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Chapter 1
Introduction

1.1 Introduction to the research topic

Career Development and Retention is more common issues of concerned particularly in every house, organizations, industries, etc. It is directly connected to the individuals who always wanted to be on the upward side from their beginning point, whether it is education or work. We can find closer definition of career by Arthur, Hall and Lawrence (1989)\(^1\) that evolve the sequence of persons work experience over a period of time. Each individual has certain things in mind some time planned but majority of them are unplanned. Many writers, thinkers and philosophers have put in their ideas and thoughts about career and written several books for guiding individuals and organizations about career development. There are several of them who have also highlighted about retention of such developed talent in their respective area.

The topic selected for research is more focused to the Career Development and Retention of Research Employees carrying out their research in the selected Research Institutes. Research in various fields is well thought and ongoing process across the globe. Every country wants to design and develop a research programme by involving expert people to contribute in the national or international development with their novel ideas and innovations. At the same time these Research Institute attract young students in the field of research and development. The topic selected for research study typically brings out few factors influencing the career development of such researchers working in selected research institutes and also the programmes designed by these institutes for retention of such talent within their institutes.

\(^{1}\)Arthur, Hall and Lawrence in *Hand Book of Career Theory* (page 8)

http://books.google.co.uk/books?id=VsjaHqmE42gC&pg=PP1&dq=handbook+of+career+theory#v=onepage&q&f=false.
There are various factors that attract careers in research institutes. The study could find who Research Employees are and what exactly they do. How they are recruited and what is career path available to them. Human Resource Practices and Programmes followed in such research Institutes and their efforts for career development and retention of research employees. Interestingly the research study was able to find useful information about why researchers leave research institutes.

1.2 Research Institutes

Research Institutes is an organization meant for doing research activities. It may be involved in either basic or pure research or may be in the applied research. One can find research institutes in social sciences or management. As mentioned in the Wikipedia “Science is a body of empirical, theoretical, and practical knowledge about the natural world, produced by scientists who emphasize the observation, explanation, and prediction of real world phenomena.”\(^2\) As defined in the Wikipedia, the free encyclopedia, Research Institute is an establishment endowed for doing research\(^3\). Research Institutes may specialize in basic or fundamental research or may be oriented to applied research.

In the early period there are evidences of having few astronomical and mathematical observatories in countries like India, Greece, Baghdad, China, etc.\(^4\) Research Institutes in modern Europe were also there but there was enough progress seen continuously. In 17\(^{th}\) century as a part of scientific revolution, Research Institutes in St. Petersburg was the first institute established to conduct scientific research with the structure of university. 19\(^{th}\) and 20\(^{th}\) centuries many institutes like Rockefeller Institute, Carnegie

\(^2\) http://en.wikipedia.org/wiki/History_of_science
\(^3\) http://en.wikipedia.org/wiki/Research_Institutes
Institute of Washington and the Institute for Advanced Study were established\(^5\). In 1930s the need for establishing research organizations for the development of natural resources and new industries in India began to emerge.\(^6\) In India, there is a deep history of research in the field of Mathematics and natural sciences. In India one can find scientific structure like Jantar-Mantar in Delhi and Jaipur, which have been used for research.

After the independence period, the Government of India has started establishing research institutes in India. The Government has to take lead in funding these institutions as no one from private or corporate was ready to have fundamental research institutes.

Scientific research and development in India is seen since 1947 i.e. after the independence where it received substantial political support and funding from the government through a five-year plan. As a result, India has experts in such fields as astronomy and astrophysics, liquid crystals, condensed matter physics, molecular biology, virology, and crystallography. Observers have pointed out, however, that India's emphasis on basic and theoretical research rather than on applied research and technical applications has diminished the social and economic effects of the government's investments. In the mid-1990s, government funds supported nearly 80 percent of India's research and development activities, but, as elsewhere in the economic sector, emphasis increasingly was being put on independent, nongovernmental sources of support.\(^7\)

As pointed out by James Heitzman and Robert L. Worden, One of the most famous scientists of the pre- and post-independence era was Indian-trained


\(^6\) http://en.wikipedia.org/wiki/Council_of_Scientific_and_Industrial_Research

