At the very outset, it will be worthwhile, to examine the meaning of Research and Development and to see whether any cleavage may be drawn between two. A start in this respect may be attempted by setting out the differences in purposes, methods and results between Science and Technology. Science is directed towards understanding, technology towards its uses. Secondly, whereas the criteria of achievement in Science can only be applied by Scientists as a professional group, the criteria of success in technology is that of the market, whether the new idea is a commercial asset or not, the final judgement is exercised by the consumer. With this in backdrop one explanation of Research which has been given by Charles E Wilson (General Motors) is — "Research is when you do not know what you are doing".

A second explanation of the Research given by Dr. Albert S. Gyorgi, the Nobel Prize Winner has been that "Research is to see what everybody also has seen and to think what nobody else has thought".

A third definition of Research enjoying wider acceptance is — "Research generally covers any type of orderly
Based on these definitions of research, the same is now classified as:

1. **Pure Research**

This is an investigation for knowledge without immediate concern for its application.

2. **Basic or Fundamental Research**

It is concerned with research for new scientific knowledge. The salient feature of this type of research is that it is not related to any given commercial product as such. Therefore, it seemingly has no immediate pay off to its sponsor. From the long-range view however, it is the fountain head of new technology.

3. **Applied Research**

It is concerned with the conversion of scientific knowledge into the technology. In other words the focus here is on developing a basic research finding into a commercial or consumer objective i.e. it is the intermediate activity between discovery of basic phenomenon and the generation of the final product. It is usually taken as inclusive of development.~

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+ Basic research is driven mainly by the aspirations of scientists who make discoveries; such research can therefore be classified as discovery-driven research. There is another kind of research which may be called as society-driven or market-driven research. Scientific breakthroughs come rarely in contd....
Viewing from another angle, all research can therefore be divided into the following two categories:

(a) **Defensive Research**: It is designed to protect existing products, processes and services against obsolescence and effective competition.

(b) **Offensive Research**: When research is oriented towards creating new products, processes and services, it is called offensive research.

A variant of these classifications can also be noticed. Instances on the point are found in Japan. In Japan, continuous development and experimental research expenses of any existing product or method are excluded from research and development costs and treated as a separate item. Research and Development expenditure... 

+ contd....

discovery-driven research, but once made, they lead to major innovations and quantum leaps in science and technology. Such research requires time, patience, perseverance and dedication. The results of such research cannot always be predicted. Once a major discovery is made the considerable amount of applied research is made to see that the result of discovery become useful or lead to innovation.

In a market-driven or society driven research the research is motivated by societal forces demanding certain products or innovations. Although the objective here remains spelt out in order to attain the objective it becomes necessary to carry out a considerable fundamental research. It is immaterial whether the research is discovery-driven or society driven it may require fundamental as well as applied work in order to give rise innovation. (Vide 75th Indian Science Congress, Platinum Jubilee Session January 7-12, 1988, Presidential Address by Professor C.N.R. Rao, pp.3-4).

are then divided into two main classes, namely,

(i) Experimental Research Expenses and
(ii) Developing Expenses

Experimental Research Expenses:

It is the special costs incurred when an operating enterprise attempts experimental production of new goods or does research on a new technological possibility.

Experimental research expenses are then classified into (a) Basic (b) Applied and (c) Industrialisation Research expenses which correspond respectively to the steps of scientific possibility.

Development:

Once research has been defined it will be logical to define the term development.

Development is identified as the processes that are concerned with translating research finding into products or processes and with different stages involved in bringing the product or service to an operational level. In other words the fruits of research are passed on to development and the results obtained from development work are passed on to benefit production.

In Japan development expenses are deemed to be the special costs that are incurred when an operating enterprise adopts
a new technology, develops new resources, finds new market and improves its management system.  

Development expenses are then further classified into (a) preparatory development and (b) full scale development expenses which correspond respectively to the first step when an enterprise makes a decision to do full-scale development and the second step when the enterprise decides to take responsibility for the success or failure of the project.

**Difference between Research and Development**:  

From the definition of Research and Development given above it is now possible to make a cleavage between the two viz, Research and Development, which becomes all the more necessary as the function of development and research, especially applied research, very often overlaps.

Truely speaking, it is only when research ends successfully that one can speak of development. Therefore, development expenditure unlike research expenditure, is the cost incurred for examining the viability of putting the results of research on a practical commercial basis. Development testifies that it is scientifically and technologically feasible to manufacture a particular product in accordance with a specific formula.

3. Ibid.  
design of technique found out by research. Thus, development is the 
next stage of research when a trial or pilot run is made with the 
result of research. It is a stage, when, based on research findings 
a small unit of the product is manufactured under practical produc­
tion condition in order to test whether large scale manufacture 
of the same would be commercially viable. Once this test becomes 
successful, a full scale production on commercial basis begins. 
Development is not therefore research. It is rather a step forward 
next to research. Development in fact forms a bridge between resear­
ch and commercial production though it is more akin to the latter.

Raisond'être for Developing an 
Accounting Definition of Resear­
ch and Development : 

In industries the terms 'Research and Development' are generally 
used together to describe a distinct function very often of inde­
pendent status like production function, marketing function and 
finance function. As to the range of activities to be included un­
der the ambit of Research and Development, no uniformity of opini­
on exists even to-day among the industries. Generally businessmen, 
accountants and most users of financial statements view industrial 
Research and Development as an activity composed of scientific or 
technological exploration and experimentation either to discover 
and exploit new technologies, products or processes or to improve 
the existing ones with the aim of sustaining or enhancing the
profitability of an enterprise. A general consensus therefore prevail among accountants, businessmen and users of financial statements on the nature and objective of industrial Research and Development. Nevertheless, it did not lead to any satisfactory accounting definition of Research and Development to serve as a basis for distinguishing expenditures for Research and Development from expenditures for other functions.

