentage R&D Expenditure / Export

Sr. No	Sector	Total Export (Rs. Lakhs)	Average Annual Export (Rs. Lakhs)	No. of Exporting Enterprises	Annual Export / Enterprise	Total R&D Expenditure (Rs. Lakhs)	Average Annual R&D Expenditure (Rs. Lakhs)	No. of R&D Enterprises	Annual R&D Exp. / Enterprise	R&D Exp. / Export
1	Agricultural Machinery	258.84	86.28	4	21.57	300.56	100.19	63	1.59	7.37
2	Automotive	1086.68	362.23	8	45.28	196.60	65.53	26	2.52	5.57
3	Chemical	669.57	223.19	6	37.20	163.25	54.42	23	2.37	6.36
4	Drug & Pharma	1653.30	551.10	12	45.93	253.17	84.39	32	2.64	5.74
5	Electronics	2309.42	769.81	14	54.99	567.95	189.32	47	4.03	7.33
6	Gems & Jewelry	496.03	165.34	4	41.34	17.26	5.75	6	0.96	2.32
7	Leather	1492.70	497.57	10	49.76	214.64	71.55	34	2.10	4.23
8	Light Engineering	2462.12	820.71	18	45.59	557.06	185.69	128	1.45	3.18
9	Machine Tools	2260.31	753.44	18	41.86	752.54	250.85	76	3.30	7.89
10	Scientific Instruments	314.86	104.95	3	34.98	9.69	3.23	3	1.08	3.08
11	Textiles & Garments	4687.52	1562.51	27	57.87	405.46	135.15	68	1.99	3.43
12	**Total (1-11)**	**17691.35**	**5897.12**	**124**	**47.56**	**3438.18**	**1146.06**	**506**	**2.26**	**4.76**

For details please refer Volume-I Table 3.1.9 & 3.1.11 (Pages 23 & 29)

Figure - 3.1.11 C
Sector wise R&D Expenditure / Export

(Figure in %age)



OBSEVATION

- On overall basis, R&D Expenditure / Export works out to 4.76%

Table - 3.1.12
Manpower - R&D Enterprises (2009-2010)

Sr. No.	Sector	Sample Data													
		Sample R&D Ent.	Projected Universe R&D Ent.	Male Employee (Nos.)				Female Employee (Nos.)				Total Male Emp.	Total Female Emp.	Total Female / Male (%)	Total Female R&D / Total Male R&D (%)
				Full Time		Part Time		Full Time		Part Time					
		No.	No.	Total	R&D	Total	R&D	Total	R&D	Total	R&D	No.	No.		
1	Agricultural Machinery	63	1324	940	173	0	0	138	0	0	0	940	138	14.68	0.00
2	Automotive	26	551	568	74	0	0	104	0	0	0	568	104	18.31	0.00
3	Chemical	23	497	400	43	0	0	42	0	0	0	400	42	10.50	0.00
4	Drug & Pharma	32	672	706	72	0	0	152	62	0	0	706	214	30.31	86.11
5	Electronics	47	984	1710	143	0	34	535	97	0	0	1710	632	36.96	67.83
6	Gems & Jewelry	6	118	73	0	0	0	22	0	0	0	73	22	30.14	0.00
7	Leather	34	693	437	63	0	0	93	0	0	0	437	93	21.28	0.00
8	Light Engineering	128	2660	2534	337	0	0	0	0	0	0	2534	0	0.00	0.00
9	Machine Tools	76	1592	2364	222	0	0	0	0	0	0	2364	0	0.00	0.00
10	Scientific Instruments	3	57	42	6	0	0	13	2	0	0	42	15	35.71	33.33
11	Textiles & Garments	68	1436	1149	134	0	0	254	0	0	0	1149	254	22.11	0.00
12	**Grand Total**	**506**	**10584**	**10923**	**1267**	**0**	**34**	**1353**	**161**	**0**	**0**	**10923**	**1514**	**13.86**	**12.71**

Continued----->

For details please refer Volume-II Annexure-6A & Annexure 6B (Pages 141-155)

Table - 3.1.12
Manpower - R&D Enterprises (2009-2010)

Continue from previous ----→

Sr. No	Sector	Universe Data							
		Overall Universe	Overall Sample	Universe / Sample	Total Male Employee	Total Female Employee	Total Male + Female Employee	Total R&D Employee	Total R&D Employee / Total Employee
					No.	No.	No.	No.	%
1	Agricultural Machinery	15556	748	20.80	19722	2891	22613	3634	16.07
2	Automotive	3417	164	20.84	12118	2229	14347	1583	11.03
3	Chemical	3236	154	21.01	8642	893	9535	922	9.67
4	Drug & Pharma	2610	124	21.05	14731	3144	17875	2818	15.77
5	Electronics	4393	212	20.72	35965	11226	47191	5645	11.96
6	Gems & Jewelry	2222	107	20.77	1465	444	1909	0	0.00
7	Leather	7591	365	20.80	8861	1871	10732	1271	11.84
8	Light Engineering	44218	2123	20.83	52737	0	52737	7014	13.30
9	Machine Tools	8751	418	20.94	49587	0	49587	4670	9.42
10	Scientific Instruments	489	24	20.38	792	244	1036	112	10.81
11	Textiles & Garments	9545	457	20.89	24431	5327	29758	2849	9.57
12	**Grand Total**	**102028**	**4896**	**20.84**	**229051**	**28269**	**257320**	**30518**	**11.86**

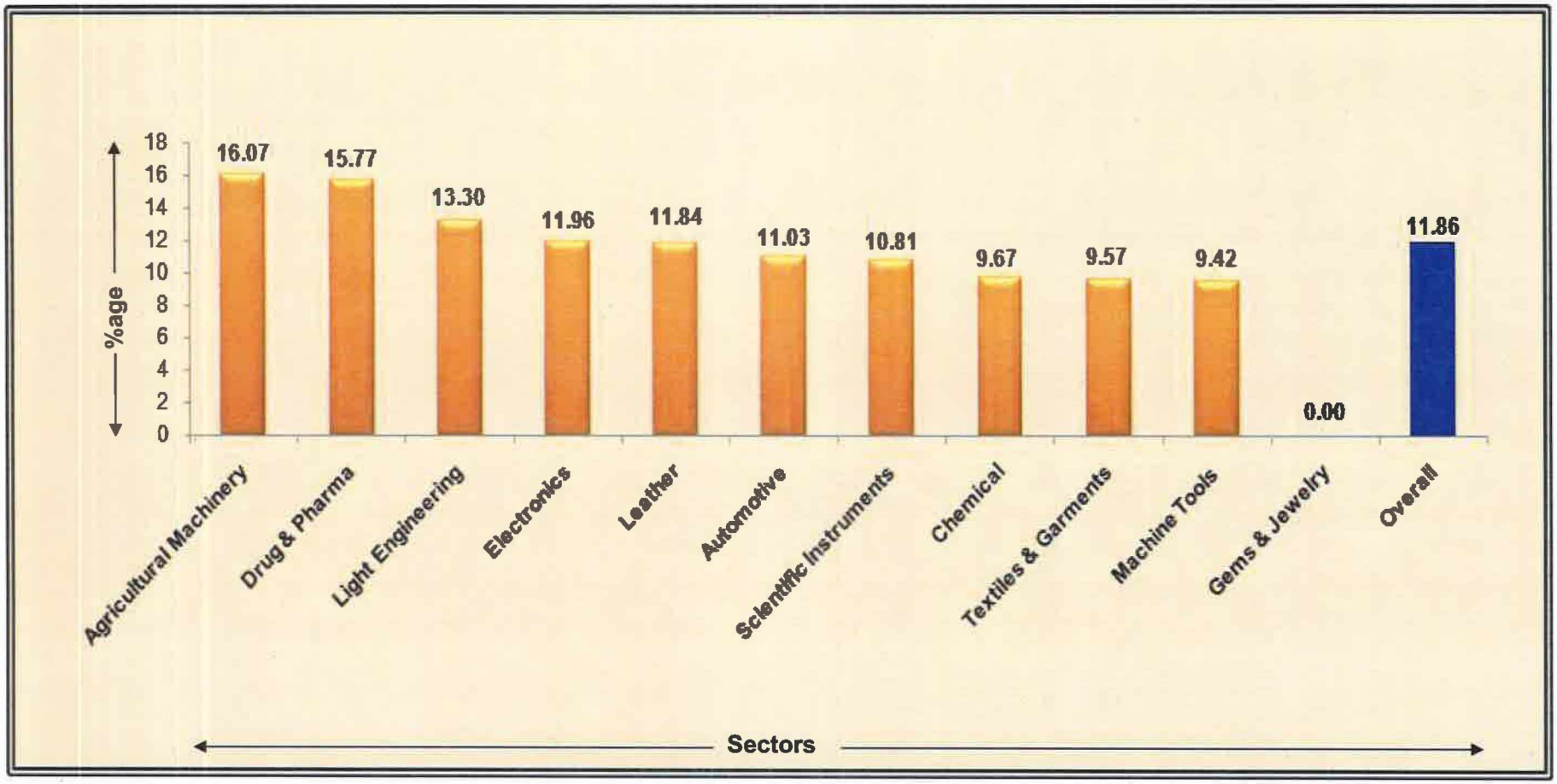
For details please refer Volume-II Annexure-6A & Annexure 6B (Pages 141-155)

OBSERVATION

- On overall basis, during the year 2009-10, R&D employees are 11.86% of total employees, female to male R&D employees 12.71%.

Figure - 3.1.12
Total R&D Manpower / Total Manpower (2009-10)

(Figure in %age)



OBSERVATION

- On overall basis, during the year 2009-10, R&D employees are 11.86% of total employees.

Table - 3.1.13
Sector wise Break-up of R&D Areas of Enterprises

Multi Choice
(Figures in Numbers)

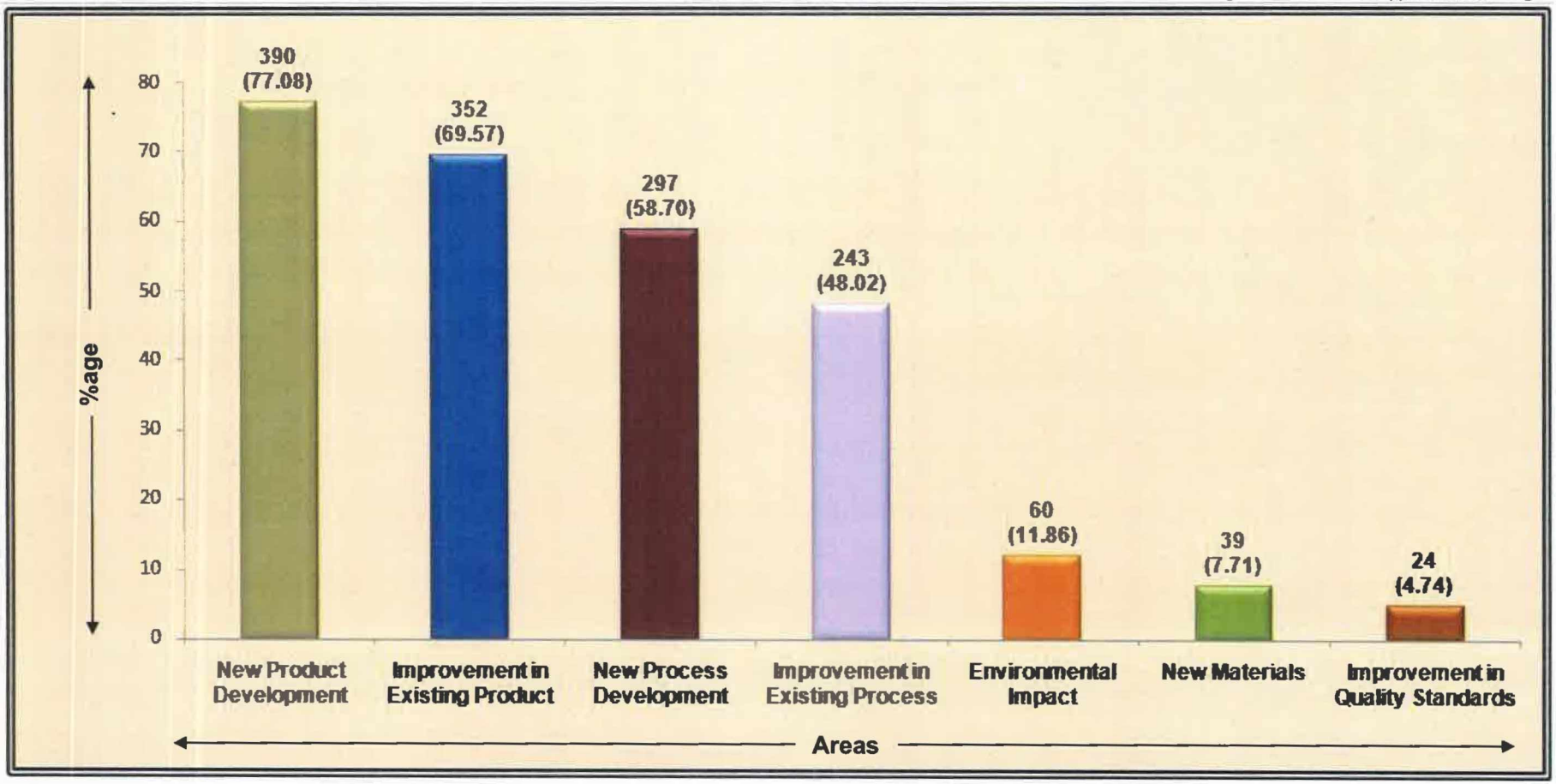
Sr. No	R&D Areas / Sector	Sample R&D Ent.	New Product Development	New Process Development	Improvement in Existing Product	Improvement in Quality Standards	Environment Impact like Introduction of Green Technologies	Improvement in Existing Process	New Materials
1	Agricultural Machinery	63	48 (76.19)	43 (68.25)	39 (61.90)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
2	Automotive	26	21 (80.77)	16 (61.54)	13 (50.00)	0 (0.00)	10 (38.46)	0 (0.00)	0 (0.00)
3	Chemical	23	18 (78.26)	17 (73.91)	15 (65.22)	0 (0.00)	14 (60.87)	0 (0.00)	0 (0.00)
4	Drug & Pharma	32	22 (68.75)	21 (65.63)	18 (56.25)	0 (0.00)	0 (0.00)	19 (59.38)	0 (0.00)
5	Electronics	47	40 (85.11)	34 (72.34)	35 (74.47)	24 (51.06)	26 (55.32)	32 (68.09)	0 (0.00)
6	Gems & Jewelry	6	6 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	6 (100.00)	0 (0.00)
7	Leather	34	24 (70.59)	0 (0.00)	13 (38.24)	0 (0.00)	10 (29.41)	16 (47.06)	0 (0.00)
8	Light Engineering	128	94 (73.44)	64 (50.00)	128 (100.00)	0 (0.00)	0 (0.00)	84 (65.63)	0 (0.00)
9	Machine Tools	76	64 (84.21)	51 (67.11)	34 (44.74)	0 (0.00)	0 (0.00)	32 (42.11)	39 (51.32)
10	Scientific Instruments	3	3 (100.00)	0 (0.00)	3 (100.00)	0 (0.00)	0 (0.00)	3 (100.00)	0 (0.00)
11	Textiles & Garments	68	50 (73.53)	51 (75.00)	54 (79.41)	0 (0.00)	0 (0.00)	51 (75.00)	0 (0.00)
12	**Grand Total**	**506**	**390 (77.08)**	**297 (58.70)**	**352 (69.57)**	**24 (4.74)**	**60 (11.86)**	**243 (48.02)**	**39 (7.71)**