Chandrasekhara Venkata (C.V.) Raman, an ardent nationalist, prolific researcher. He was a director of the Indian Institute of Science and founded the Indian Academy of Sciences in 1934 and the Raman Research Institute in 1948. Another leading scientist was Homi Jehangir Bhabha, an eminent physicist internationally recognized. He with financial assistance from the Sir Dorabji Tata Trust, Bhabha established the Tata Institute of Fundamental Research in Bombay. Other eminent pre-independence scientists include Sir Jagadish Chandra (J.C.) Bose, Meghnad Saha, Satyendranath (S.N.) Bose, Prafulla Chandra Ray and many others who have contributed Indian research and development through their research work and institutes established.

At the onset of independence, Nehru called science "the very texture of life" and optimistically declared that "science alone . . . can solve problems of hunger and poverty, of insanitation and illiteracy, of superstition and deadening customs."

One of the early planning documents was the Scientific Policy Resolution of 1958, which called for embracing "by all appropriate means, the cultivation of science and scientific research in all its aspects--pure, applied, and educational" and encouraged individual initiatives. Scientific Resolution Policy 1958-59 emphasize about careers ' To ensure that the creative talent of men and women is encouraged and finds full scope in scientific activity'8.

In 1983 the government issued a similar statement, which, while stressing the importance of international cooperation and the diffusion of scientific knowledge, put considerable emphasis on self-reliance and the development of indigenous technology. Science and Technology Policy 2013 of the Government of India mentioned about ‘Making careers in Science, research and innovation attractive enough for talented and bright minds.9


9 http://dst.gov.in/stsysindia/stp2013.htm
1.3 Functioning of Research Institutes

In India, science and technology policy and research have largely been the domains of government since 1947 and are largely patterned after the structure left behind by the British. Within the central government, there are a top-down apparatus and a plethora of ministries, departments, lower-level agencies, and institutions involved in the science and technology infrastructure. The Government through its various departments established various research institutes in India. There are few basic criteria for establishing any research institutes that government has followed.

Figures 1.1 and 1.2 show an example of organizational charts of one of the institutes from national and international levels.

Figure 1.1: Organization chart of one of the Indian research institutes

![Organization chart of one of the Indian research institutes](http://www.tropmet.res.in/static_page.php?page_id=102)
1.3.1 Autonomy is necessary:

There are mainly two types of research institutes i.e. Fundamental or Basic and Applied. The fundamental research institutes are generally established by the Government under the respective department. The main aim for setting up of research institutes is to achieve scientific development and growth which in turn results in the national development.

Overall functioning of these institutes is left to the management board/governing councils who will ensure that there are research facilities created and used by research employees. After a proper procedure and approval of the competent authority, the Senior most Research Employees is appointed.

Source: https://science.nrao.edu/about/organization
as the Director. Functional autonomy is given to such research institutes so that there are smooth research operations.

1.3.2 Scope of Autonomy for academic:

The autonomy is given with a specific goal and purpose. It aims that research institutes to adopt innovative and flexible management approaches to quickly move forward on a promising new idea in a selective manner. It is also clear that the research institutions would need to scale up with a comprehensive research infrastructure to address various dimensions of research and technology needs of the country.

Scope includes certain procedural flexibility in building infrastructure, procurement of research equipments in time without going for government norms which may cause delay, etc. Scope also includes designing and jotting down a programme to engage research employees, their career development, motivational programmes, good human resource practices, possible monetary and non-monetary benefits. Every Institute is allowed to do so depending on the nature of their research area and feasibility.

1.3.3 Rules and By-laws – Adopted and approved by the Statutory Authority:

Research Institutes design and develop their rules and bylaws for their smooth functioning. Sometimes they adapt certain rules designed commonly by the government. Sometimes they take it from some other institutes. Once these set of rules and bylaws are framed, they are adapted as a base for many other policies and programmes in the research institutes.