Itemwise examination and analysis of expenditures for Research and Development show that expenditure on this score like other business expenditures, may also be classified as expenditure for materials, for labour and for other overheads. These classifications, beside being simple would have an additional advantage of having inter industry uniformity as the nature of expenditures which are to be kept within the boundary of expenditure for Research and Development would become alike. But pursuing these sorts of classifications would have the difficulty that it would fail to disclose the impact of Research and Development expenditures on the financial position of the company on the one hand and operational results correctly on the other. These difficulties explain the need for developing an accounting definition of Research and Development with precise functional boundaries. Establishment of precise functional boundaries, it is claimed would also go long way in emerging uniform principles for determining the amount to be reported as Research and Development costs in the

financial reports of the companies, thus furnishing subsequently a uniform basis for making comparative analysis of the performance of the companies on this score. This would further provide accountants with a reliable means of defining what is and what is not Research and Development so that Research and Development costs in financial statements could be reported in their right context.

Accounting Definition of Research and Development:

The necessity, purpose and the advantages that are likely to accrue from the development of a definition of Research and Development for the purpose of accounting have already been explained. It would, therefore, be relevant to examine the attempts that the accountants have so far made to develop an accounting definition of Research and Development. A beginning for the purpose may be made by explaining whether definition of Research and Development for the purpose of accounting could be anything different from the available definitions of Research and Development.

It would have to be borne in mind that principles and practices of accounting for Research and Development costs can not but be parallel with the growth and expansion of Research and Development activities in the industries which is true both for the developed and developing countries. In support of this proposition we take the case of USA as a representative of developed countries.
just by way of reference.

An historical analysis of the growth of Research and Development shows that in U.S.A. industrial research had been the province of the lone inventor till the late nineteenth century*. Research at that time was based on trial and error methods rather than the being application of high grade scientific and technological knowledge that characterizes the industrial research today at the fag end of twentieth century.

Formal scientific investigations were mainly done in the university laboratories having no direct connection with industries. Industries based on new inventions tended to grow slowly and find their market gradually. In the circumstances it was natural that innovation could not cause any abrupt and profound economic dislocations. It is therefore no wonder that there has been hardly any reference about the accounting for Research and Development expenditures in the contemporary literature on accounting. And whatever expenditures a firm might have incurred on this score would be reported as "experimental expenses". If the experiment could reasonably be expected to result in profitable processes, the opinion was to treat the costs therefor as capital outlay and the process itself or the patent representing it an intangible asset6.

In 1917, the Federal Reserve Board in consultation with Federal Trade Commission and the American Institute of

* Instances on the point are the inventions of men such as Edison, Westing House, Eastman and Bell.

Accountants, at present the American Institute of certified Public Accountants, in the proposal on Approved Method for the preparation of balance sheet statements tentatively subscribed to the proposal of showing Research and Development Expenses as 'experimental charges' in the section of the balance sheet dealing with the deferred charges to operations. In other words, the endorsed policy had been to treat the Research and Development expenses as a deferred revenue item in the balance sheet till the outcome of experiment was known. This practice of accounting for Research and Development continued in USA till 1929 with the support of Federal Reserve Board.

When the 1st World War broke out in Europe in 1914, the neglect of science by most industries in the United States came to the surface. As a sequel, thereof, between the years 1914 and 1939 a tremendous demand for Scientists and Engineers in industrial laboratories, with the concurrent expansion in scientific training could be noticed in USA. During this period United States also could become the world's unquestioned leader in scientific and technological literature. By a process of information exchange, fundamental advances in knowledge due to research largely in University laboratories stimulated development of their industrial applications, and those in turn brought new problems for the academic scientists to study.

The conditions under which Research and Development
had to be carried on in smaller factories were often make shift arrangements and as such less than ideal. Consequently companies often found that a better alternative for them was to sponsor the research they needed at an established technological research institute. In 1913 at the University of Pittsburgh the foundation of the Mellon Institute was the first institute of that category. It carried out research under the sponsored programme. In some industries research was carried out on a cooperative basis in the laboratories of trade associations. The typical example being the Underwriters Laboratories and the Laboratory of the American Gas Association. Despite this upsurge for research in the industries the position till 1930s had been that it was only in the large companies, scientifically or technologically oriented, which had their own research laboratories.

Accounting for Research and Development expenditures became the growing concern during the 1920s to members of the National Association of Cost Accountants, at present the National Association of Accountants (NAA). The Association was so much beset with the problem that the question figured in its discussion at least on three different occasions, namely, 1922, 1924 and in 1926.

In 1922, in the first New England Regional Cost Conference of the NAA the subject of "Development costs and their liquidation" was explained and the view that emerged from the discussion had been not to capitalize expenses for what might be
called "research or preliminary experimental work". All other expenses in connection with the development of a product are to be charged to the development account and that account is to be carried as a deferred asset.8

In 1924, a query was made by the National Accounting Association to its members about their handling of experimental expenses. From the replies obtained, what emerged, was that there was to be a difference of treatment, in accounting practice, in respect of cost of continuing research programme and the cost of a substantial development project. When cost of developing a new article or line was to be treated as a deferred account, experimenting expenses i.e. the expenses covering the current and ordinary minor expenses for experiments which are continuous in nature, in most manufacturing establishments, such expenses were charged against current operation, each month, and assessed against the lines of products affected.9

During the middle 1930s the subject received attention in four noteworthy publications. One such publication is the survey made by Clark. In that survey the views expressed


(i) a survey made by Norman B. Clark in 1934;
(ii) the AICPA's Examination of Financial Statements in 1936;
(iii) the Study of Sanders, Hatfield and Moore, A Statement of Accounting Principles in 1938, and
(iv) an NAA Study of 106 Companies in 1939.
had been that 'Development Work' on manufacturing methods should be charged to manufacturing expense, whereas the same on new products is to be capitalized and amortized over production or charged off outside of cost. Expenses for fundamental research is generally charged as an administrative expense, or out of surplus, since usually it is considered as not essential to operations.