For details please refer Volume-II Annexure-7 (Pages 156-159)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.13
Break-up of R&D Areas of Enterprises

Figure in brackets ( ) indicate %age



OBSERVATION

- On overall basis, maximum 390 (77.08%) enterprises reported New Product Development, followed by 352 (69.57%) Improvement in Existing Product as the main areas under R&D.

Table - 3.1.14
Break-up of R&D Benefits

Multi Choice
(Figures in Numbers)

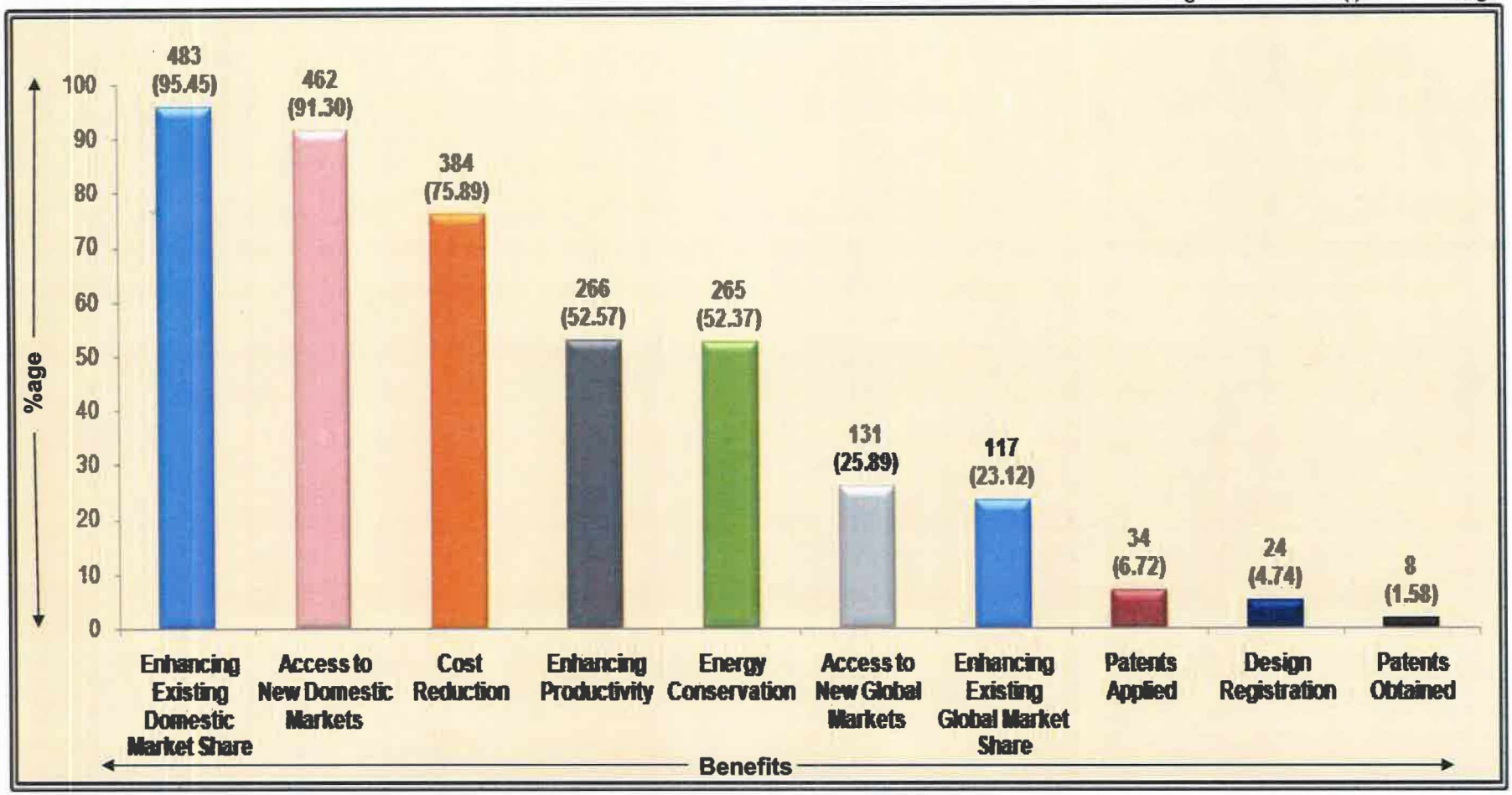
Sr. No.	Sector / Benefits	Sample R&D Ent.	Cost Reduction	Energy Conservation	Enhancement in Productivity	Enhancing Existing Market Share		Access to New Markets		Patents		Design Registration
						Domestic	Global	Domestic	Global	Applied	Obtained	
1	Agricultural Machinery	63	45 (71.43)	15 (23.81)	47 (74.60)	48 (76.19)	4 (6.35)	41 (65.08)	4 (6.35)	13 (20.63)	0 (0.00)	24 (38.10)
2	Automotive	26	16 (61.54)	10 (38.46)	0 (0.00)	23 (88.46)	8 (30.77)	17 (65.38)	0 (0.00)	7 (26.92)	0 (0.00)	0 (0.00)
3	Chemical	23	13 (56.52)	10 (43.48)	12 (52.17)	23 (100.00)	6 (26.09)	17 (73.91)	3 (13.04)	0 (0.00)	0 (0.00)	0 (0.00)
4	Drug & Pharma	32	19 (59.38)	16 (50.00)	19 (59.38)	31 (96.88)	12 (37.50)	30 (93.75)	12 (37.50)	14 (43.75)	8 (25.00)	0 (0.00)
5	Electronics	47	32 (68.09)	37 (78.72)	28 (59.57)	43 (91.49)	14 (29.79)	44 (93.62)	14 (29.79)	0 (0.00)	0 (0.00)	0 (0.00)
6	Gems & Jewelry	6	4 (66.67)	0 (0.00)	2 (33.33)	6 (100.00)	4 (66.67)	4 (66.67)	3 (50.00)	0 (0.00)	0 (0.00)	0 (0.00)
7	Leather	34	30 (88.24)	0 (0.00)	4 (11.76)	34 (100.00)	4 (11.76)	34 (100.00)	10 (29.41)	0 (0.00)	0 (0.00)	0 (0.00)
8	Light Engineering	128	103 (80.47)	108 (84.38)	100 (78.13)	128 (100.00)	18 (14.06)	128 (100.00)	18 (14.06)	0 (0.00)	0 (0.00)	0 (0.00)
9	Machine Tools	76	61 (80.26)	19 (25.00)	0 (0.00)	76 (100.00)	18 (23.68)	76 (100.00)	27 (35.53)	0 (0.00)	0 (0.00)	0 (0.00)
10	Scientific Instruments	3	3 (100.00)	0 (0.00)	0 (0.00)	3 (100.00)	3 (100.00)	3 (100.00)	3 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
11	Textiles & Garments	68	58 (85.29)	50 (73.53)	54 (79.41)	68 (100.00)	26 (38.24)	68 (100.00)	37 (54.41)	0 (0.00)	0 (0.00)	0 (0.00)
12	**Grand Total**	**506**	**384 (75.89)**	**265 (52.37)**	**266 (52.57)**	**483 (95.45)**	**117 (23.12)**	**462 (91.30)**	**131 (25.89)**	**34 (6.72)**	**8 (1.58)**	**24 (4.74)**

For details please refer Volume-II Annexure-8 (Pages 160-163)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.14
R&D Benefits

Figure in brackets ( ) indicate %age



OBSERVATION

- On overall basis, maximum 483 (95.45%) enterprises reported Enhancing Existing Domestic Market Share, followed by 462 (91.30%) Access to New Domestic Markets as the benefits under R&D.

Table - 3.1.15
Sector wise Factors / Sources of R&D Activities

Multi Choice
(Figures in Numbers)

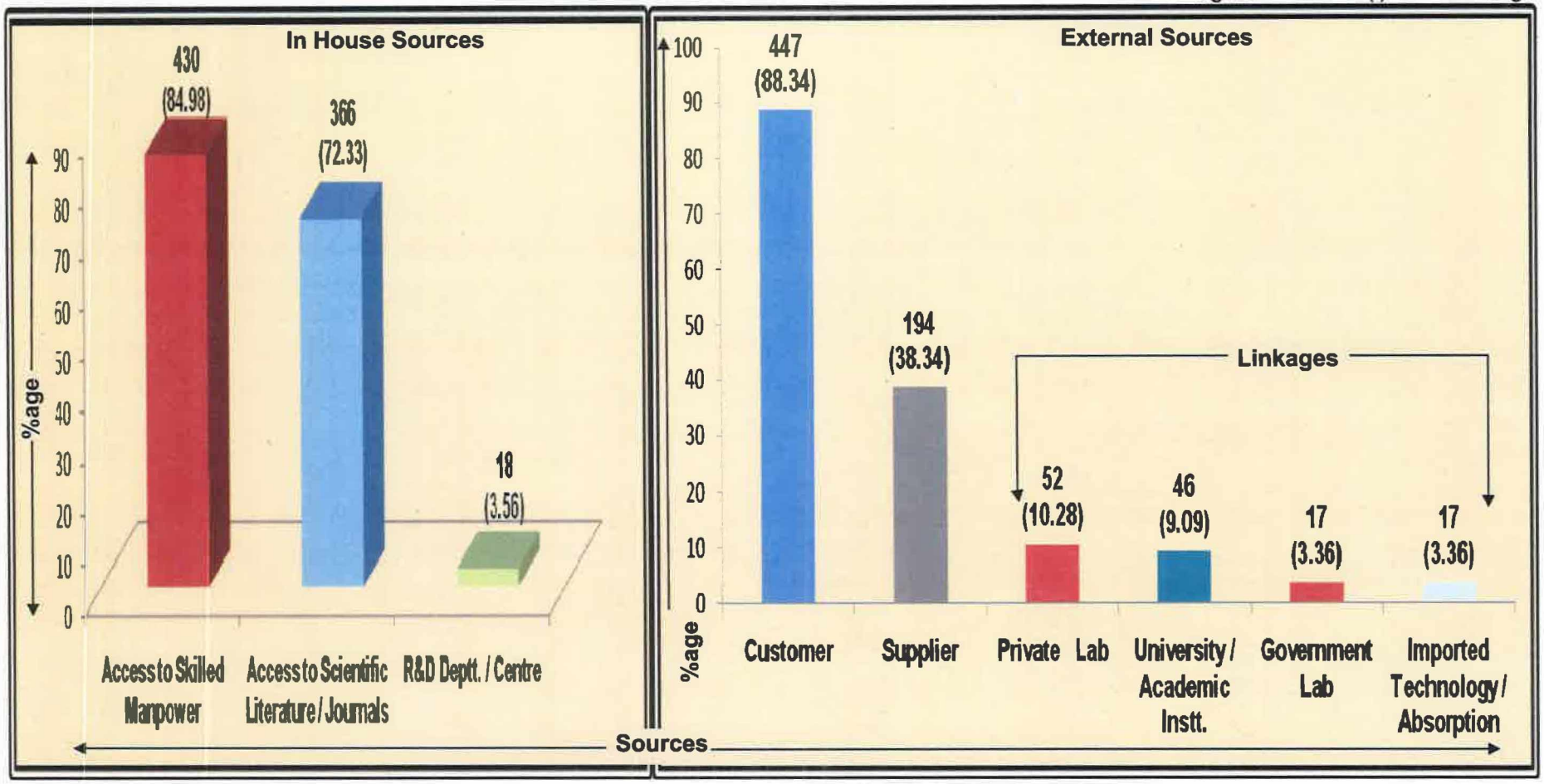
Sr. No.	Sector \ Sources	Sample R&D Ent.	In House Sources			External Sources					
			Access to Skilled Manpower	R&D Department / Centre	Access to Scientific Literature / Journals	Customer	Supplier	Govt. Lab	Private Lab	University / Academic Instt.	Imported Technology / Absorption
1	Agricultural Machinery	63	42 (66.67)	7 (11.11)	39 (61.90)	51 (80.95)	35 (55.56)	0 (0.00)	23 (36.51)	20 (31.75)	0 (0.00)
2	Automotive	26	23 (88.46)	0 (0.00)	13 (50.00)	22 (84.62)	4 (15.38)	15 (57.69)	11 (42.31)	0 (0.00)	0 (0.00)
3	Chemical	23	19 (82.61)	1 (4.35)	14 (60.87)	23 (100.00)	2 (8.70)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
4	Drug & Pharma	32	27 (84.38)	9 (28.13)	24 (75.00)	21 (65.63)	20 (62.50)	2 (6.25)	17 (53.13)	0 (0.00)	0 (0.00)
5	Electronics	47	40 (85.11)	0 (0.00)	34 (72.34)	38 (80.85)	22 (46.81)	0 (0.00)	0 (0.00)	10 (21.28)	0 (0.00)
6	Gems & Jewelry	6	6 (100.00)	0 (0.00)	6 (100.00)	6 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7	Leather	34	22 (64.71)	0 (0.00)	13 (38.24)	34 (100.00)	18 (52.94)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
8	Light Engineering	128	117 (91.41)	0 (0.00)	105 (82.03)	117 (91.41)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
9	Machine Tools	76	76 (100.00)	0 (0.00)	65 (85.53)	76 (100.00)	45 (59.21)	0 (0.00)	0 (0.00)	0 (0.00)	17 (22.37)
10	Scientific Instruments	3	3 (100.00)	0 (0.00)	3 (100.00)	3 (100.00)	0 (0.00)	0 (0.00)	1 (33.33)	2 (66.67)	0 (0.00)
11	Textiles & Garments	68	55 (80.88)	1 (1.47)	50 (73.53)	56 (82.35)	48 (70.59)	0 (0.00)	0 (0.00)	14 (20.59)	0 (0.00)
12	**Grand Total**	**506**	**430 (84.98)**	**18 (3.56)**	**366 (72.33)**	**447 (88.34)**	**194 (38.34)**	**17 (3.36)**	**52 (10.28)**	**46 (9.09)**	**17 (3.36)**