Such rules and bylaws are the basis for day to day running of institute, recruitment of directors, administrators, research employees, career development programmes for employees, plans for development of research facilities, other scientific and technical developments, etc. Many office orders, standard operating procedures are designed on the basis of these rules and bylaws.
1.3.4 Management Board/Governing Council,

Once the institutes are established, the government appoints a Management Board and/or Governing Council to monitor and to run the research institutes and its activities through a Management Board. Management Board includes expert members from inside the organization or from other institutes. In their periodic meeting they discuss issues related to day to day operations. The decisions become part of updated rules and bylaws. Figure 1.3 shows an example of an organization chart.

Figure 1.3: Organization chart for Management Board
1.3.5 Decision Authority – Director

Generally, the Director under the guidance of Management Board and/or Governing Council executes the programmes approved for running of the research institutes. The Director is empowered to appoint further staff members in the institutes and its financial aspects.

1.3.6 General Organization Chart

Typically research institute will have their own style or type of organization chart. Figure 1.4 shows the general structure of organization chart observed in Indian research institutes.

Figure 1.4: Organization chart in the Research Institute
1.3.7 Academic (Scientific) and Administration – two wings

There are two types of wings function under the leadership of the Director. Academic wing under the leadership of Deans carries out research activities through their research employees. The Administrative wing provides active support to research programme. Every organization has a different chart of organization. Figure 1.5 on the next page shows the organization chart of one of the NASA organizations’ departments.
Figure 1.5: NASA organization chart showing Transformed Structure

Figure 1.6 shows organization chart of Indian research institutes with hierarchy of administrative, academic and financial powers to run such institutes smoothly.

Figure 1.6: Organization chart of Indian Satellite Research Organization

Source: http://www.iirs.gov.in/organisationstructure
1.3.8 Various Committees

The Director appoints various committees who will advise and recommend developmental programmes which help smooth functioning of research institutes. These committees include, Academic Programme Committee, Purchase Committee, Works Committee, Administrative & Finance Committee, etc.

Figure 1.7 shows a general hierarchy Chart of a committee in research institutes.

Figure 1.7: Chart showing a Committee in the Research Institutes

1.3.9 Autonomy for Recruitment, Administration and Development plans, etc.

While establishing the research institutes, the statutory authority allows certain autonomy in academic activities i.e. they have freedom to design and implement policies and programmes that help in creating research facilities, laboratories, etc. Research Institutes are authorized to design their recruitment policy, career development programmes, HR practices, working conditions, Budget, organizing conferences, deputation of employees, etc. Generally, research employees are recruited based on merit, skill, research output and deep
experience in their field of research. Figure 1.8 shows a typical advertisement for calling applications for research employees.

Figure 1.8: Format of Advertisement in Research Institutes

Source: [http://www.currentscience.ac.in/Volumes/107/02/0317.pdf](http://www.currentscience.ac.in/Volumes/107/02/0317.pdf)

1.3.10 Human Resource Practices in Research Institutes

Earlier and even now in most of the research institutes in India, the functions human resource departments were/are carried out by Administration or Establishment departments. The Research Institutes have now started giving importance to human resource functions. Research Institutes follows healthy research practices within the framework of their autonomy, following are some of the functions carried out by the Human Resource Department/ Establishment.
1.3.11 Recruitment & Selection

Recruitment policies for research employees are different than that of general employees. For general employees (other than research employees) they have to follow certain government norms for reservations. However, research institutes have autonomy in designing recruitment and selection norms for research employees so that they get best people to carry out their research activities.

1.3.12 Training & Development Programmes

Induction Training programmes, periodic lectures from the experts, various seminars, opportunity for everyone to get valuable guidance, up to date advanced data for reading and accessing purpose, books and periodicals, etc. are available for all research employees under the training and development programmes. Various types of conferences, seminars and workshops are organized through which research employees get an opportunity to exchange their ideas and gain knowledge.

1.3.13 Motivational Programmes

Research Institutes due to their autonomy have introduced certain monetary and non-monetary benefits to its employees. Monetary includes other than salary benefits include Leave Travel Concession, Book Allowance, Performance Related Incentive Scheme (PRIS), Knowledge Update Allowance, etc. Non-monetary benefits include deputing research employees to conferences and seminars those are held in India or outside India by paying all expenses, recognizing his research work for awards, making him authority in certain academic programmes, longer vacations, flexible working hours, exposure to research facilities, advanced laboratory equipments, Laptops and Computers, etc.
1.3.14 Welfare Facilities:

In addition, research employees are provided Housing facility. Majority of research institutes build or hire housing accommodation for their research employees. It is essential so that they can devote more and more time on research activities. Along with housing facility, medical facility is also provided to all research employee and their close dependants.