In the second publication, the American Institute of Certified Public Accountants dealt briefly with the treatment of development expenditures under the general subject of 'accounting for deferred charges. The views expressed had been that if development and similar expenditures are deferred they should be written off over a reasonable period having regard to the nature of the expenditures.

In the third one, i.e. in the study of Sanders, Hatfield and Moore, the opinion expressed had been that experimental expenses might be listed in the balance sheet as a deferred charge only when there was rationale for the same and the said deferred charge is to be allocated over periods on the basis of competent judgement.

In the fourth publication i.e. in the National Association of Accountants study covering 106 companies the conclusion reached, had been that there was a very great reluctance on the part of the companies to capitalize research and Development expenses.
After 1939 the scientific and engineering approaches that were used to solve military production problem became a recognised part of industrial activity. In consequence, even when the hostilities of the 2nd World War ceased, Research and Development activities in the companies were retained and the search for new products and processes continued unabated as the industries realised that innovation leads to higher profits and greater growth. Consequently, expenditures for Research and Development recorded a stiff rise in the industries in USA and Research and Development function became an important user of corporate funds.

As the number of companies engaged in Research and Development increased, competition began to play a very important role in the success or failure of specific Research and Development projects. Technological success was no longer considered enough to assure commercial success. Discussions with personnel of companies with a long history of Research and Development indicated that the rapid development of competitive products reduced the life cycles of products considerably. Increasing competition increased the uncertainty and this in turn resulted in an increasing hesitancy on the part of the companies to defer Research and Development costs. The issue therefore continued to be debated even in the late fifties and one view had been that the possibility of commercial success of any new product at the time of expenditure usually was so remote that there was no valid basis for deferment of Research and Development expenditure for
the same. It could be treated as deferred expenditure only when there was a reasonable assurance that development project in progress would be commercially successful.

Legal View:

It needs hardly be stressed that on the development of accounting principles, legal decisions have influence. In fact, legal decision is one of the three sources from which accounting principles originated. In the circumstances, it will be relevant to discuss how the judicial views have influenced the treatment of expenditures for Research and Development in accounting. Needless to mention, the same is also attempted here with reference to the developments in USA.

In USA during the late 1920s and early 1930s many court cases mostly relating to taxes gave substantial support to the principle of deferring Research and Development costs. The views expressed had been that costs of unsuccessful projects should be recorded as expenses when the projects are abandoned and costs of successful projects should be amortized over the useful lives of the projects.

The Internal Revenue Service of USA, however on many occasions did not toe the legal decisions. In most of the cases these decisions were contested.

Service, favoured, the claim for deferral whereas in many cases which were not contested due to lack of material the Internal Revenue Service actually favoured writing off of the amounts inspite of court decisions to the contrary. In 1948 on an evident divergence between court decisions supporting deferral of Research and Development costs and the accounting practice of recognizing those costs as expenses as incurred, Jack R. Miller, formerly a United States Senator from Iowa and a Professor of Law at Notre Dame, commented that deferral of Research and Development costs "would result in an overstatement of capital more often than their deduction would result in an understatement of income" and added that in his opinion, the apparent uncertainty about the practice to follow in respect of treatment of expenditures for Research and Development in the accounts arose from administrative practice of the Internal Revenue Service.

During the early 1950s enough of evidences exist showing considerable uncertainties of the attitude of the Internal Revenue Service toward the treatment of Research and Development expenditures in the accounts. For example, in 1952 Commissioner Dunlop appearing before the Joint Committee of Internal Revenue Taxation observed that Research and Development costs usually are a necessary part of most businesses and stated that over the long term the effect on corporate income of current deduction of

research costs did not appear to differ materially from deferral and subsequent amortization. He also called attention to the difficulties involved in applying specific costs to various projects and processes.

Considerable controversy also developed in tax accounting over specific research costs, the determination of lives and the time of abandonment of a project. The Inland Revenue service normally allowed Research and Development costs to be treated as current expenses, and many companies followed that practice. As Research and Development expenditures increased, the development of new products and processes created the need for new facilities, equipment and working capital. The growing need for capital increased the possibilities that a company would write off Research and Development costs currently to reduce current taxes. Economic and scientific circles also started exerting considerable pressure in favour of allowing immediate write off of Research and Development costs for tax purposes based on the belief that Research and Development costs play a vital role in accelerating capital formation and general economic growth. In the light of these developments, in 1954, Congress enacted Section 174 of the Revenue Act that permitted Research and Development costs, for tax purposes, to be treated as expenses in the year incurred. Therefore, a trend away from deferral was clearly evident since 1954, in the accounting literature and in accounting and tax practice in USA.
India represents the position obtaining in the Underdeveloped Countries of Asia and Africa. In the Underdeveloped Countries Scientific Research and Development could not make much progress till recently, for a number of reasons. The single greatest reason for the same had been their failure to activate themselves during the Industrial Revolution of the Western Europe in the Eighteenth Century. In many cases, this was due to colonialism, imperialism and exploitation. For instance, in the Nineteenth Century and also in the early part of Twentieth Century, India served mainly as a source of raw materials and market for the finished products of the British industries. It will be noted that large scale modern industries such as Jute, Iron and Steel, Cotton, Sugar, Paper pulp match etc. all started developing in India in the first quarter of the Twentieth Century particularly after the grant of protection to them by the then British ruler.