For details please refer Volume-II Annexure-9 (Pages164-167)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.15
Factors / Sources of R&D Activities

Figure in brackets ( ) indicates %age



OBSERVATION

- On overall basis, maximum 447 (88.34%) enterprises reported Customer as the external source, followed by 430 (84.98%) Access to Skilled Manpower as the in-house source.

Table - 3.1.16
Sector wise Sources of Funds for R&D

Multi Choice
(Figures in Numbers)

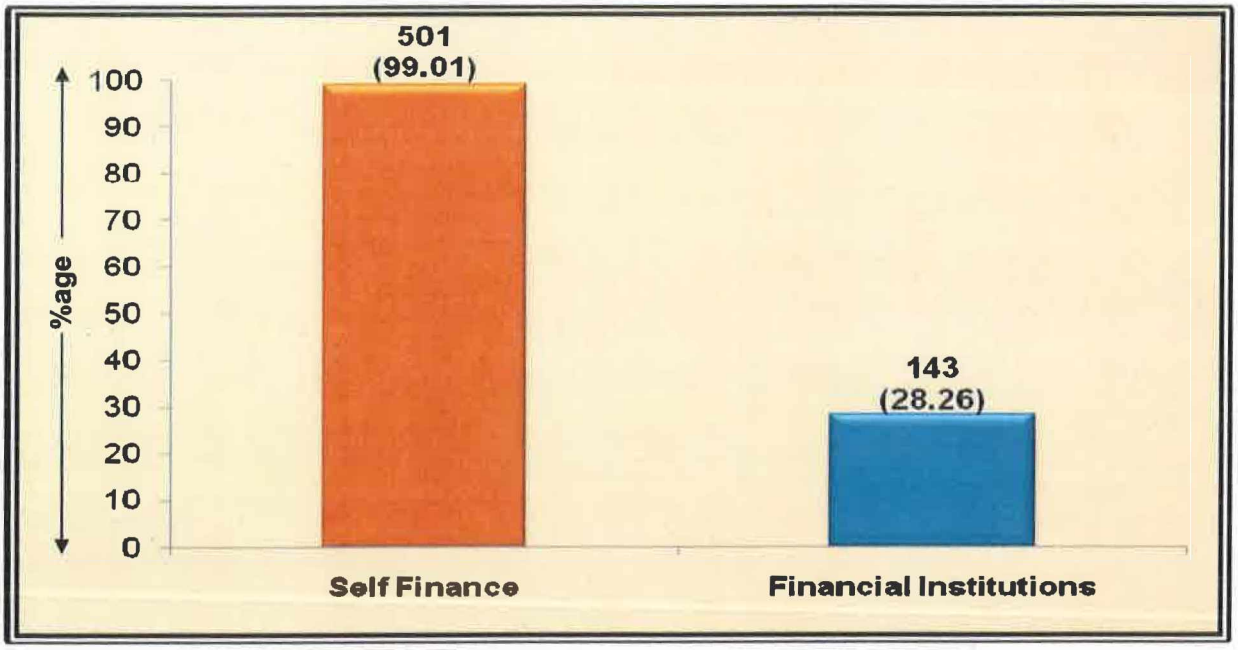
Sr. No.	Sector	Sample R&D Enterprises	Self Finance	Financial Institutions
1	Agricultural Machinery	63	58 (92.06)	41 (65.08)
2	Automotive	26	26 (100.00)	18 (69.23)
3	Chemical	23	23 (100.00)	9 (39.13)
4	Drug & Pharma	32	32 (100.00)	19 (59.38)
5	Electronics	47	47 (100.00)	10 (21.28)
6	Gems & Jewelry	6	6 (100.00)	0 (0.00)
7	Leather	34	34 (100.00)	12 (35.29)
8	Light Engineering	128	128 (100.00)	8 (6.25)
9	Machine Tools	76	76 (100.00)	14 (18.42)
10	Scientific Instruments	3	3 (100.00)	1 (33.33)
11	Textiles & Garments	68	68 (100.00)	11 (16.18)
12	**Grand Total**	**506**	**501 (99.01)**	**143 (28.26)**

For details please refer Volume-II Annexure-10 (Pages 168-169)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.16
Overall Break-up of Sources of Funds for R&D

Figure in brackets ( ) indicate %age



OBSERVATION

- On overall basis, 501 (99.01%) enterprises reported Self Finance. 143 (28.26%) reported funds from Financial Institutions also.

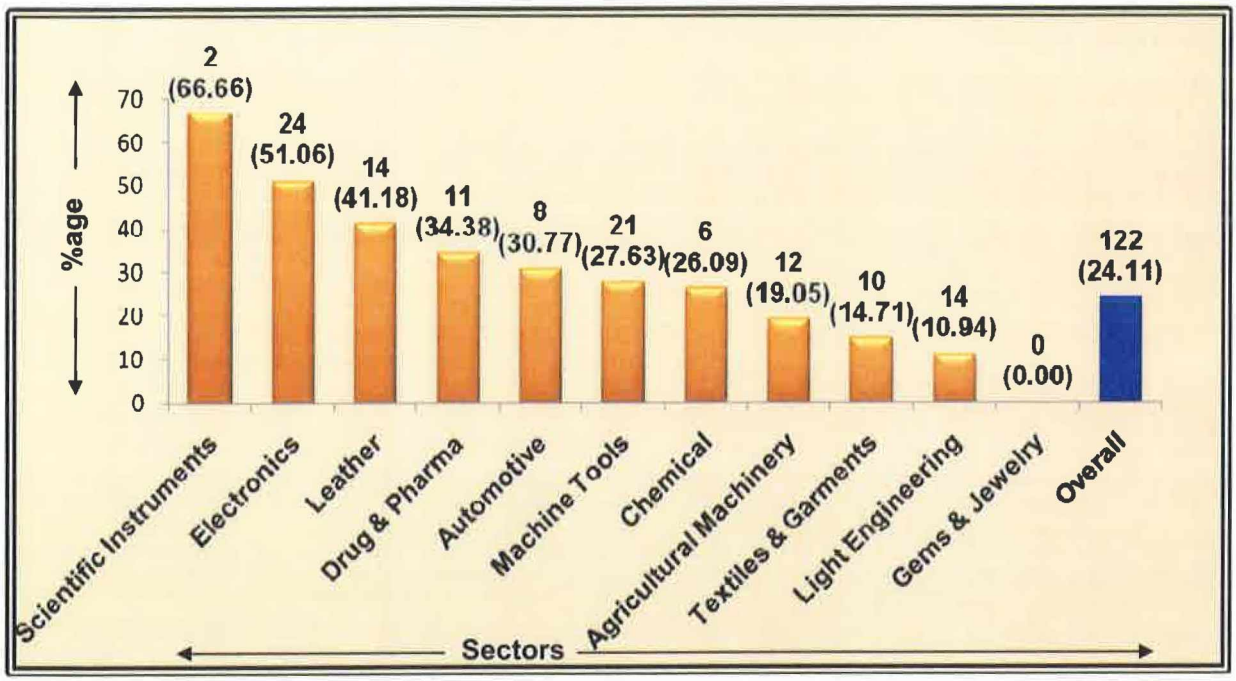
Table - 3.1.17
Sector wise Break-up of Training for R&D Personnel

Sr. No.	Sector	Sample R&D Enterprises	Yes
		No.	No.
1	Agricultural Machinery	63	12 (19.05)
2	Automotive	26	8 (30.77)
3	Chemical	23	6 (26.09)
4	Drug & Pharma	32	11 (34.38)
5	Electronics	47	24 (51.06)
6	Gems & Jewelry	6	0 (0.00)
7	Leather	34	14 (41.18)
8	Light Engineering	128	14 (10.94)
9	Machine Tools	76	21 (27.63)
10	Scientific Instruments	3	2 (66.66)
11	Textiles & Garments	68	10 (14.71)
12	**Grand Total**	**506**	**122 (24.11)**

For details please refer Volume-II Annexure-11 (Pages 168-169)

Figure - 3.1.17
Sector wise Break-up of Training for R&D Personnel

Figure in brackets ( ) indicates %age



OBSERVATION

- On overall basis, 122 (24.11%) enterprises reported having given specialized training to their R&D personnel.

Table - 3.1.18
Sector wise Break-up of Problems for Undertaking R&D Activities

Multi Choice
(Figures in Numbers)