1.3.15 Career Development

Once the research employee join the organization, based on performance during the certain period (number of years), he or she is promoted to the next level. He or she rises in the hierarchy in the same organization. Sometimes they hold key positions within the organization. There are various programmes designed and implemented by the research institutes. The same have been discussed and described in the Chapter 5 under data analysis.

1.3.16 Retention programmes

Research Institutes also ensure that the research employees remain in the research institutes. Through the retention programme, authorities in the research institutes ensure that official needs of research employees are catered for. They design, develop, upgrade and maintain high class of state-of-art research facilities, laboratories, etc. Research Institutes also organize feedback meetings to strengthen their retention programmes.

1.3.17 Functions for Administration Department:

The Administration Department plays supportive role in the research institutes. Figure 1.9 shows the Administrative hierarchy chart in the research institutes. The administrative functions briefly include budgeting, accounting, procurements and inventory. General administration takes care of welfare facilities such as hostel, housing, medical, travel, recreation, organizing seminars, etc.
Figure 1.9: Hierarchy Chart of Administration in the Research Institute
1.3.18 Wage and Salary Administration:

The Government pays salary to all research employees. Pays are fixed and approved by the research institutes as per the central government norms. Along with salary, certain allowances are also decided by the Institutes based on the approval of the government. To attract new research employees, for career development and a part of the retention programme, the research institutes pay Performance Related Incentive Scheme (PRIS), Update Allowance, Book Allowance, Contingency allowance, Travel allowances, Deputation Allowance, etc.

1.4 Role of Government in Research Institutes:

Government-administered science and technology emanate from the Office of the Prime Minister, to which a chief science adviser and the Science Advisory Council, when they are appointed, have direct input. The prime minister de jure controls the science and technology sector through the National Council on Science and Technology responsible for ocean development, atomic energy, electronics, and space. Other ministries and departments also have significant science and technology components and answer to the prime minister through their respective ministers. Among them are agriculture, chemicals and fertilizers, civil aviation and tourism, coal, defense, environment, food, civil supplies, forests and wildlife, health and family welfare, home affairs, human resource development, nonconventional energy sources, petrochemicals, and petroleum and natural gas, as well as other governmental entities.  

The National Council on Science and Technology is at the apex of the science and technology infrastructure and is chaired by the prime minister. The integration of science and technology planning with national socioeconomic planning is carried out by the Planning Commission (see Development Planning, this ch.). Scientific advisory committees in individual socioeconomic

ministries formulate long-term programs and identify applicable technologies for their particular area of responsibility.\textsuperscript{11}

Based on the recommendations of the governing council and the finance ministry’s clearance, the government establishes a research institute under a special statute. While establishing such institutes, the government takes care of Project sanction, Manpower sanction, Grants / Funds for Plan and Non plan Expenditure. They also have a stipulation of an auditing the financial aspects

1.5 Dependency on the Government Funding:

The pure or fundamental research institutes are to be supported by the government only. India's largest private company by market value, Reliance Industries, spent a negligible 0.16% of its Rs 2,11,727 crore revenues on R&D, while L&T, the bluest of blue chip engineering companies, invested 0.21%. By comparison, Petro bras and Petro China, two companies from emerging markets in a comparable industry as Reliance, spent 1.3% and 1%, respectively. Siemens, the German engineering giant, spent 5% of its $5 billion revenues on R&D.\textsuperscript{12} The research institutes are fully dependent on the Government funding. They require funds for creating research facilities, for development, upgrade, and maintain such research facilities, for entering into collaborations with other institutes, for paying salary, allowances, deputations to foreign countries, buying laboratory equipments, building new laboratory buildings, buying furniture and capital equipments, etc.