But, in the socio-economic environment of that period, the industries which started developing in India did not bother for modern Research and Development. Though there was no Research and Development efforts at the individual firm level, under different industries, that started developing in the country, as aforesaid, there was however no dearth of the efforts of the individual scientists for Research and Development. In otherwords, at that time research was essentially the province of lone inventors. Thus, a similarity of situation could be noticed among most developed countries like USA and underdeveloped countries like
India, so far as the Research and Development are concerned. Noteworthy among the lone inventors were -

1. J.C. Bose (1958-1937)
2. Prafulla Chandra Roy (1861-1944)
5. Meghnad Saha (1893-1949)
6. Homi Jahangir Bhabha (1909-1966)
7. Darashaw Nasherwan Wadia (1883-1969)
8. Sisir Kumar Mitra (1890-1963)
10. Birbal Sahani (1891-1949)
11. Srinivas Ramanujan (1887-1920)
12. Shanti Swarup Bhatnagar (1894-1955)

The list is not exhaustive but only representative.

In India, Research and Development moved to the firm level with the gradual growth of the industries, as the same was found a must, for their survival and growth. But most significant development in the sphere of Research and Development in India occurred only in the post Independent years under the Scientific Policy Resolution adopted by Parliament on 4th of March 1958. A major objective of this resolution was to secure for the
people of the country the benefits from the acquisition of Scientific knowledge and its application. The resolution also set out some other aims like encouraging individual initiative for the acquisition and dissemination of knowledge as well as the discovery of new knowledge, fostering programmes for training of scientific and technical personnel to fulfil the needs in the fields of science and education, agriculture, industry and defence and ensuring an adequate supply of scientists and recognising their work.

Since the adoption of scientific policy resolution the Government constantly laid emphasis on the development of science and technology as major instruments for achieving national goals of self reliance, economic and social development. Major scientific departments with their research laboratories/institutions in the Central Government are the main vanguards of the research efforts being carried out in the country. They are : The Council of Scientific and Industrial Research (CSIR), Indian Council of Agricultural Research (ICAR), Indian Council of Medical Research (ICMR), Department of Atomic Energy (DAE), Department of Electronics (DOE), Department of Space (DOS), Defence Research and Development Organisation (DRDO), Department of Ocean Development (DOD), Department of Environment (DOEN), and Ministry of Science and Technology comprising of three departments - Department of Science and Technology (DST), Department of Scientific and Industrial Research (DSIR) and Department of Biotechnology (DBT). Some of these autonomous research bodies have been designed to
undertake the 'Blue Sky' research and some for community research works. Besides, there are other Central Government Ministries/Departments such as Ministry of Telecommunication, Railways etc. who have a number of research institutions under their administrative and financial control to carry out research programmes of practical relevance to the respective areas of responsible ministries/departments.

The State Governments supplement the efforts of the Central Government in those areas which are of prime importance to them viz, agriculture, animal husbandry, fisheries etc.

Industrial establishments both in the private and public sectors undertake Research and Development activities as already stated for their survival and growth. Governments also encourage these research efforts. As on 1st September, 1988 there were about 1016 units in our country engaged in various kinds of industrial Research and Development, about 12 per cent of them being in the public sector. During 1982-83 the industrial in-house research units in the country numbered around 750 only. Thus, over a period of six years, the number of Research and Development units in industry increased by more than 1.35 times. Similarly, the number of Scientific and Technical personnel employed in such units also increased during the period of six years from 38,899 to 62,926. A commensurate increase in expenditure incurred by such units also resulted. The annual investment is Rs. 725.11 crores compared to

Rs.285.61 crores during the year 1982-83. These statistics suggest a reasonably satisfactory rate of growth in Research and Development activities undertaken by the industry, although one could wish this rate much higher.

A major work in the field of science and technology is also carried out in educational institutions that come under the Central and State Governments directly or indirectly. There are about 174 Universities, Institutes of Technology and the like which carry on research funded mainly by the University Grants Commission. Many research projects in these academic institutions are also funded by various other scientific agencies such as Department of Science and Technology, the Council of Scientific and Industrial Research, the Indian Council of Agricultural Research etc.

Another significant development in the sphere of Research and Development in India has been the establishment of National Research and Development Corporation by the Government of India in 1954 with the purpose of developing, exploiting and commercialising in public interest the patents and invention of the CSIR, Government departments, Universities and individual inventors. The NRDC has also been empowered to enter into equity participation with the companies created specifically for exploiting knowhow possessed by it, which require investment over Rs.50 lakhs.

In response to the need for guidelines to cover-scarce character of a developing economy there had been an announcement of a technology policy in January 1983. This policy aims at ensuring that country's available natural endowments, especially human resources, are optimally used for a continued increase in the well-being of all sections of the people. Among its objectives are the attainment of technological competence and self-reliance, provision of gainful employment, making traditional skills commercially competitive, ensuring maximum development with minimum capital, modernisation of equipment and technology, conservation of energy ensuring harmony with environment etc.

Presently, Research and Development activities in India are therefore carried out under four major sectors viz, (i) Central Government, (ii) The State Government (iii) various in-house Research and Development units of the industrial undertakings both under the public and private sectors and (iv) research performed in various higher centres of learning. A pictorial presentation of this set up for Research and Development in India is attempted in the next page.