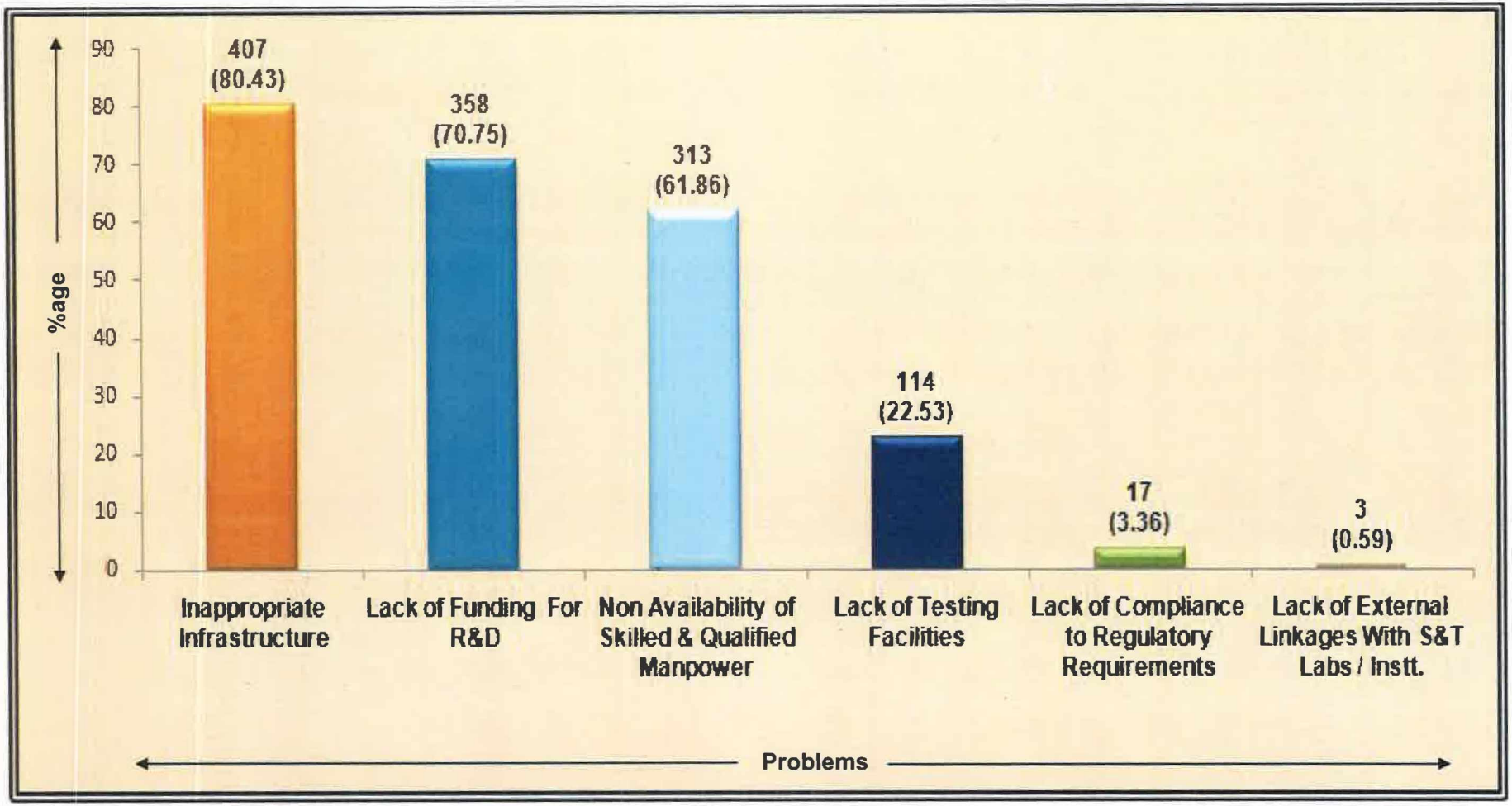
Sr. No.	Problems / Sector	Sample R&D Enterprises	Non Availability of Skilled & Qualified Manpower	Lack of Funding For R&D	Inappropriate Infrastructure	Lack of Testing Facilities	Lack of External Linkages With S&T Labs / Institutions	Lack of Compliance to Regulatory Requirements
1	Agricultural Machinery	63	43 (68.25)	30 (47.62)	52 (82.54)	22 (34.92)	0 (0.00)	0 (0.00)
2	Automotive	26	6 (23.08)	9 (34.62)	19 (73.08)	4 (15.38)	3 (11.54)	0 (0.00)
3	Chemical	23	10 (43.48)	14 (60.87)	23 (100.00)	8 (34.78)	0 (0.00)	0 (0.00)
4	Drug & Pharma	32	20 (62.50)	18 (56.25)	25 (78.13)	0 (0.00)	0 (0.00)	0 (0.00)
5	Electronics	47	27 (57.45)	36 (76.60)	25 (53.19)	19 (40.43)	0 (0.00)	17 (36.17)
6	Gems & Jewelry	6	3 (50.00)	6 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
7	Leather	34	11 (32.35)	34 (100.00)	34 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
8	Light Engineering	128	91 (71.09)	79 (61.72)	103 (80.47)	16 (12.50)	0 (0.00)	0 (0.00)
9	Machine Tools	76	50 (65.79)	76 (100.00)	76 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
10	Scientific Instruments	3	3 (100.00)	3 (100.00)	3 (100.00)	3 (100.00)	0 (0.00)	0 (0.00)
11	Textiles & Garments	68	49 (72.06)	53 (77.94)	47 (69.12)	42 (61.76)	0 (0.00)	0 (0.00)
12	**Grand Total**	**506**	**313 (61.86)**	**358 (70.75)**	**407 (80.43)**	**114 (22.53)**	**3 (0.59)**	**17 (3.36)**

For details please refer Volume-II Annexure-12 (Pages 170-173)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.18
Overall Problems for Undertaking R&D Activities

Figure in brackets ( ) indicates %age



OBSERVATION

- On overall basis, maximum 407 (80.43%) enterprises reported Inappropriate Infrastructure, followed by 358 (70.75%) lack of Funding for R&D.

Table - 3.1.19
Sector wise Ownership Pattern of All / R&D Enterprises

Figures in Numbers)

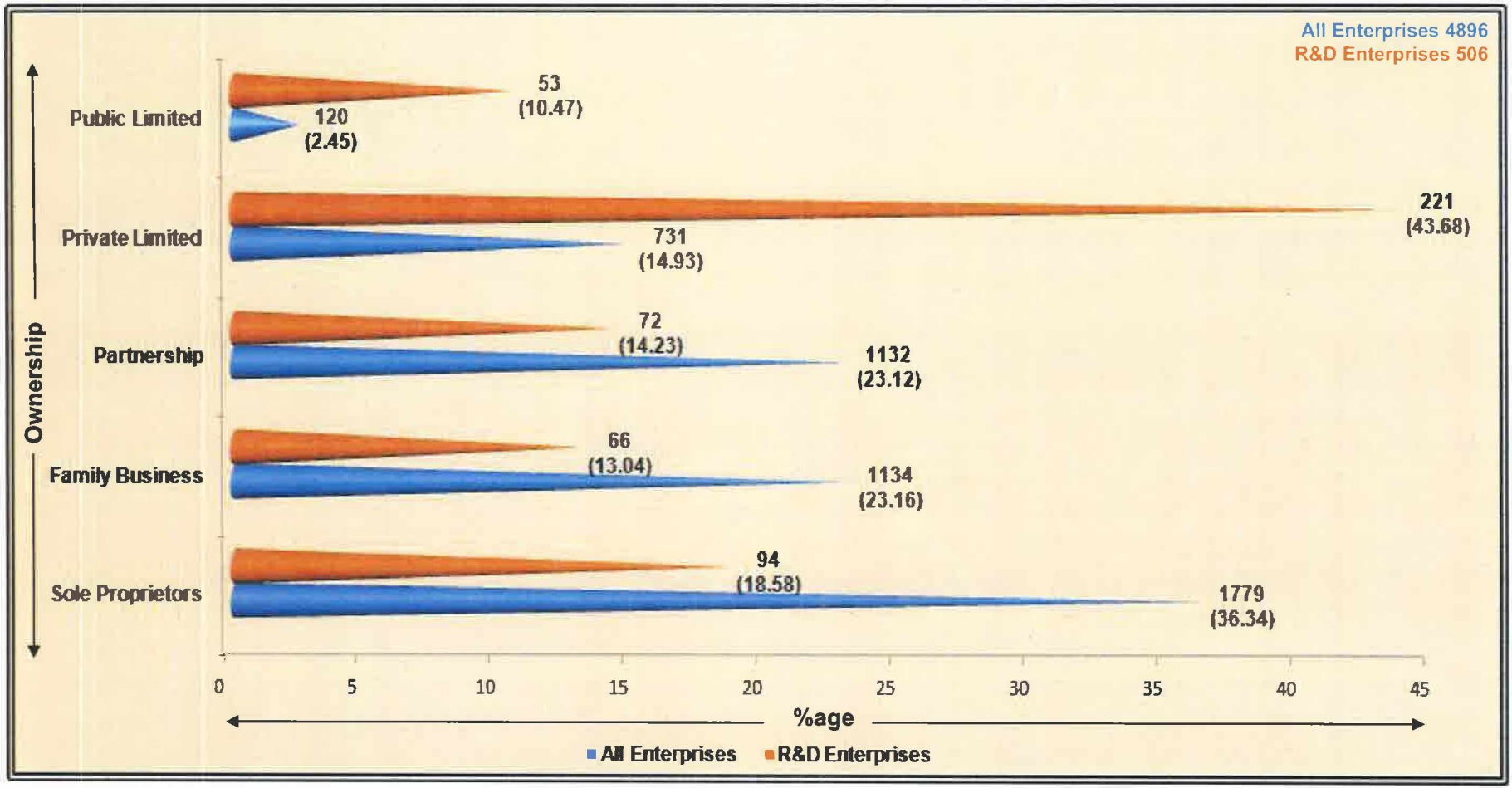
Sr. No.	Sectors	Sample Size	R&D Ent.	Sole Proprietorship		Family Business		Partnership		Private Limited		Public Limited	
				All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.
1	Agricultural Machinery	748	63	551 (73.66)	19 (30.16)	78 (10.43)	2 (3.17)	72 (9.63)	5 (7.94)	40 (5.35)	30 (47.62)	7 (0.94)	7 (11.11)
2	Automotive	164	26	48 (29.27)	4 (15.38)	28 (17.07)	2 (7.69)	21 (12.80)	2 (7.69)	46 (28.05)	8 (30.77)	21 (12.80)	10 (38.46)
3	Chemical	154	23	55 (35.71)	6 (26.09)	40 (25.97)	2 (8.70)	36 (23.38)	5 (21.74)	19 (12.34)	8 (34.78)	4 (2.60)	2 (8.70)
4	Drug & Pharma	124	32	58 (46.77)	4 (12.50)	9 (7.26)	0 (0.00)	10 (8.06)	1 (3.13)	38 (30.65)	22 (68.75)	9 (7.26)	5 (15.63)
5	Electronics	212	47	71 (33.49)	11 (23.40)	40 (18.87)	5 (10.64)	34 (16.04)	8 (17.02)	56 (26.42)	18 (38.30)	11 (5.19)	5 (10.64)
6	Gems & Jewelry	107	6	30 (28.04)	0 (0.00)	37 (34.58)	3 (50.00)	34 (31.78)	1 (16.67)	6 (5.61)	2 (33.33)	0 (0.00)	0 (0.00)
7	Leather	365	34	92 (25.21)	4 (11.76)	104 (28.49)	8 (23.53)	122 (33.42)	3 (8.82)	44 (12.05)	17 (50.00)	3 (0.82)	2 (5.88)
8	Light Engineering	2123	128	644 (30.33)	27 (21.09)	556 (26.19)	24 (18.75)	568 (26.75)	27 (21.09)	315 (14.84)	45 (35.16)	40 (1.88)	5 (3.91)
9	Machine Tools	418	76	110 (26.32)	9 (11.84)	107 (25.60)	14 (18.42)	115 (27.51)	11 (14.47)	73 (17.46)	33 (43.42)	13 (3.11)	9 (11.84)
10	Scientific Instruments	24	3	8 (33.33)	0 (0.00)	3 (12.50)	0 (0.00)	7 (29.17)	1 (33.33)	5 (20.83)	1 (33.33)	1 (4.17)	1 (33.33)
11	Textiles & Garments	457	68	112 (24.51)	10 (14.71)	132 (28.88)	6 (8.82)	113 (24.73)	8 (11.76)	89 (19.47)	37 (54.41)	11 (2.41)	7 (10.29)
12	**Grand Total**	**4896**	**506**	**1779 (36.34)**	**94 (18.58)**	**1134 (23.16)**	**66 (13.04)**	**1132 (23.12)**	**72 (14.23)**	**731 (14.93)**	**221 (43.68)**	**120 (2.45)**	**53 (10.47)**

For details please refer Volume-II Annexure-13 (Pages 174-180)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.19
Overall Ownership Pattern of All / R&D Enterprises

Figure in brackets ( ) indicate % age



OBSERVATION

- On overall basis, maximum 1779 (36.34%) ownership pattern is Sole Proprietorship, followed by 1134 (23.16%) Family Business.
- R&D enterprises, maximum 221 (43.68%) reported ownership pattern as Private Limited, followed by 94 (18.58%) Sole Proprietorship.