Recently, in the 99\textsuperscript{th} Indian Science Congress (ISC), Prime Minister of India

\begin{itemize}
\end{itemize}
Dr. Manmohan Singh said that “Over the past few decades, India’s relative position in the world of science had been declining and we have been overtaken by countries like China." The prime minister also emphasised the need for increasing spending in the science sector. "As far as resources are concerned, the fraction of GDP spent on research and development in India has been too low and stagnant. We must aim to increase the total R&D spending as a percentage of GDP to 2% by the end of the 12th Plan Period from the current level of about 0.9%,"\textsuperscript{13}

Government’s approval is very much necessary for autonomy in procedures, policies, etc. Research Institute also needs certain freedom for running day to day activities of the institute which includes fast tract purchases, deviation of certain norms, flexible procedures, and flexibility in utilizing funds for scientific research. Figure 1.10 shows funding by the Department of Science and Technology (DST), Government of India to a research Institutes.

\textsuperscript{13} http://economicsdoodle.blogspot.in/2012/01/indias-r-expenditure-as-percentage-of.html
1.6 Creating and using (Exposure) Research Facility:

Once the funds and grants are sanctioned, research institutes create research facilities. To set up these facilities, experts from various fields are invited. Faculties are appointed based on experience so that they can guide research employees. It is also necessary to give exposure of such research facilities to Research Employees who use this facility and produce results.
1.7 **Research Activities in Research Institutes:**

Research Institute has 24X7 working model i.e. research employee carry out their research activities day and night round the clock. All laboratories and computer labs are open all the time for them to continue their working all the time.

Research Institutes try to maintain better working conditions. They try to provide adequate resources for research employees to work and carry out their research activities. Research Employees prefer to work any time and hence provision of flexible working hours is made.

Well-equipped laboratories and advanced Computer facilities are key requirements of any research institute and these are the main factors for career development of research employees.

1.8 **Collaborations with Other Research Institutes:**

Research Employees working in one research institute collaborate with other research employees in other institute. They participate in the meetings and conferences organized by other research institutes and share their result through their talk or poster presentation. Research Employees on their own visit other research institutes to gain more knowledge from their experts and also for giving or listen a talk of other expert senior research employee.

1.9 **Collaborations with International Research Institutes:**

Sometimes research employees are invited by the International Research Institutes in their conferences or for a special event. Research Employees get financial support for this kind of visit and share their knowledge with the international research institute.

Research Employees are also deputed to International Research Institutes on the support of their parent research institute to attend meetings and conference.
This kind of support results in motivation and employee satisfaction. These activities also help research institute to retain such talent within the institute.

Similarly, joint research programmes are worked out between national and international research institutes so that research employees gain knowledge from experts. Research employees for such institutes visit each other to enhance research activities for better understandings.

1.10 Difficulties and problems faced by the Research Institutes:

Research Institutes face lot of difficulties due to insufficient funds from the government. Government may not give total funds required by the research institute. Due to this research institutes cannot create or upgrade research facilities. Research facilities are soul of any research institutes because career development and retention programmes are dependent on such facilities. Absence of research facility affect career development of research employees in research institutes.

Due to inadequate funds, research institute cannot give monetary assistance sufficiently to research employees. Even if research employees are more concerned about research work than monetary benefits, money plays an important role for building research facilities, organizing national and international conferences, etc.

Government while granting funds imposes too much bureaucratic procedure on the research institutes. This creates delay in procurement of laboratory equipments which are essential part of research facilities. Due to this certain activities are not completed in time due to procedural delay. Getting panicked because of this, research employees think to leave such institutes.

If Government does not give funds or grants and due to this if the research institute do not create or upgrade research facilities, then research employees leave such research institutes and join some other research institute.
1.11 Career and Career Development in research institutes:

Attracting and retaining young meritorious students in science and technology is a major concern. These entire institutes one can find a common thing that they want young students to come and join them for doing research activities. Depending on their research work, they will be getting their Doctor of Philosophy degrees. In short, these institutes are producing Scientists or Researchers in the respective fields. For guiding these students towards their research, there are senior researchers called ‘Faculty’ working in a dual role. These senior researchers not only guide young students in their research activities but also they themselves carry out their own research. The main importance of such institutes is to produce quality research papers out of their research.