An idea of expenditure for Scientific Research and Development at the national level in India, as obtains today can be had from Table No.1 that follows.
Chart 1

Research and Development Activity in India

State Sector

Industrial Sector

Various higher Centres of learning

Public Sector

Private Sector

Universities

Colleges

ITI

Others

Central Sector

Major Scientific Agencies

CSIR

ICAR

ICMR

DAE

DOE

DOS

DRDO

DOD

DOEn

Ministry of Science and Technology

DST

DSIR

DBT

Other Central govt. Ministries
Departments

CSIR = The Council of Scientific and Industrial Research
ICAR = Indian Council of Agricultural Research
ICMR = Indian Council of Medical Research
DAE = Department of Atomic Energy
DOE = Department of Electronics
DOS = Department of Space
DRDO = Defence Research and Development Organisation
DOD = Department of Ocean Development
DOEn = Department of Environment
DST = Department of Science and Technology
DSIR = Department of Scientific and Industrial Research
DBT = Department of Biotechnology
Legal View:

It will be recalled that judicial pronouncements had impact on the treatment of Research and Development expenditures in the accounts of corporate undertakings in U.S.A. though Internal Revenue Service, in the State, on many occasion, in the interest of State exchequer did not agree with the legal decisions. It therefore, becomes relevant to enquire what has been the Indian scenario in this respect.

Question of legal pronouncement on the treatment of Research and Development in the accounts of Corporate Undertakings can arise only when one demands deduction in respect of Research and Development expenses for the purpose of ascertaining taxable income to which the Revenue department of Government does not acquiesce. In India though the Income Tax Act for the first time was passed in 1896, which was given a more detailed shape by the Indian Income Tax Act 1922, the Act was conspicuous by the absence of any provision relating to the treatment of Research and Development expenses in the accounts of business undertakings for the purpose of ascertaining their respective taxable income. Research and Development expenses, needless to mention did not receive consideration of the Government for reasons already stated. It was only in 1958 when the provisions were made in the Indian Income Tax Act 1922, by an amendment, regarding the treatment of Research and Development expenses in the business accounts for the purpose of ascertaining the income on which tax was to be levied. Under section 10 of the said Act and
its sub-clauses for the purpose of admissibility of the amounts spent on Research and Development as an expense in the computation of taxable income, the following rules had been made.

(a) any expenditure (not being in the nature of capital expenditure) laid out or expended on scientific research related to the business was admissible for the purpose of taxation.

(b) any sum paid to scientific research association having as its objects the undertaking of scientific research related to the class of business carried on, and any sum paid to a University, College or other institution to be used for scientific research in social science or statistical research related to the class of business carried on and the said expenditures were admissible provided that such association, University, College or institution is for the time being approved for this purpose by the prescribed authority.

(c) in respect of any expenditure of a capital nature on scientific research related to the business, an allowance for each of the five consecutive previous years beginning with the year in which the expenditure was incurred, or where the expenditure was incurred prior to the commencement of the business, for each of the five consecutive previous years beginning with the year in which the business was commenced, equal to one-fifth of such expenditure was to be treated as an allowable deduction in the computation of taxable income.
provided that an allowance shall be made for any expenditure incurred more than three years before the commencement of the business.

Provided further that -

Where an asset representing scientific research expenditure of a capital nature ceases to be used for scientific research related to such business -

(i) no allowance shall be made in respect of any previous year after the previous year in which the cessation takes place, and

(ii) if the aggregate of the amounts allowed under clause (xiv) of Section 10 added to the value of the asset immediately before the cessation is less than the said expenditure, there shall also be allowed in respect of the previous year in which the cessation takes place an additional deduction equal to the difference.

Where such asset is sold without having been used for other purposes, the sale proceeds shall be taken to be the value of the asset immediately before the cessation, and if an additional allowance or a greater additional allowance would have been made in respect of the previous year in which the cessation occurred on the basis of that value, an amount equal to the additional allowance which would have been made, or, as the case may be, to the difference between the additional allowance which would have been made and the additional allowance which was made for that year.
shall be made in respect of the previous year in which the sale occurs:

Where the proceeds of the sale plus the total amount of allowances made under this clause exceed the amount of the expenditure, the excess or the amount of the allowances so made, whichever is the less shall be treated as a receipt of the business accruing at the time of the sale:

Where a deduction is allowed for any previous year under this clause in respect of expenditure represented wholly or partly by an asset, no deduction shall be allowed under clause (vi) or clause (vii) for the same previous year in respect of that asset.

Where an asset is used in the business after it ceases to be used for scientific research related to that business, and a claim for an allowance under clause (vi) or clause (vii) is made in respect of that asset, the actual cost to the assessee of the asset shall be treated as reduced by the amount of any deductions allowed under this clause.

Clause (b) of the provision to clause (vi) shall apply in relation to deductions allowable under this clause as it applies in relation to deductions allowable in respect of depreciation.

If any question arises under clause (xii), clause (xiii) or this clause as to whether, and if so to what
extent, any activity constitutes or constituted or any asset is or was being used for scientific research, the Central Board question to the prescribed authority, of Revenue shall refer the whose decision shall be final.

An examination of the different provisions pertaining to admissibility of Research and Development expenditures for the purpose of taxation of corporate income would reveal that in general Research and Development expenses had been an admissible expenses under the Indian Income Tax Act 1922 as amended in 1958. Naturally till 1958 there had been no legal pronouncements in India unlike in U S A about the treatment of Research and Development expenditures in the accounts of the corporate sector.

But in the Finance Act 1988 the provisions relating to the treatment of Research and Development expenditures in the business accounts and its admissibility for the purpose of ascertaining assessable income have been changed by the incorporations of the new provisions in the Indian Income Tax Act 1961 as stated below:

If an assessee carries on scientific research relating to his business and incurs revenue expenditure, he can claim deduction u/s 35(1) upto the assessment year 1988-89. With effect from the assessment year 1989-90 i.e., after the omission of section 35 such expenses can be claimed as deduction u/s 37(1).

Revenue expenditure incurred by an assessee on payment of salary to research personnel and on material inputs during the three years immediately prior to the commencement of
business is deductible in computing the business income of the year in which business is commenced. With the omission of section 35, the benefit of this deduction cannot be availed from the assessment year 1989-90.