Table - 3.1.20
Sector wise Break-up of Establishment Year of All / R&D Enterprises

(Figures in Numbers)

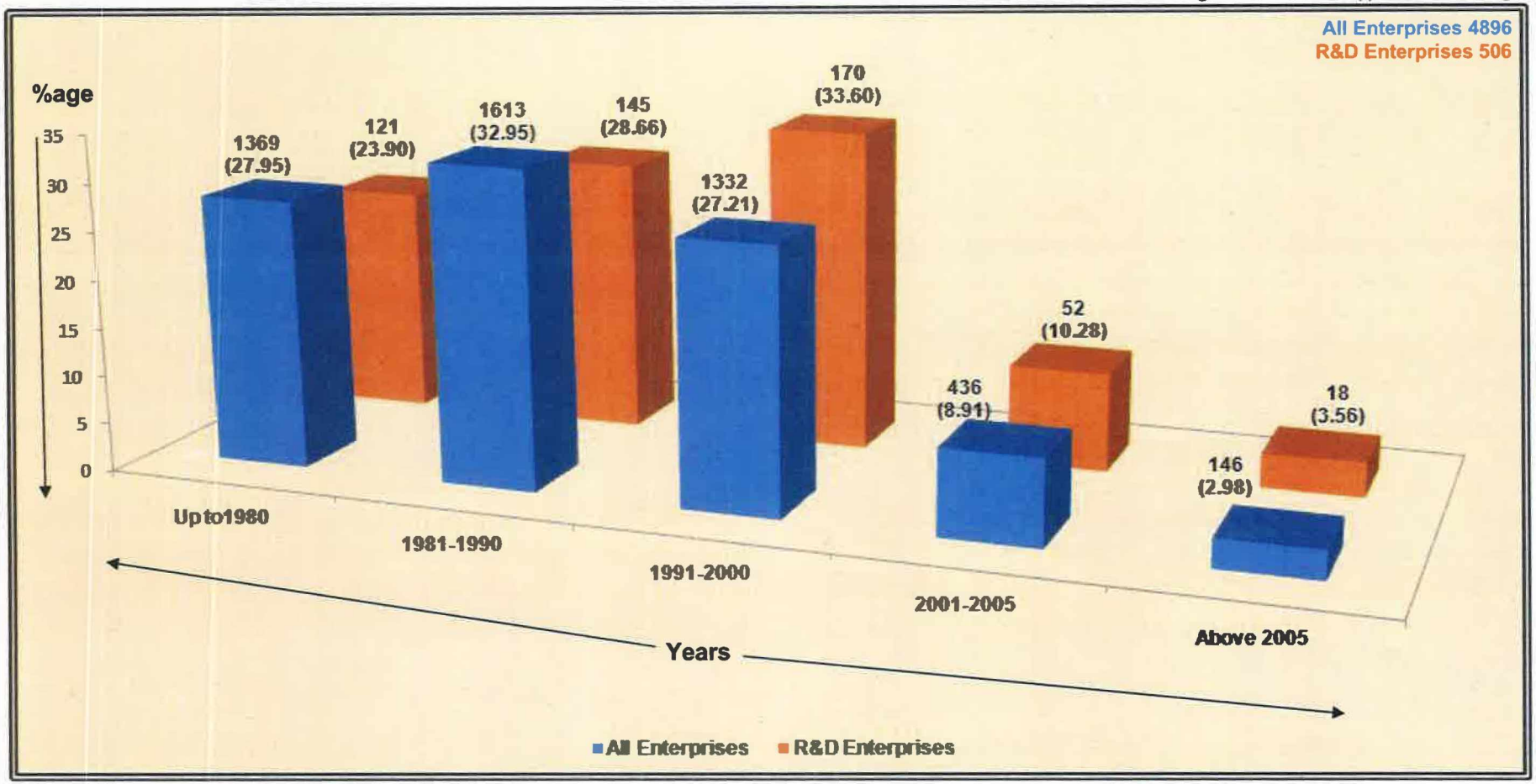
Sr. No	Sector	Sample Size	R&D Ent.	Up to 1980		1981-1990		1991-2000		2001-2005		Above 2005	
				All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.
1	Agricultural Machinery	748	63	82 (10.96)	7 (11.11)	262 (35.03)	26 (41.27)	377 (50.40)	29 (46.03)	19 (2.54)	1 (1.59)	8 (1.07)	0 (0.00)
2	Automotive	164	26	16 (9.76)	4 (15.38)	22 (13.41)	3 (11.54)	105 (64.02)	15 (57.69)	17 (10.37)	4 (15.38)	4 (2.44)	0 (0.00)
3	Chemical	154	23	48 (31.17)	4 (17.39)	19 (12.34)	1 (4.35)	68 (44.16)	14 (60.87)	13 (8.44)	3 (13.04)	6 (3.90)	1 (4.35)
4	Drug & Pharma	124	32	28 (22.58)	6 (18.75)	15 (12.10)	4 (12.50)	61 (49.19)	18 (56.25)	16 (12.90)	2 (6.25)	4 (3.23)	2 (6.25)
5	Electronics	212	47	11 (5.19)	0 (0.00)	25 (11.79)	7 (14.89)	128 (60.38)	26 (55.32)	32 (15.09)	10 (21.28)	16 (7.55)	4 (8.51)
6	Gems & Jewelry	107	6	44 (41.12)	0 (0.00)	16 (14.95)	0 (0.00)	34 (31.78)	5 (83.33)	10 (9.35)	1 (16.67)	3 (2.80)	0 (0.00)
7	Leather	365	34	132 (36.16)	12 (35.29)	97 (26.58)	8 (23.53)	81 (22.19)	7 (20.59)	45 (12.33)	5 (14.71)	10 (2.74)	2 (5.88)
8	Light Engineering	2123	128	712 (33.54)	42 (32.81)	938 (44.18)	55 (42.97)	229 (10.79)	11 (8.59)	182 (8.57)	14 (10.94)	62 (2.92)	6 (4.69)
9	Machine Tools	418	76	100 (23.92)	17 (22.37)	106 (25.36)	19 (25.00)	139 (33.25)	30 (39.47)	54 (12.92)	9 (11.84)	19 (4.55)	1 (1.32)
10	Scientific Instruments	24	3	9 (37.50)	2 (66.67)	6 (25.00)	1 (33.33)	5 (20.83)	0 (0.00)	4 (16.67)	0 (0.00)	0 (0.00)	0 (0.00)
11	Textiles & Garments	457	68	187 (40.92)	22 (39.71)	107 (23.41)	21 (30.88)	105 (22.98)	15 (22.06)	44 (9.63)	3 (4.41)	14 (3.06)	2 (2.94)
12	**Grand Total**	**4896**	**506**	**1369 (27.95)**	**121 (23.90)**	**1613 (32.95)**	**145 (28.66)**	**1332 (27.21)**	**170 (33.60)**	**436 (8.91)**	**52 (10.28)**	**146 (2.98)**	**18 (3.56)**

For details please refer Volume-II Annexure-14 (Pages 181-187)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.20
Overall Establishment Year of All / R&D Enterprises

Figure in brackets ( ) indicates %age



OBSERVATION

- On overall basis, maximum 1613 (32.95%) enterprises established during the period 1981-1990, followed by 1369 (27.95%) during the period up to 1980.
- R&D enterprises, maximum 170 (33.60%) established during the period 1991-2000, followed by 145 (28.66%) during the period 1981-1990.

Table - 3.1.21
Sector wise Owner / CEO Qualifications for All / R&D Enterprises

(Figures in Numbers)

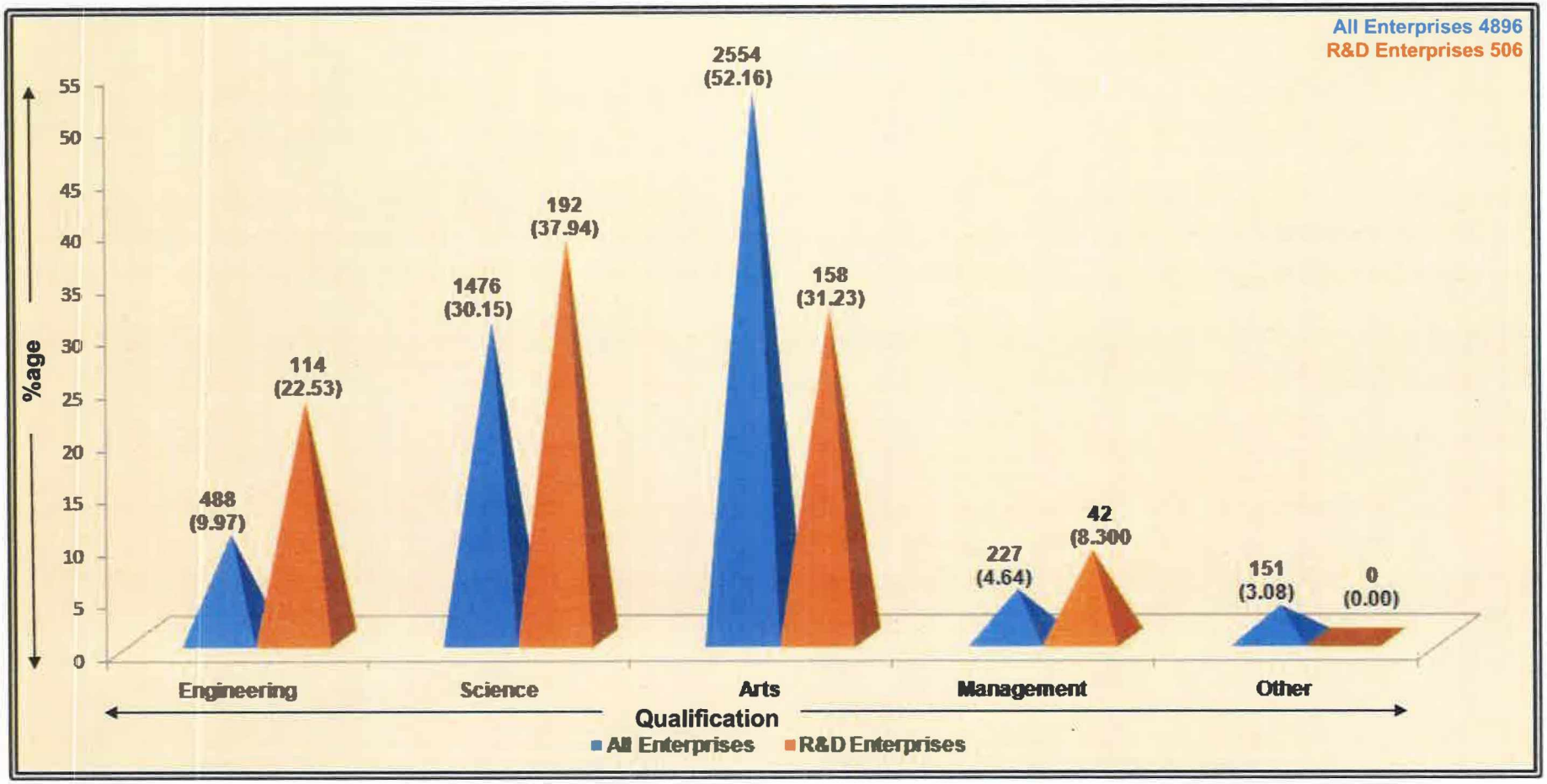
Sr. No.	Sector	Sample Size	R&D Enterprises	Engineering		Science		Arts		Management		Others	
				All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.	All Ent.	R&D Ent.
1	Agricultural Machinery	748	63	71 (9.49)	22 (34.92)	185 (24.73)	16 (25.40)	431 (57.62)	18 (28.57)	32 (4.28)	7 (11.11)	29 (3.88)	0 (0.00)
2	Automotive	164	26	33 (20.12)	8 (30.77)	46 (28.05)	7 (26.92)	62 (37.80)	9 (34.62)	23 (14.02)	2 (7.69)	0 (0.00)	0 (0.00)
3	Chemical	154	23	15 (9.74)	1 (4.35)	85 (55.19)	14 (60.87)	44 (28.57)	6 (26.09)	10 (6.49)	2 (8.70)	0 (0.00)	0 (0.00)
4	Drug & Pharma	124	32	20 (16.13)	5 (15.63)	51 (41.13)	13 (40.63)	20 (16.13)	7 (21.88)	33 (26.61)	7 (21.88)	0 (0.00)	0 (0.00)
5	Electronics	212	47	86 (40.57)	26 (55.32)	55 (25.94)	10 (21.28)	40 (18.87)	5 (10.64)	31 (14.62)	6 (12.77)	0 (0.00)	0 (0.00)
6	Gems & Jewelry	107	6	3 (2.80)	3 (50.00)	0 (0.00)	0 (0.00)	34 (31.78)	3 (50.00)	0 (0.00)	0 (0.00)	70 (65.42)	0 (0.00)
7	Leather	365	34	0 (0.00)	0 (0.00)	166 (45.48)	16 (47.06)	199 (54.52)	18 (52.94)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
8	Light Engineering	2123	128	136 (6.41)	28 (21.88)	588 (27.70)	40 (31.25)	1374 (64.72)	57 (44.53)	25 (1.18)	3 (2.34)	0 (0.00)	0 (0.00)
9	Machine Tools	418	76	49 (11.72)	7 (9.21)	198 (47.37)	55 (72.37)	171 (40.91)	14 (18.42)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
10	Scientific Instruments	24	3	4 (16.67)	3 (100.00)	15 (62.50)	0 (0.00)	5 (20.83)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
11	Textiles & Garments	457	68	71 (15.54)	11 (16.18)	87 (19.04)	21 (30.88)	174 (38.07)	21 (30.88)	73 (15.97)	15 (22.06)	52 (11.38)	0 (0.00)
12	**Grand Total**	**4896**	**506**	**488 (9.97)**	**114 (22.53)**	**1476 (30.15)**	**192 (37.94)**	**2554 (52.16)**	**158 (31.23)**	**227 (4.64)**	**42 (8.30)**	**151 (3.08)**	**0 (0.00)**

For details please refer Volume-II Annexure-15 (Pages 188-194)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.21
Overall Owner / CEO Qualifications for All / R&D Enterprises

Figure in brackets ( ) indicates %age



OBSERVATION

- On overall basis, maximum 2554 (52.16%) owner / CEO Arts qualified, followed by 1476 (30.15%) Science.
- For R&D Enterprises, maximum 192 (37.94%) owner / CEO are Science qualified, followed by 158 (31.23%) Arts.