There are different types of recruitment types and formalities followed in such institutes. An advertisement in the new papers and on the website is common. Since these institutes want academically talented students for doing research, they conduct written test and personal interview for the short listed students. For the past few years, some of these institutes particularly in India, they are not finding enough students to join.

To overcome this problem, few research institutes have joined together to get more students in the research filed. They conduct an entrance test together at various centers in the country. Because of this, student can write exam as per their choice of center.

1.12 General Career Path in Research Institute:

Some of the senior professors get additional academic-cum-administrative responsibility on the positions like Dean, Director, Chairman, etc. Figure 1.11 on the next page shows the career path in research institute like NCRA, Innovation and Technology, Chapter 8, http://www.planningcommission.nic.in/plans/planrel/fiveyr/11th/11_v1/11v1_ch8.pdf
1.13 **Required Qualifications for a Career in Research Institute:**

Research Employees MUST have completed postgraduate Science or Technical degrees in their field. Researcher positions at institutes, colleges and universities generally require Ph.D.s, while master's degrees are sometimes acceptable for jobs in the public and private sectors. Research Employees include biologists, chemists, computer scientists, environmental scientists, medical doctors, physicists, anthropologists, historians, political scientists and sociologists, among other professionals. Research Employees are naturally curious to find out something new. Research Employee requires analytical skills and attention to detail in order to design procedures and record results accurately. They require excellent communication and writing skills.
1.14 Career Development of Research Employees:

There are certain set of rules and procedures followed in research institutes for career development of research employees. Typically, the career growth depends on the number of years spent in a particular grade or post and overall performance. Once these conditions are met, the individual research employee is considered for promotion and his potentials are discussed in high level committee, which then recommends next level of promotion to the research employee. There are questions which need to be answered by the research employee to prove that his performance is the best.

One of the important factors for career development is Job Security. Everyone wants to settle in the working life. If Job Security is provided or assured, then employees try to devote more time on their work. The same is the case of research employees. If job security is provided, the research employees work hard, put extra efforts on their research activities. They do not have to find other institute for better and secured job position.

1.15 Need for Retention in Research Institutes:

The Institutes’ reputation depends on the quality of talented personnel they have in the research. The Research Institutes apply various strategies for providing better working conditions, improving research facilities, providing other facilities like housing, medical, welfare, updated library, electronic equipments, etc. required for research activities; to retain the research employees in their own institute. The research centres carry out research and development. While the research centres focus more sharply on technology and product development, the grant-in-aid institutions concentrate relatively more on basic research.

The country’s development depends on the technological and research development. Every country wants to design and develop a research programme by involving expert people to contribute in the national or international development with their novel ideas and innovations. The goal of
every Research Institute is to engage people in the field of research and development. These institutes implement the monetary and non-monetary aspects to motivate and retain such talented employees. The topic selected for research study will typically bring out the retention of such researchers working in selected research institutes and also the programmes designed by these institutes for retaining them. There are various reasons why research employees leave research institutes.

1.16 Programmes for Retention and Reasons for leaving:

Since the research institutes are autonomous bodies, they are empowered to design and develop their own programmes for recruitment, human resource practices, career development programmes and retention strategies. For these activities they get funds from the Government. So what are the advantages of these human resource practices to Research Employees working in such organizations? Even after such programmes, research employees leave research institutes and that required a study so as to understand what are possible reasons.

Research Employees have passion to do research for the country, strong academic interest, very simple leaving, etc. But at the same time they are not after money oriented jobs despite that they have better qualifications for those jobs. As rightly said in the article ‘Employee Motivation’ - For all the championing of alternative motivators, money still occupies a major place in the mix of motivators. This study found the other side of these research employees. They are more concerned about their research work. They feel that job satisfaction is more important than monetary benefits. The main reasons for their leaving are lack of proper recognition to research work, non-availability of state-of-art research facility, absence of facilities like housing, medical, etc.