If an assessee makes contributions to other institutions for the purpose of carrying on scientific research, he can claim deduction upto the assessment year 1988-89 if

(i) the payment is made to an approved scientific research association which has, as its object, the undertaking of scientific research related or unrelated to the business of assessee;

(ii) the payment is made to an approved University, College or Institution or to a public sector undertaking for the use of scientific research related or unrelated to the business of the assessee;

(iii) the payment is made to an approved University, College or Institution for the use of research for social sciences or statistical research related to the business of the assessee.

Since the Amending Act has omitted Sec. 35, the aforesaid contributions will not be eligible for deduction u/s 35 from the assessment year 1989-90. However, from the assessment year 1989-90, an assessee whether carrying on a business or profession or not can claim deduction u/s 80 G in respect of contribution to a notified institution of national importance which
has as its main object the undertaking of scientific research or carrying out of any rural development programme or programme of conservation of natural resources or of afforestation of wasteland. This deduction can, however, be claimed only if the aggregate amount of donation or contributions qualifying for the purpose of section 80 G is not less than Rs 250.

Till the assessment year 1988-89 the entire capital expenditure other than expenses on purchase of land, incurred by a person on scientific research relating to his business is allowable as deduction. After the omission of section 35, the capital expenditure is not allowable as deduction with effect from the assessment year 1989-90. Since plant or machinery acquired for the purpose of carrying scientific research relating to business of the assessee can be regarded as used for the purpose of the business, deduction u/s 32 A and 32 A B can be claimed. If amount invested in plant or machinery does not exceed 20 per cent of the book profit u/s 32 A B, the amount of deduction u/s 32 A and 32 A B is higher than deduction available u/s 35+

A minute analysis and interpretation of the above provisions reveal that there has been a metamorphosis in respect of the admissibility of the Research and Development expenditure for the purpose of ascertaining assessable business income.

+ For the Assessment year 1993-94 100 % deduction is made available u/s 35 in respect of expenditure on scientific research related to assessee's business (both revenue and capital excluding cost of land). Amount paid to approved institutions for approved research in social science or statistical research also qualifies for deduction. (Vide Badal Mukherjee - Concise Income Tax Law and Practice, Eastern Law House, Calcutta, p.363).
It now remains to be seen how the business particularly the corporate sector reacts to these provisions.

Dimension of Research and Development

Expenditure in India

Research and Development in India, it will be recalled, is essentially a development in the post Independent years. Nevertheless the progress in this respect as shown in Table 1 has been quite significant. Expenditure on Research and Development had been Rs.1.10 crores in the year immediate after Independence i.e. 1948-49. It increased to Rs.760.52 crores in 1980-81 and to Rs.4003.79 crores in 1989-90. Thus taking the year 1948-49 as the base year, the expenditure for Research and Development, increased in India by 691 times in 1980-81 and 3640 times in 1989-90. Out of the total for the year 1989-90, 89% of the expenditure on Research and Development came from the Governmental sources covering both the Central and State Governments. The rest 11% came from the private sector. Out of the total expenditure from the Government sources about 93% came from Central Government and the rest 7% from the State Governments. It will be noticed from the Table that the most significant rise in respect of Research and Development expenses in all the sectors viz, Central State and private sector occurred once in the year 1965-66 and again in 1975-76.

In Table 2, an attempt has been made to project the growth of Research and Development expenses in India
### Table 1: Showing the Trends in National Expenditure on Research and Development Activities between 1948-49 and 1989-90

<table>
<thead>
<tr>
<th></th>
<th>1.10</th>
<th>4.68</th>
<th>12.14</th>
<th>21.78</th>
<th>62.45</th>
<th>112.47</th>
<th>287.63</th>
<th>580.49</th>
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<td>3.51</td>
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<tr>
<td>N.A</td>
<td>N.A.</td>
<td>N.A.</td>
<td>0.15</td>
<td>2.43</td>
<td>14.59</td>
<td>42.35</td>
<td>120.69</td>
<td>207.83</td>
<td>233.19</td>
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</tbody>
</table>

Source: Department of Science and Technology: Research and Development Statistics, 1988-89, Government of India, New Delhi, p.47.

Note: N.A = Not Available
Table - 2

<table>
<thead>
<tr>
<th>Column</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNP at current Prices</td>
<td>12635</td>
<td>21866</td>
<td>36452</td>
<td>66375</td>
<td>122571</td>
<td>185047@</td>
<td>206445@</td>
<td>232730@</td>
<td>258637@</td>
<td>291789*</td>
<td>346277*</td>
</tr>
<tr>
<td>Expenditure on Research and Development</td>
<td>22.93</td>
<td>68.39</td>
<td>139.64</td>
<td>356.69</td>
<td>760.52</td>
<td>1381.10</td>
<td>1781.55</td>
<td>2068.78</td>
<td>2495.87</td>
<td>2936.94</td>
<td>3471.81</td>
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<tr>
<td>Expenditure on Research and Development as Percentage of GNP</td>
<td>0.18</td>
<td>0.31</td>
<td>0.38</td>
<td>0.53</td>
<td>0.62</td>
<td>0.75</td>
<td>0.86</td>
<td>0.89</td>
<td>0.96</td>
<td>1.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>


Note : @ Provisional

* Quick Estimate
In relation to its Gross National Product at current prices since the year 1958-59. It will be observed that the expenditure on Research and Development had been only 0.18% in the year 1958-59. It increased to 0.31% at the end of 1965-66. Since 1965-66 the growth as a percentage of Gross National Product at current prices had been steady. And at the end of 1988-89 it reached a level of 1% of the Gross National Product. Thus, it will be noticed from the Table that over a span of three decades the Research and Development expenses in India as a percentage of Gross National Product, increased by almost 6 times indicating a sense of gradual awareness about the importance of Research and Development in building up the national economy.