Table - 3.1.22
Sector wise Conformity to Standards for All / R&D Enterprises

Multi Choice
(Figures in Numbers)

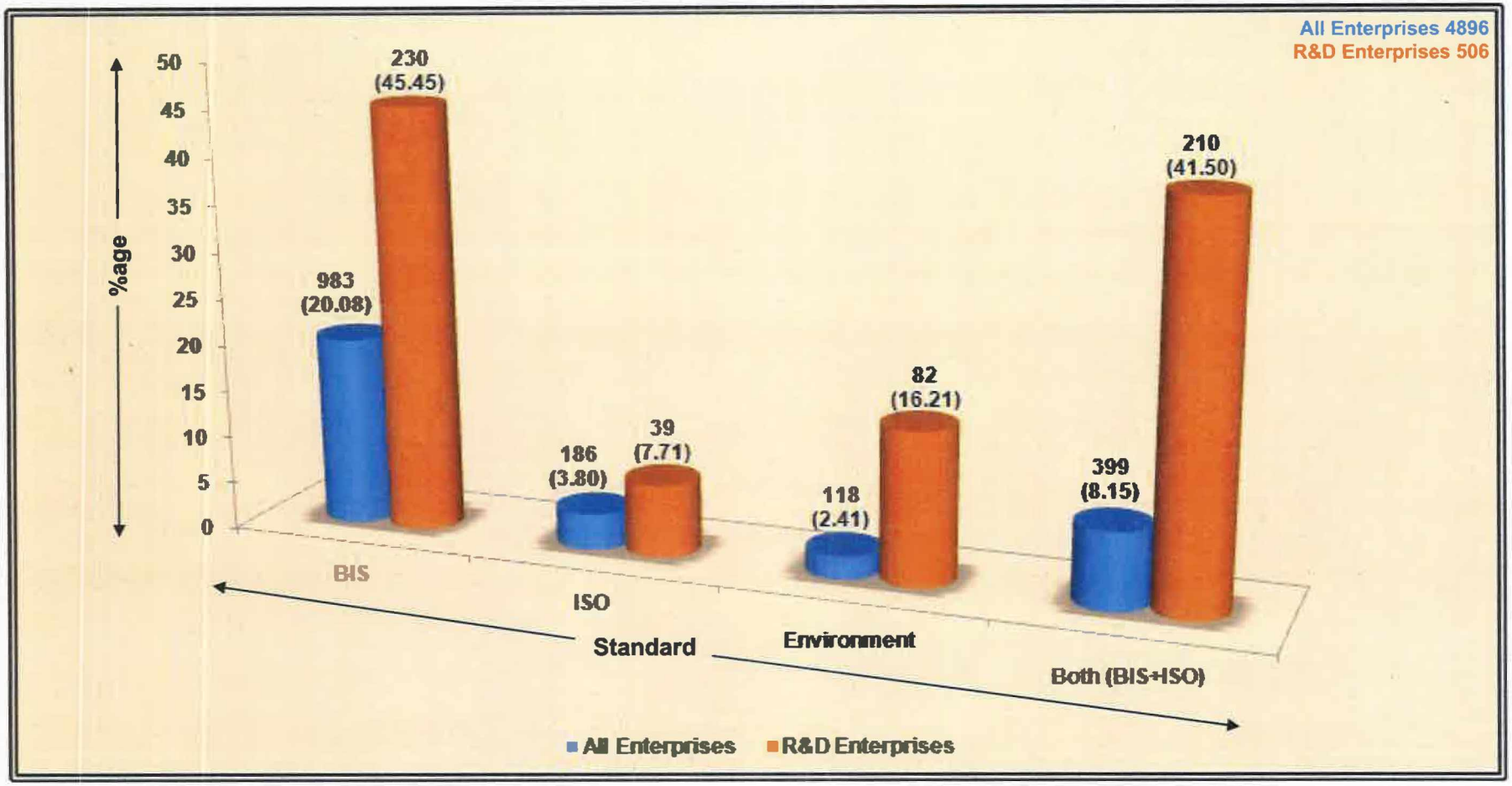
Sr. No.	Sector	Sample Size	R&D Enterprises	System - BIS		Product - ISO		Environmental		Both (BIS+ISO)	
				All Enterprises	R&D Enterprises	All Enterprises	R&D Enterprises	All Enterprises	R&D Enterprises	All Enterprises	R&D Enterprises
1	Agricultural Machinery	748	63	232 (31.02)	37 (58.73)	4 (0.53)	0 (0.00)	0 (0.00)	0 (0.00)	4 (0.53)	4 (6.35)
2	Automotive	164	26	138 (84.15)	0 (0.00)	0 (0.00)	0 (0.00)	44 (26.83)	8 (30.77)	26 (15.85)	26 (100.00)
3	Chemical	154	23	12 (7.79)	0 (0.00)	6 (3.90)	0 (0.00)	16 (10.39)	16 (69.57)	24 (15.58)	23 (100.00)
4	Drug & Pharma	124	32	41 (33.06)	0 (0.00)	12 (9.68)	0 (0.00)	10 (8.06)	10 (31.25)	36 (29.03)	32 (100.00)
5	Electronics	212	47	74 (34.91)	15 (31.91)	42 (19.81)	12 (25.53)	7 (3.30)	7 (14.89)	46 (21.70)	20 (42.55)
6	Gems & Jewelry	107	6	11 (10.28)	2 (33.33)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	4 (3.74)	4 (66.67)
7	Leather	365	34	49 (13.42)	26 (76.47)	10 (2.74)	0 (0.00)	14 (3.84)	14 (41.18)	8 (2.19)	8 (23.53)
8	Light Engineering	2123	128	263 (12.39)	96 (75.00)	63 (2.97)	20 (15.63)	0 (0.00)	0 (0.00)	122 (5.75)	12 (9.38)
9	Machine Tools	418	76	131 (31.34)	44 (57.89)	18 (4.31)	7 (9.21)	0 (0.00)	0 (0.00)	55 (13.16)	25 (32.89)
10	Scientific Instruments	24	3	16 (66.67)	0 (0.00)	4 (16.67)	0 (0.00)	0 (0.00)	0 (0.00)	4 (16.67)	3 (100.00)
11	Textiles & Garments	457	68	16 (3.50)	10 (14.71)	27 (5.91)	0 (0.00)	27 (5.91)	27 (39.71)	70 (15.32)	53 (77.94)
12	**Grand Total**	**4896**	**506**	**983 (20.08)**	**230 (45.45)**	**186 (3.80)**	**39 (7.71)**	**118 (2.41)**	**82 (16.21)**	**399 (8.15)**	**210 (41.50)**

For details please refer Volume-II Annexure-16 (Pages 195-201)

Note: Figure in brackets ( ) indicates %age.

Figure - 3.1.22
Overall Conformity to Standards for All / R&D Enterprises

Figure in brackets ( ) indicates %age



OBSERVATION

- On overall basis, 1568 (32.03%) enterprises have either BIS or ISO or Both.
- For R&D enterprises, 479 (94.66%) have either BIS or ISO or Both.

Section – 4
Case Studies

Case Study No: 4.1 **Sector: Agricultural Machinery**

Item	Information
1. **Name of the Enterprise with address**	M/s Yash Agro Mech Pvt Ltd, 351, GIDC Kathwada, Ahmedabad – 382430, Gujarat
2. **Item(s) manufactured**	Motor Operated Chaff Cutters
3. **Establishment year**	1985
4. **Size**	Micro

5. Brief Profile

Yash Agro Industries are one of the leading manufacturers of a wide range of Chaff Cutters. The wide range of the cutters is very useful for chopping up hay and oat-straw to feed Cows, Horses and other animals. These cutters are widely demanded by agriculture and dairy industries. Designed according to the exact industry standards, the range of these cutters is easy to operate with perfect mobility. The products are widely valued and are manufactured as per the BIS with a sophisticated infrastructure facility. Our dedicated R&D efforts particularly from 2003 onwards have reduced the fodder wastage by apporx. 30%

A chaff-cutter is an agricultural instrument for chopping hay or straw into half-inch lengths to be used as food for animals. The economical advantage of the chaff-cutter does not depend on its rendering the chopped food more digestible; but on permitting it to be more thoroughly mixed with the more nutritive and palatable food, and preventing the animal from rejecting any part of it. By the use of the chaff-cutter animals are therefore induced to consume a much larger proportion of fodder with their food, which not only improves the condition of the stock, but saves time in feeding, thus allowing the animal more time for repose.

6. R&D Activities

Initially the enterprise stated manufacturing manual chaff cutters It was mainly used for chopping of dry paddy straw used for mushroom cultivation and other dry and green fodders. Its capacity was 0.6-0.8 q/h of dry fodder and 1.2-1.4 q/h for green fodder. Two persons are required for its operation.

With sustained R&D efforts the enterprise has developed variable speed motorized cutters of capacities varying from capacities adequate to feed 5.to 250 animals with single phase motors or three phase motors which can be operated by one person

The enterprise R&D activities primarily meet the following parameters:-

- Improvement in manufacturing process
- Productivity enhancement
- Enhancing domestic market share

Earlier the enterprise was manufacturing manual chaff cutters. With R&D efforts, chaff cutters can be now driven at various speeds and can achieve various lengths of cuts of chaff with respect to various animal preferences. New chaff cutter machines include portable tractor driven chaff cutter also.

The enterprise has set up very rigorous quality checks that are carried out throughout all the stages by the manufacturing team. Special emphasis is given on the following parameters:-

- Design
- Crushing capacity
- Filling capacity
- Power input
- Overall space requirement (Compactness)
- Bolts and nuts adjustments
- Final finishing of the machine

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Availability of funds at affordable interest rates for R&D
- Inappropriate infrastructure
- Lack of testing facilities

Case Study No: 4.2 **Sector: Automotive**

Item	Information
1. **Name of the Enterprise with address**	M/s HGI Automotives Pvt Ltd., 295, HSIDC Industrial Estate, Faridabad-121005, Haryana
2. **Item(s) manufactured**	Automobile Fuel Supply System Pressure die castings for clutch head covers
3. **Establishment year**	1998
4. **Size**	Small

5. Brief Profile

HGI Automotives Pvt. Limited established in 1998 with ISO 9001-2000 certified, started its journey as a manufacturer and exporter in the field of automobile fuel supply systems and pressure die castings for clutch head covers. The company has earned exemplary reputation by ceaselessly raising the bar and setting new standards in the same field.

The enterprise comprises of seasoned industry experts and skillful people, who strive hard to provide the customized based product supply. There is continuous customer feed back system to incorporate their suggestions for product improvements from time to time. This enables the enterprise to offer products satisfying customer needs and there by achieving customer satisfaction. The excellent work record and motivated team of experts allows the enterprise to effectively compete for, and successfully deliver high-quality products to the customers.

The commitment to quality and safety is second to none. The enterprise adopts a proactive approach in regard to both of these important concerns, and meet quality and safety requirements of the customers. The quality of all the manufactured products is maintained in line with the BIS also.

6. R&D Activities

During the last decade and in the present scenario the fuel prices are going up substantially. Therefore the automotive manufactures have been demanding fuel supply systems which are energy efficient and also to meet growing needs of air conditioning and various other power accessories. At the same time the Euro Norms are becoming more stringent. In order to meet all these requirements the HGI enterprise R&D team has developed a fuel efficient system by modifying the existing system

Similarly the R&D team has developed a new process for producing ductile die-cast parts from aluminum which is light weighted. Use of new material and advanced development of processes and methods has been developed in close cooperation with the customers and well known automobile research institute.

The infrastructure for R&D activities includes the following:--

- Die Casting Machines and Melting Furnaces
- Lathe Machines
- Milling Machines
- Drill Machines

- Surface Grinders
- Belt Grinders
- Tapping Machines
- Buffing & Polishing Machines

It is the endeavor of HGI team to conduct regular tests with the OEM manufactures and prove customers' acceptance and obtain timely feedbacks for future product improvements in performance, quality and safety. This is needed to validate the technical systems including all infrastructural aspects.

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Funding for R&D
- Inappropriate infrastructure
- Timely availability of suitable grade raw materials for pressure die casting
- Too frequent power cuts
- Labor Unrest in the region

Case Study No: 4.3 **Sector: Chemical**

Item	Information
1. **Name of the Enterprise with address**	M/S Matangi Industries 28, Phase 1, GIDC Vatva-382445, Ahmedabad (Gujarat)
2. **Item(s) manufactured**	Vinyl Sulphone (Dye Intermediate)
3. **Establishment year**	1994
4. **Size**	Micro

5. Brief Profile

Matangi Industries has been set-up in Ahmedabad in 1994, with an objective to manufacture vinyl sulphone (dye intermediate) using indigenous raw materials. Through several years of research and development works, today they manufacture best quality Vinyl sulphone in Ahmedabad to meet the various requirements of dyes industries in the country. The chemical processes used by the enterprise include ethoxylation, propoxylation, alkoxylation, etherification, reduction, sulphonation and condensation. Emphasis is on continuous technological up gradation and development in the world of science, led to the production of benchmark quality products with cutting edge technologies.

6. R&D Activities

As a first step for R&D, Matangi Industries obtained ISO 9001:2000 certifications. This enabled the following:-

- Multi-level quality checking and control measures stringently followed to ensure and maintain high quality of products
- Best quality control laboratory equipment to ensure products as per customer requirements

Enterprise R&D presented a method for improved detection of pseudouridine in nucleoside mixtures based on the specific derivatization with methyl vinyl sulphone followed by analysis by capillary HPLC–mass spectrometry. Reaction conditions were optimized in order to obtain the best yield and specificity. The method was successfully applied to different nucleoside mixtures.

Pagination is the process of covalent attachment of polyethylene glycol polymer chains to another molecule, normally a drug or therapeutic protein. Pagination is routinely achieved by incubation of a reactive derivative of PEG with the target macromolecule. The covalent attachment of PEG to a drug or therapeutic protein can "mask" the agent from the host's immune system (reduced immunogenicity and antigen city), and increase the hydrodynamic size (size in solution) of the agent which prolongs its circulatory time by reducing renal clearance. Pagination can also provide water solubility to hydrophobic drugs and proteins.