1.17 Need for selecting the topic for research:

i. Research Institutes have different aims and goals. Their working and functioning style is different than other commercial industrial units. There are mainly two types of research Institutes exist in India i.e. Fundamental Research Institutes (Basic or Pure) and Applied Research Institutes. They get funds or grants from various sources to carry our certain research activities in the global interest. Sometime the nature of research activities is very specific. They have fully equipped laboratories and expert senior researchers working with them. These institutes attract many bright and brilliant students called Research Scholars to pursue research work in their laboratories. They offer monetary and non-monetary benefits to these students and researcher. They also design different working conditions and motivational programmes in such research institutes.

ii. “First, I am concerned by the fact that our best minds are not turning to science, and those who do, do not remain in science. On the one hand, we are truly proud of the fact that this year, all the nineteen young boys and girls who represented India in Olympiads, came back with medals. On the other hand, our past record shows that practically none of such Olympiad medal winners pursued science subsequently as a career! We must reverse this trend.”

iii. Author from the National Knowledge Commission (Sam Pitroda, Chairman) in India pointed out to the Prime Minister emphasizing that a strong foundation in the pure sciences is essential to transform India into a knowledge superpower. Unfortunately, as the economy grows, fewer students are opting for the pure sciences. This has led to a talent crunch, seriously impeding the development of the future generation of scientists and teachers. We are aware that this is a world-wide

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phenomenon, but countries like China and South Korea, having invested prudently in science education, are now beginning to reap rich dividends. The Prime Minister of India also responded saying “Today we in India are experiencing the benefits of the reverse flow of income, investment and expertise from the global Indian Diaspora. The problem of “brain drain” has been converted happily into the opportunity of “brain gain.” –Manmohan Singh, Prime Minister of India.17

iv. It is essential to bring out such information about the career development of researchers carrying out research activities in these institutes. As far as the topic is concerned, we hardly find any research done in the social science particularly related to Researchers and their career development. Few research organizations have themselves come out with report and need to have researchers in the pure research. The Advisory committee of India also gave a status report to the Government of India highlighting need of researchers in the country.

v. Considering this gap there is a need to take up this topic for research. In addition, the following points are also needed to be studied:

a. Various efforts taken by these institutes to attract and recruit researchers
b. Career Path available to these researchers
c. Monetary and non-monetary aspects followed in such institutes
d. Welfare facilities provided by these institutes
e. Human Resource Practices followed in these institutes
f. Career Development programme implemented in these institutes
g. Various programmes developed to retain researchers in these institutes
h. Motivational programmes that satisfies researchers

17 Prime Minister’s speech in 97th Indian Science Congress, jerala, Release ID: 56582, Press Information Bureau.
i. Reasons why researchers leave research institutes
j. Bring out some suggestions based on the findings and conclusions.

vi. After going through literature and few research papers on career development and retention, it is noticed that they are all about industries and corporate section. No research is carried out by any student of any university, on the topic selected for this study. However, such Research Institutes prepare their Annual, Periodic reports and bring out various facts to the knowledge of the government.

vii. The principal Advisor of the Government of India along with Department of Science & Technology, National Knowledge Commission, (Report 2008-09) have submitted report about engaging more people into research organizations. Everybody emphasized that there is need to grow research activities in the research organizations.18

viii. In the newspapers (DNA, 22/8/2014) the Director General of DRDO mentioned that in India only 4 out of 1000 students opt for Research while in Japan 110 out of 1000, Germany 76/1000 and Korea 46/1000 is the ratio and therefore we need to seriously increase careers in this fields. Times of India dated 6th Dec 2012, reported that 700 scientist left the DRDO due to poor salary, no challenging work, lack of recognition to research work, etc.. The Hindu newspaper reported that there is need of 68% more full time researchers in fundamental research than the present one.

ix. Research Institutes have different aims and goals. Their working and functioning style is different than other commercial industrial units.

The Fundamental Research Institutes get funds or grants from the government to carry our certain research activities in the global interest. They have fully equipped laboratories and expert senior researchers working with them.

x. The Autonomous institutes get autonomy in running their activities and framing their own policy for recruitment and career development of research employees. These institutes attract many bright and brilliant personnel to pursue research work in their laboratories. They offer monetary and non-monetary benefits to these researchers. They also design different working conditions and motivational programmes in such research institutes.

xi. It is interesting to study their Human Resource Practices particularly for career development and retention of research employees. Considering this gap there is a need to take up this topic for research with the objectives mentioned in the study.