In Table 3 that follows an attempt has been made to project the growth of Industrial Research and Development expenditures in the country in relation to turnover over a period of five years since 1984-85. It will be noticed from the Table that the expenditure for Research and Development in the industries covering both public and private sectors increased from ₹328.07 crores in 1984-85 to ₹575.51 crores in 1987-88 and to ₹697.87 crores in 1988-89 representing a hike about 50.63% and 82.66% respectively. When measured in relation to turnover the expenditure for Research and Development by industrial sector constituted 0.52% in the public sector and 0.72% in the private sector in 1984-85. Since 1984-85 the percentage of Research and Development expenditure on turnover increased to some extent only in case of public sector but except in 1988-89 the percentage of the
## Table 3: Statement Showing Industrial Research and Development Expenditure Versus Sales Turnover between 1984-85 and 1988-89

(\( \text{Rs. in crores} \))

<table>
<thead>
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<td>5</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Research & Development Expenditure:

- **Public Sector**
  - 1984-85: 171.22
  - 1985-86: 198.62
  - 1986-87: 235.70
  - 1987-88: 288.47
  - 1988-89: 361.32

- **Private Sector**
  - 1984-85: 210.85
  - 1985-86: 227.37
  - 1986-87: 269.80
  - 1987-88: 287.04
  - 1988-89: 336.55

- **Total**
  - 1984-85: 382.07
  - 1985-86: 425.99
  - 1986-87: 505.50
  - 1987-88: 575.51
  - 1988-89: 697.87

### Sales Turnover:

- **Public Sector**
  - 1984-85: 32,771.20
  - 1985-86: 35,361.80
  - 1986-87: 37,199.84
  - 1987-88: 41,968.02
  - 1988-89: 46,662.48

- **Private Sector**
  - 1984-85: 29,199.60
  - 1985-86: 32,584.30
  - 1986-87: 41,863.75
  - 1987-88: 49,838.68
  - 1988-89: 54,208.36

- **Total**
  - 1984-85: 61,970.80
  - 1985-86: 67,946.10
  - 1986-87: 79,063.59
  - 1987-88: 91,806.70
  - 1988-89: 1,00,870.84

### Research & Development Expenditure as % of Turnover:

- **Public Sector**
  - 1984-85: 0.52
  - 1985-86: 0.56
  - 1986-87: 0.63
  - 1987-88: 0.69
  - 1988-89: 0.77

- **Private Sector**
  - 1984-85: 0.72
  - 1985-86: 0.70
  - 1986-87: 0.64
  - 1987-88: 0.58
  - 1988-89: 0.62

### Sources:

same declined to some extent in case of private sector. From 1984-85 to 1987-88 though in absolute terms the amount of expenditure for Research and Development in the industries under private sector increased, nevertheless, in relation to the sale it showed a declining trend.

Again in Table 4 that follows an attempt has been made to show the per capita Research and Development expenditure and expenditure for Research and Development as a percentage of Gross National Products in a number of developed and developing countries. It will be noticed from the Table that most of the developed countries spend 2% to 5% of their Gross National Products for Research and Development. But in the developing countries this figure is very marginal. For India this figure in 1988 had been only 1.0%.

Again when per capita Research and Development expenditure for India in US dollar had been 3.06 in the year 1988, the same figure for US$ 308.674/1983, US$ 494.304/1986, the developed countries like Japan, U S A, U K and U S S R had been US$ 177.88 in 1983 and US$ 153.80 in 1986 respectively.

The Object and Scheme of the Work:

From what have been stated so far it is crystal clear that expenditure for Research and Development in the business and industries in India are on the increase from year to year. From the nature of these expense and the time of their incurrence, it is apparent that accounting treatment may pose some practical difficulties and wide
Table - 4: Showing Per Capita Research & Development Expenditure and Expenditure on Research & Development as a Percentage of GNP in the Selected Countries

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Country</th>
<th>Per Capita Research &amp; Development Expenditure in US $</th>
<th>Per Capita GNP in US $</th>
<th>Research &amp; Development Expenditure as % of GNP</th>
</tr>
</thead>
</table>


Note: Figures in brackets indicate Year.
divergence may be noticed between inter and intra industries. It is because of these difficulties that the accounting for Research and Development costs has become a subject matter of wide controversy. Three methods are currently used for dealing with the Research and Development costs. One of them is to treat the Research and Development cost as expense on the ground that research is vital to maintain industry ranking. The second one is to capitalise and to amortise the costs over the expected product life. The third one is to defer only costs of probably commercial success.

Each of the aforesaid treatments has arguments and counter arguments. Those who argue in favour of expensing out the Research and Development costs find the logic of such treatment in the following:

(i) uncertainty about future benefits;
(ii) lack of casual relationship between expenditures and benefits;
(iii) its inability to meet the accounting concept of an asset;
(iv) difficulties of applying matching concept;
(v) its devastating effect on the financial stability of a firm undertaking the expenses should no worthwhile benefits accrue to it in future.

But charging the Research and Development costs to the current period as an expense on revenue basis creates some difficulties also. For example, profits current will be low; interpretation of financial statement through ratio
analysis will be rendered sterile; distorts profitability, net-worth and capital employed in the enterprise; affects Government's collection from taxes on business profits.

Again as profits will be reduced there is a great chance for decreasing further investment and earnings of the shareholders with impact on firm value.

The situation gets complicated further because Government grants various tax concessions for the promotion of Research and Development at firm level besides granting subvention the condition for which has impact on accounting treatment. It is therefore argued that correct approach to deal with Research and Development costs will be to capitalise such costs.