R&D efforts resulted in the following:-

- Cost Reduction
- Energy Saving
- Productivity Enhancement

With the development of the new Vinyl Sulfone , the enterprise had been able to capture a large share of the domestic market, an increase of about 25% in two years

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Funding for R&D
- Inappropriate infrastructure
- Lack of availability of trained man power

Case Study No: 4.4	Sector: Drug & Pharma

Item	Information
1. **Name of the Enterprise with address**	M/s Elder Pharmaceuticals Limited, D-220, TTC Industrial Area, Thane Belapur Road, Navi Mumbai-400706, Maharashtra
2. **Item(s) manufactured**	Bulk Drugs & Pharmaceuticals Formulations Surgical and Medical Devices.
3. **Establishment year**	1983
4. **Size**	Medium

5. Brief Profile

Elder Pharmaceuticals principal activities include the manufacturing and marketing of prescription pharmaceutical brands, surgical and medical devices. The enterprise is one of the leading players in the pharmaceutical formulation market in India in the MSME sector, being a leading player in therapeutic segments - Women's Healthcare, Wound Care and Nutraceuticals.

They have the necessary distribution Infrastructure and marketing capabilities to reach all segments of the country and thereby make their product offerings available to patients even in smaller towns and villages of India.

They intend to double their turnover within the next two-three years due to extensive R&D activities. Elder's business strategy is simple: they believe in innovation and introduction of new concepts, rather than competing in an already fiercely competitive market.

They also launched the Mass Market Initiative-Adventus. They have received accreditation from Ministry of Health-Japan for their Active Pharmaceutical Ingredients (API) plant at Patalganga, Maharashtra, opening up the fast growing Japanese markets for the company's products, which is a positive step towards strengthening the organization's position as a supplier of APIs and intermediates in the Japanese market.

With their highly motivated employees, they keep raising the standards of their performance in all spheres of activities so as to generate more value for the customers.

6. R&D Activities

At Elder Pharma, R&D is regarded as the backbone of the Company evident from the establishment of a modern Research and Development facility at Nerul. The key R&D and manufacturing strengths ensure as ready product pipeline. Continuous investment is being made by the Company in R&D in an attempt to develop newer initiatives in niche therapeutic areas.

The key objectives of the R&D initiatives at Elder Pharma are as follows:

- Development of new products
- Developing NDDS (New Drug Delivery Systems) for the existing products in order to augment the product benefits
- Developing formulations which are currently being outsourced so that these can be manufactured in-house in order to ensure stringent quality controls thereby enhancing productivity also
- Development of analytical methods, documentation and patent registrations

Currently, the Company has over 35 products in the pipeline across various therapeutic segments which would be available over a span of next 2-3 years in the Indian market and subsequently in the export market too.

R&D Scientists at Elder Pharmaceuticals' recently expanded and modernized R&D centre have come up with a novel drug delivery system (NDDS) for a Nutraceuticals formulation called Coenzyme Q(10) [CO Q10] enabling Elder Pharma to become the first company to launch this Nutraceuticals in a novel form.

In the domestic market, the Women's Healthcare division is performing exceedingly well. Going forward, our R&D objective is also to foray into the segment of women's hygiene as well.

Elder Pharma's R&D centre worked extensively on the development of a chewable form of CO Q10- offering optimum dose of 100 mg per tablet - making it more palatable and acceptable to patient population This has facilitated Elder to capture a sizeable share of the Nutraceuticals market segment. Thus, addition of Ecozyme to the product portfolio of Elder Pharma would lead to a consolidation of its presence in this segment.

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Timely availability of skilled & qualified man power
- Inappropriate infrastructure
- Drug price control regime is still not very conducive for growth of the sector
- Duties on raw materials is very high
- Lack of indigenous availability of animals for research at affordable cost

Case Study No: 4.5 **Sector: Electronics**

Item	Information
1. Name of the Enterprise with address	M/s Vijaya Lakshmi Electronics B-61, Sector-83, Phase-II Noida-201 305, Uttar Pradesh
2. Item(s) manufactured	Switched Mode Power Supplies (SMPS), Inverters, PCBs
3. Establishment year	2007
4. Size	Small

5. Brief Profile

Vijaya Lakshmi Electronics (VLE) manufactures electronic assemblies & is An ISO 9001:2008 Certified enterprise with prime focus on quality standards and R&D.

They have a wide range of product line of SMPS AC/DC Adapters, UV Ballasts, Battery Chargers, LED Drivers, Solar Lantern, Solar CFL, Solar LED Home Lighting & Telecom products etc,

VLE is to become the market leader in the near future in offering technology oriented solutions that exceed customer expectations and create a healthy environment They offer customized solutions which are cost effective, flexible and state-of- the=art.

6. R&D Activities

The enterprise has a state of the art infrastructure and cutting edge technology to meet the vast client requirements in this era of continuously evolving technology.

With continuous R&D the enterprise has developed number of customized solutions in Switched Mode Power Supplies (SMPS), Electronic Ballasts, LED Drivers, AC/DC SMPS Adapters, Telecom Products, Solar Products

The R&D efforts have resulted in increasing existing domestic market share and also entering new domestic markets

One of the main area of R&D activities is in SMPS. Switched Mode Power Supplies (SMPS) of medium power ratings are extensively used in heating, welding and telecommunication power supply applications. The enterprise has developed a new 3-phase ac-dc converter at the front end. The auto connected transformer is designed suitable for producing 3-phase voltages of same magnitude and having equal phase shift. The 3-phase ac-dc converters are capable of suppressing up to 17th harmonic in the supply current along with the power factor improvement close to unity at varying loads. A set of power quality indices on input ac mains and magnetic ratings for various auto connected transformer configurations for this SMPS are also manufactured so that the best converter configuration can be chosen according to the requirements for a particular application. This device can work under varying load conditions. THD of ac mains current and PF are improved

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Availability of funds at affordable interest rates for R&D
- Inappropriate infrastructure
- Lack of availability of skilled & experienced personnel at the right time

Case Study No: 4.6	Sector: Gems & Jewelry

Item	Information
1. **Name of the Enterprise with address**	Zaveri & Co. Pvt Ltd, 2, C G Road, Complex, Ahmedabad – 380006, Gujarat
2. **Item(s) manufactured**	Gold, Diamond & Silver Jewelry
3. **Establishment year**	1993
4. **Size**	Small

5. Brief Profile

Zaveri & Co Pvt Ltd. Established In the year 1993 were the first in all over the India in MSME sector to Import Gold through IOB the scheduled Bank, when Government of India liberalized the import policy, in the year 1998.

There after in the year 2000 with the initiation of World Gold Council when Bureau of Indian Standards introduced Assaying and Hallmarking Scheme, Zaveri & Co Pvt Ltd were the first to get BIS License Were also first jewelers for hallmarking of highest pieces of Gold Jewellery for the year 2000 to 2004. ZC are also first exclusive Jewellery manufacturer and designer among Gujarat State for Solitaire "ARISIA" Brand Diamond Jewellery promoted by Diamond Trading Corporation of Dee Beers.

6. R&D Activities

With intensive efforts over long periods, the enterprise R&D team has modified the gold jewelry making process by changing the quality of wax, air speed, temperature and vacuum conditions. The modified process is given below:_

- First design is finalized by studying the latest journals and customer demands of new designs
- A wax model is carved.
- Attach a sprue to the wax. The sprue serves as a channel for melting wax to escape during burn-out and later for molten gold to enter during casting.
- Then the sprued wax is attached to a round rubber base. An investment flask is placed over the wax and is attached to the rubber base. The investment flask is a round cylindrical steel tube, similar to a tin can open at both ends.
- Investment begins as a dry fine white powder similar to plaster-of-paris in feel. It is especially formulated to withstand high temperatures and hold great detail during casting. The investment is mixed with water creating slurry to the consistency of cake batter.
- At this point the air bubbles are removed from the investment. This is done by placing the investment slurry in a vacuum where the air is drawn out. This is called debubblizing.
- The slurry is then poured into the flask completely surrounding the wax. The flask is then placed into the vacuum chamber for a final debubblizing to make sure there are no air pockets attached to the model that would corrupt the casting.

- After the investment hardens the rubber base is removed and the flask goes into the burn-out oven. The burn-out takes hours at a high temperature until all the wax is eliminated. Once the burn-out has taken place only a hollow replica of the original wax carving remains inside the flask.
- The mold is ready for casting. The flask is placed in a casting machine and the gold is melted in a crucible with a torch. At the proper casting temperature the molten gold is thrown by centrifugal force into the hollow mold and held there until it solidifies. Now a cast replica of your "lost" wax. Is available
- The investment is then broken away from the cast piece. What remains is the rough casting. Now it's time to clean up and polish the casting.

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Availability of funds for R&D

Case Study No: 4.7	Sector: Leather

Item	Information
1. Name of the Enterprise with address	M/s Leo Wetblue Leather Pvt Ltd, 118, Leather Complex, Kapurthala Road, Jalandhar - 144001, Punjab
2. Item(s) manufactured	Finished Leather & Products
3. Establishment year	1993
4. Size	Medium

5. Brief Profile

Established in the year 1993, Leo Wet Blue Leather (P) Ltd. is among the leading manufacturers and exporters of finished leather and exclusive collection of leather products. The range includes fashion bags, corporate gifts, fashion garments, leather goods, leather home furnishings, corporate desk sets, leather desk sets, ladies leather jackets, ladies leather trousers, fashion accessories and shoes & sandals. Apart from this, the enterprise also specializes in undertaking Turnkey Tannery Projects on specific customer requirements. The tannery unit produces high quality finished leather in an eco friendly manner to meet worldwide market trends.

6. R&D Activities

Our R&D team has adopted the following tanning process after intensive research, which has resulted in cost savings with particular emphasis on maintaining environment impact thereby enhancing our market share both in domestic market and global market :_

- Preservation
- Bioprocess
- Narrow pH leather processing
- Integrated processes
- Natural colors
- Eco-benign tanning
- Chrome management
- Zero discharge

LWBL team took Zero Emission Research Initiative by adopting Water recycle and reuse method based on zero wastewater discharge principle for pre-tanning operations standardized which reduced Water consumption levels reduced from 17 to 1.7 L/kg of hide (raw to wet blue)

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Availability of funds at affordable interest rates for R&D
- Inappropriate infrastructure

Case Study No: 4.8	Sector: Light Engineering

Item	Information
1. **Name of the Enterprise with address**	M/s Uni-Mech Industries 5401/A, G.I.D.C. Phase IV, Vatva, Ahmedabad - 382 445, Gujarat
2. **Item(s) manufactured**	Storage Tanks
3. **Establishment year**	1986
4. **Size**	Small

5. Brief Profile

Uni-Mech Industries one of the leading manufacturer and supplier of Storage Tanks used in various industries particularly in chemical. To keep ahead with latest technological developments in the Chemical industry, the enterprise has developed their manufacturing activities accordingly. The tanks are manufactured in SS, MS & Non-Ferrous Metals as per desired customers' specifications & Drawings.

6. R&D Activities

The enterprise R&D team has developed new technological inside coating process by which the corrosion is the bare minimum that include: new corrosion prevention and suppression systems using reticulated foam inserts and fine water mist. Corrosion prevention via inerting requires that the oxygen concentration be reduced below the Limiting Oxygen Concentration (LOC) for a particular chemical at a specified temperature and pressure. The LOC is the smallest concentration of chemical that can support flame propagation at the stated temperature and pressure.

The above development has resulted in cost reduction there by making the tanks more popular in the market (Increase in Sales by 40% in two years)

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Availability of funds at affordable interest rates for R&D
- Inappropriate infrastructure

Case Study No: 4.9 **Sector: Machine Tools**

Item	Information
1. Name of the Enterprise with address	M/s Precitec Precision Machinery Pvt Ltd, A-353(b), 8th Main Road, Peenya Industrial Estate, Phase 2, Bangalore – 560058, Karnataka
2. Item(s) manufactured	Centering Machines
3. Establishment year	1978
4. Size	Micro

5. Brief Profile

Precitec specializes in design and manufacturing of centering machines, for various industries and segments like automobile component manufacture, assembly lines, heavy engineering industries, onsite machining and other Machine Builders. Precitec has a full fledged design office It is equipped with various design software for CAD drafting, 3D modeling, gear design etc. It has also in-house machine shop with CNC lathe, machining center, Milling-machines, surface grinders, tool and cutter grinder, these machines serve both production and other in-house requirements.

6. R&D Activities

The enterprise R&D team has designed a new structure of the machine for high-precision radial tire production with low-ring hub that can be adjusted. This new machine consists of Top Center Machine Assembly, Frame Assembly and Bottom Center Machine Assembly. The new design has resolved the problem of compatibility of multi-specifications and made the process of replacing the bladder convenient and also improved the overall performance of the machine.