Those who advocate amortisation of Research and Development costs argue:

(i) That the increase expected in the earnings in the future is due to the efforts of Research and Development and so future periods should bear a legitimate share of such expenses.

(ii) Charging the expenses in the current period results in wide fluctuations in costs and profits.

(iii) When a patent results from Research and Development, it is but reasonable that the cost of the patent should be amortised in future years which receive benefit from it.

(iv) It is not correct to charge expenses
not directly related to current activity, to current costs and
profits. The third process, it would be recalled is
to defer only costs of probably commercial success. The arguments
that are adduced in favour of capitalisation and subsequent amor­
tisation are also applicable for deferment of Research and Develop­
ment costs, the only difference being the time span over which
such costs are to be written off.

What is more interesting is that some prac­
tices for the accounting treatment of Research and Development
costs have already developed in a number of countries, e.g. Australia, Canada, Germany, Japan, U.S.A., U.K., Ireland etc. In the
mean-time an International Accounting Standard (I A S - 9) has also
been issued by the International Accounting Standard Committee. Fo­
llowing that some regional standards in this regard have also been
developed. As for instance India. In India, Accounting treatment of
Research and Development costs is covered by Accounting Standard
8 (AS-8). The standard identifies items of costs which comprise Re­
search and Development costs, lays down conditions under which
Research and Development costs may be deferred and requires spe­
cific disclosures to be made in the Annual Report regarding Resear­
ch and Development costs.

14. N.K. Prasad, Principles & Practice of Cost Accounting, Book
Syndicate Private Limited, Calcutta - 700 009, pp.16-33.
India is one of the leading developing countries in the World. Hence, Research and Development costs are not uncommon in the enterprises both in the private and public sector though the development is comparatively of recent origin. In the context of what have been stated above regarding the problems relating to the accounting treatment of costs for Research and Development, it will be worthwhile to examine the Indian practices in this regard and to suggest its stream-lining, if found necessary, from the study. To be most specific, the objective of the study is to examine the following issues taking them as the parameter of accounting practices in respect of Research and Development costs:

(i) Whether the Accounting Policy Statement contains any information about Research and Development, particularly when Accounting Policy Statement has become an integral part of the reporting practices of the corporate undertakings in India with effect from 1st of April, 1991.

(ii) How the total Research and Development costs are treated in Profit and Loss Account and Balance Sheet for reporting purposes?

(iii) Whether the schedule of expenses forming a part of profit and loss account contains information on Research and Development in details as to its break-up in the schedule.

(iv) Where a part of Research and Development costs is capitalised and carried to Balance Sheet, how is the capitalised cost shown in the list of assets?
(v) Whether under the category of fixed assets in the schedule, the Research and Development items are shown as a separate one?

(vi) What has been the statutory disclosure requirement in respect of Research and Development and to what extent is this followed by the Companies in India?

(vii) Whether there is any difference in respect of reporting practices centering round Research and Development costs in the public and private sectors.

(viii) Whether Research and Development costs are shown in 'Notes on Accounts' schedule.

(ix) Whether the undertakings reporting for Research and Development are following Accounting Standards issued by the International Accounting Standard Committee (IAS-9) and Accounting Standard Board in India (AS-8) on accounting for Research and Development costs.

To this end, the study will examine the practices in this regard over the five years between 1985-86 and 1989-90 in twenty companies, selected at random, from the cross section of Indian industries such as Pharmaceuticals, Chemicals, Iron and Steel, Cement, Engineering, Electricals, Electronic and Telecommunication industries belonging both to the private and public sector with an average annual turnover ranging between Rs.1.61 crores and Rs.1627.6 crores in case of private sector and Rs.117.92 crores and Rs.5,566.63 crores in case of public sector respectively. The range
of turnover of the selected sample companies appears to be very wide. This is mainly because of the fact that Research and Development activities are not a common phenomena among the rank and file of Indian industries especially in the private sector. Hence, in the selection of sample this aspect had to be ignored which we presume as a limitation of our study. The disparity between turnover of the companies under private and public sectors which have been selected as the samples for the study is mainly because of the fact that the public sector companies in India are generally giant in size and in many cases have monopoly control over the Indian market. Another significant point to note that the period of our study of the accounting practices in India in respect of the treatment of Research and Development costs falls within the period when there was no Accounting standard to be followed under mandatory order. Incidentally, it may be stated that Accounting Standard for the treatment of Research and Development costs issued by Accounting Standard Committee in India (AS-8) only has been made effective from 1st of April 1991. Information relating to the Indian practices will be collected by the issue of questionnaires and through personal interviews of the Executives in charges of Accounting and Finance. The study will also draw heavily from the existing literature on the subject including the Accounting Standards that have been issued by the International Accounting Standard Committee (IAS-9) and by the Accounting Standard Board in India (AS-8). Recourse will also have on published and unpublished records of the selected corporate enterprises
whenever possible. The gamut of the present exercise being the examination of the issues involved in respect of accounting practices of Research and Development costs in the Indian industries, no attempt is being made here to find out the impact of Research and Development on the transfer of foreign technology in India with all its other consequences. This we presume to be a separate field of investigation and research and as such falls beyond the purview of the present study.

The present study will be divided into following chapters:

1. Introduction
2. Importance and Place of Research and Development Division in the Organisation Structure of Indian Industries
3. Concept of an 'Asset'
4. Classification of Assets and Valuation of Intangibles
5. Concept of an 'Expense'
6. Budgeting and Controlling of Research and Development Expenses - The Indian Practice
7. Present Accounting Practices in Regard to Treatment of Research and Development Expenses in the Corporate Sector in India
8. Conclusion and Recommendations