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Availability of funds at affordable interest rates for R&D
- Inappropriate infrastructure

Case Study No: 4.10	Sector: Scientific Instruments

Item	Information
1. **Name of the Enterprise with address**	M/s Scientific India, 33, HSIDC, Industrial Area Ambala Cantt - 133006, Haryana
2. **Item(s) manufactured**	Scientific Instruments
3. **Establishment year**	1985
4. **Size**	Small

5. Brief Profile

The enterprise is engaged in the manufacturing of comprehensive range of Microscopes. The range of microscopes comprises of Biological Microscopes: Pathological-Microscopes, Research Microscopes, Fluorescence Microscope, Phase Contrast & Dark Field Microscopes, Student Microscope, Inverted Tissue Culture Microscope, Teaching Microscope, Projection Microscope and Dissecting Microscope; Stereo Microscopes: Stereoscopic Dissection Microscope, Senior Binocular Stereo Microscope and Zoom Stereo Binocular Microscope; Dissecting Microscopes: Stereoscopic Dissection Microscope and Dissecting Microscope; Student Microscopes: AJ-5 and AJ-6; Research Microscopes: XY-B1 and B2 TM; Pathological Microscopes: AJ-8, AJ-10, AJ-11, AJ-12, Microlux-16 and Microlux and OFM.

These Microscopes find applications in various laboratories. .The enterprise has a spacious state-of-the-art infrastructure, which is well segregated into various units and are installed with all the advanced amenities and tools.

6. R&D Activities

The enterprise R&D team has developed an Optofluidic Microscopy (OFM) which is a new compact and lensless microscopic imaging technique The device utilizes micro fluidic flow to deliver specimens across array(s) of micrometer-size apertures defined on a metal-coated CMOS sensor to generate direct projection images. It is a novel microfluidics-based lensless imaging technique, termed optofluidic microscopy (OFM), and demonstrates Caenorhabditis elegans imaging with an OFM that gives comparable resolution to a conventional microscope and a measured resolution limit of 490 ± 40 nm.

The optofluidic microscope (OFM) is a lensless, low-cost and highly compact on-chip device that can enable high-resolution microscopy imaging. The OFM performs imaging by flowing/scanning the target objects across a slanted hole array; by measuring the time-varying light transmission changes through the holes, we can then render images of the target objects at a resolution that is comparable to the holes' size. It also takes care of the impact of pressure-based flow and DC electro kinetic-based flow in controlling the flow motion of Giardia cysts – rotation-free translation of the parasite is important for good OFM image acquisition. It is microscopy imaging of both Giardia trophozoites and cysts with an OFM that has a focal plane resolution of 0.8 microns.

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Timely availability of skilled and qualified specialists in the field
- Lack of recognized testing facilities
- Availability of funds at affordable interest rates for R&D
- Inappropriate infrastructure

Case Study No: 4.11 **Sector: Textiles & Garments**

Item	Information
1. Name of the Enterprise with address	M/s Yarn Plus 398, Industrial Area A, Ludhiana – 141003, Punjab
2. Item(s) manufactured	Textiles Yarns
3. Establishment year	1998
4. Size	Small

5. Brief Profile

Yarn Plus is one of the leading enterprises in MSME sector in the country in the area of fancy yarns with Chenille. Yarn Plus shifted to newer products in Crochet yarns, Latest hollow spindle yarn, tube yarn etc. Always, These are very useful to the flat and Circular Knitting industries

Chenille is produced by the enterprise in the following various blends: _

a. 100% Acrylic.
b. 100% Cotton.
c. 100% Polyester.
d. Cotton / Viscose.
e. 100% Viscose.

The product range included the following:-

Chenille Yarns : Installed capacity is 1200 spindles, production 1800 Kg of chenille yarn every day

Crochet Yarn : Installed Capacity 50 Machines producing about 900 Kg of crochet yarn every day

Hollow Spindles : Installed capacity of 960 Spindles producing 2000 Kg of fancy yarn every day

Tube & needle Yarn: Installed capacity of 160 Spindles producing 350 Kg of ultra fancy yarn every day.

6. R&D Activities

With their R&D team efforts the Gretag Macbeth Colour Matching System has been developed and the sampling time has been greatly reduced. Resulting in quick drying and turnaround. The enterprise Fancynation is based on extensive R&D competence developed over a range of processes. It is single or plied yarns that are structured or multicolored. These are spun single yarns with the addition of various types or colors of fiber or knops. They can also be doubled yarns with a structure that is modified by a change of draft or by discontinuous texturing. The textured fancy yarns developed by the enterprise have special applications in furnishing and curtain fabrics, functional sportswear and luxurious outerwear. For specialties such as two-tone yarns, thick and thin yarns, elastane bypass yarns, core or

bicomponent yarns, the enterprise has developed with R&D efforts the FK6-1000 draw-texturing It excels in flexibility and efficiency. Various Fancy yarn combinations of differently textured yarns or combinations of textured yarns with special core yarns have been developed

7. Major Problems in Undertaking R&D Activities

Following are the major problems:-

- Availability of skilled and experienced experts
- Availability of funds at affordable interest rates for R&D
- Inappropriate infrastructure

Section – 5
Questionnaire

STUDY TO ASSESS RESEARCH & DEVELOPMENT (R&D) IN INDIAN MICRO, SMALL & MEDIUM MANUFACTUIRNG ENTERPRISES (MSMEs)

2010-11

QUESTIONNAIRE

Study Conducted by:

NATIONAL FOUNDATION OF INDIAN ENGINEERS

Please read the instructions before filling the questionnaire:

1. No inter entreprise comparisons will be carried out.
2. Individual identity of the entreprise providing information/ data will be kept strictly confidential.
3. Analysis will be carried on the overall basis sector wise. Only overall summary figures will be reported.
4. Attach extra sheets wherever required.
5. If any particular item is not applicable in your case, leave it blank.
6. Please tick ☑ the relevent option (s) applicable for your entreprise.

The completed Questionnaire should be returned to:

Prof. Dr. P.K. Gupta
Project Investigator & Secretary General
National Foundation of Indian Engineers (NAFEN)
Shanti Chambers, 11/6B, Pusa Road
New Delhi-110 005 (INDIA)
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Fax: +91-11- 25789399
E-mail: nafenindia@nafenindia.com
Web: www.nafenindia.com

SECTION-1

1. Name of the Enterprise _____

2. Communication Address _____

City		State	
Pin Code		Phone/Mobile	
Email		Web site	
Geographical (Spatial) Location	Longitude ----------	Latitude ----------	

3. Please identify your core sector of operations (Please tick)

☐ Agriculture M/c	☐ Automotive	☐ Chemical	☐ Drug & Pharma
☐ Electronics	☐ Gems & Jewellery	☐ Light Engineering	☐ Leather
☐ Machine Tools	☐ Scientific Instrumentation	☐ Textiles & Garments	

3.(a) Code of branch of economic activity to which your enterprise could be best classified? **(Please see Annexure-1 for codes)** ☐☐☐

4. (a) Year of the establishment of the Enterprise ☐☐☐☐

(b) Size of the Enterprise

Gross value of Plant & Machinery at the time of the setting up of the unit (`)

☐ Tiny/ Micro	☐ Small	☐ Medium
< 25 Lakhs	*> 25 Lakhs to < 5 Crs*	*> 5 Crs.to < 10 Crs.*

5. (a) Item(s) Manufactured _____

(b) Conformity to Standards

☐ System - ISO	☐ Product -BIS
☐ Environmental	☐ Labour
☐ Health & Safety (WHO etc)	
☐ Any Other (Please specify): _____	

6. Ownership Pattern of the Enterprise

☐ Sole Proprietorship	☐ Family Business
☐ Partnership	☐ Private Limited
☐ Limited Company	
☐ Any Other (pl. specify) _____	

7. Area & Qualifications of Owner / CEO

☐ Engineering/ Research	☐ B.E./B.Tech ☐ M.E./M.Tech ☐ Ph.D.
☐ Managerial	☐ BBA ☐ MBA
☐ Science/ Research	☐ B.Sc. ☐ M.Sc ☐ Ph.D.
☐ General	☐ B.A. ☐ M.A. ☐ Ph.D.
☐ Any other (pl. specify) _____	

8. Has your enterprise spent any funds towards R&D activities during the last three years? ☐ Yes ☐ No

Research & Development is defined as discovering new knowledge about products, processes, and services and then applying that knowledge to create new and improved products, processes, and services that fulfill market needs.

If Yes in Q No 8 above, kindly fill in the information in SECTION-2 on the next pages

SECTION-2

9.	Is your Enterprise recognized for R&D activities with the Department of Scientific & Industrial Research (DSIR), Govt. of India?	☐ Yes	☐ No
10.	Has your enterprise claimed any tax benefits for R&D during the last three year?	☐ Yes	☐ No
11.	Has your enterprise received any award(s)/ recognition for R&D?	☐ Yes	☐ No

12. Please provide following details with respect to your enterprise

S.No.	Item	2007-2008	2008-2009	2009-2010
a	Sales (` Lakhs)			
b	R&D Expenditure (` Lakhs)			
c	Export (` Lakhs)			

13. Please provide following details for employees engaged in the enterprise for the year 2009-2010.

(Numbers)

S.No.	Item	Male		Female	
		Full Time	Part Time	Full Time	Part Time
a	Total Employees including R&D personnel				
b	R&D Employees included in (a) above				

14. Areas under R&D Activities (Tick the relevant option (s))

☐ New Product Development	☐ New Process Development
☐ New Materials	☐ Improvement in Existing Product
☐ Improvements in quality standards	☐ Improvements in Existing Process
☐ Environment impact like introduction of Green Technologies	☐ Any other (Please Specify) _____

15. Benefits under R&D Activities (Tick the relevant option (s))

☐ Cost Reduction	☐ Energy Conservation	☐ Enhancement in Productivity	
☐ Improvements in quality standards		☐ Improvements in Emission Norms	
☐ Enhancing Existing Market Share ☐ Domestic ☐ Global		☐ Access to New Markets ☐ Domestic ☐ Global	
☐ Intellectual Property Rights (IPR) ☐ Patents ☐ Applied (Nos) _____ ☐ Obtained (Nos) _____			
☐ Trade Mark	☐ Design Registration	☐ Copy rights	☐ Geographical Indicators
☐ Any other (Please Specify) _____			

16.	Sources of R&D input of the Enterprise (Tick the relevant option (s))	☐ **In-house** ☐ Access to skilled manpower. ☐ R&D Department/ Centre ☐ Access to Scientific Literature/ Journals ☐ Any Other (Pl. Specify) _____ ☐ **External Sources** ☐ Customer ☐ Supplier ☐ Linkages ☐ Govt Lab ☐ Private Lab ☐ University/Academic Institutes ☐ Cooperative Society /Community/ Association ☐ Imported Technology adoption/ absorption ☐ Any Other (Pl. Specify) _____
17.	Sources of Funds for R&D Activities	☐ Own Sources including family & friends ☐ Financial Institutions (FIs) ☐ Venture Capital/ Angel Investors ☐ Govt Ministries/ Departments ☐ Any Other (pl. Specify _____
18.	Have you given any specialized training for R&D to your personnel?	☐ Yes ☐ No
19.	Have you encountered any problems while undertaking R&D activities? **If Yes,** in which of the following areas:-	☐ Yes ☐ No

☐ Availability of Skilled & Qualified Personnel	☐ Funding for R&D
☐ Appropriate Infrastructure	☐ Testing Facilities
☐ Compliance to Regulatory Requirements	☐ External Linkages with S&T Labs/ Institutions
☐ Any others (Please specify) _____	

20.	Motivation for carrying out R&D in the enterprise
21.	Any other information you may like to give
Place:	**Name of the Respondent**

Thanks for sparing your valuable time and filling the questionnaire. Your relevant information shall definitely help us to analyze the status of R&D activities in MSMEs in India. However, as stated above, No inter organization comparisons will be carried out. Analysis will be carried on the overall basis sector wise.
For R&D recognition by the Government, log on to www.dsir.gov.in

Annexure 1

BRANCH OF ECONOMIC ACTIVITY (BASED ON NIC 2008)	CODE
Manufacture of food products (including processing and preserving of meat, fish, fruit and vegetables etc.	010
Manufacture of beverages	011
Manufacture of tobacco products	012
Manufacture of textiles	013
Manufacture of wearing apparel	014
Manufacture of leather and related products	015
Manufacture of wood and products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	016
Manufacture of paper and paper products	017
Printing and reproduction of recorded media	018
Manufacture of coke and refined petroleum products	019
Manufacture of chemicals and chemical products (including basic chemicals, fertilizer and nitrogen compounds, plastics, man-made fibers and other chemical products)	020
Manufacture of pharmaceuticals, medicinal chemical and botanical products	021
Manufacture of rubber and plastic products	022
Manufacture of other non-metallic mineral products (includes glass and glass products)	023
Manufacture of basic metals (includes iron and steel, and other non-ferrous metals and casting of metals)	024
Manufacture of fabricated metal products, except machinery and equipment (includes structural metal products, tanks, reservoirs, generators, weapons and ammunition	025
Manufacture of computer, electronics and optical products (includes consumer electronics, irradiation, electro medical and electrotherapeutic, equipments, testing, navigating and control equipment; watches and clocks)	026
Manufacture of electrical equipment (includes motors, generators, transformers and electricity distribution and control apparatus, batteries, wiring and wiring devices, electric lighting equipment and domestic appliances)	027
Manufacture of machinery and eq2uipment n.e.c	028
Manufacture of motor vehicles, trailers and semi-trailers	029
Manufacture of other transport equipment (including ships, railway, air and space craft, military fighting etc)	030
Manufacture of furniture	031
Other manufacturing including jeweler & related articles, medical & dental instruments, musical, sports goods etc.	032
Repair and installation of machinery and equipment	033
Any other (PI. Specify)	034