1.18 Definitions and Nomenclature:

There is a need to clarify certain interpretations of the following words used in this study:

1.18.1 Research Employee:

“Research Employees” means and includes the officials or personnel working in research institutes and designated as Junior Research Fellow, Senior Research Fellow, Research Scholar, Research Trainee, Research Associate, Reader, Fellow, Associate Professor, Professor, Scientific Officers, Scientists, Researchers, etc. Any of these terms represent the Research Employee in the thesis.
1.18.2 Research Institute:

“Research Institutes” means and includes the organizations where research activities are carried out. There are different types of terminologies for Research Institutes such as Research Centre, Research Unit, Research Organization, Research Laboratory (Lab), etc. All of such represents ‘Research Institute’ in this study.

1.18.3 Selected Research Institute:

“Selected Research Institute” means and includes the Autonomous Research Institutes in Pune in the field of fundamental research and functions under various departments of the Government of India except the defense department. These Institutes are selected from Pune city. The data is collected for narrating their profiles and needful inputs for this research study purpose. Also the data is collected from samples (Research Employees - working or carrying out their research in these Institutes).

1.19 Aim and Objectives of the Study:

i. **Aim:** To carry out research study and understand about career development and retention of research employees working in research institutes.

Since the study is about Career Development and Retention of Research Employees in the selected Research Institutes, the following are objectives:

i. **To study various factors attracting careers in research institutes.**

Different types of research institutes have different types of factors to attract careers in their research institutes. It is important to study these methods and factors in such institutes.

ii. **To study existing Human Resource Practices for Career**
Development and Retention of Research Employees in research institutes.

Human Resource policies designed by any organization are very much important for benefit of its employees. The better policies help getting better human resources in the organization. Every organization designs certain human resource policies for career development of research employees, which needs to be studied.

iii. To study effects of monetary and non-monetary aspects in research institutes.

Every Institute pays salary and allowance to its employees. Research employees also get monetary benefits as their monthly salary. In addition, they get certain facilities from the institutes which are also important for an employee. It is necessary to study monetary and non-monetary benefits paid to such employees and its overall effects.

iv. To study the difference in thinking of male and female research employees about the career development and retention.

In every research organization we find that both male and female employees are carrying out their research work. It is interesting to find out about their thinking on career development and retention from their perspective.

v. To study various reasons for research employees to leave the research institutes.

Due to globalization in every field and across the globe, Research Employees are most wanted and they are bound to get jobs anywhere. It is important to study reasons why such talent leaves research institutes.
1.20 **Hypotheses formulation:**

Based on the pilot study outcome and understandings, the following Hypotheses have been formulated.

H1: Research Employees feel that Salary is more important than research work.

H2: Career Development does not depend on Research work

H3: Absence of research facilities and its exposure does not affect career development and retention.

H4: Non-monetary recognitions result in employee satisfaction.

1.21 **Research Methodology:**

1.21.1 **Research Approach** – Pragmatic (both qualitative and quantitative),
Research Method - Inductive, Research Type - Descriptive and Empirical

1.21.2 **Research Institutes Selected for Study**: Selected Research Institutes are Autonomous Research Institutes from Pune. A survey with help of the website: [http://punetech.com/research-institutions-in-pune/](http://punetech.com/research-institutions-in-pune/) was made and the following institutes are selected based on the possibility of getting data and information.

i. National Centre for Radio Astrophysics (NCRA), Pune

ii. Inter University Centre for Astronomy and Astrophysics (IUCAA), Pune

iii. National Centre for Cell Science (NCCS), Pune

iv. National Institute of Virology (NIV), Pune

v. Agharkar Research Institute (ARI), Pune

vi. National Aids Research Institute (NARI), Pune

vii. Indian Institute of Tropical Meteorology (IITM), Pune
1.21.3 Data collection Methods & Instruments

a. Primary Data Collection:

The primary data collected from these Selected Research Institutes in Pune from official sources. The following methods used to collect the data.

i. Questionnaire
ii. Personal discussions
iii. Interviews

b. Secondary data collected from relevant information sources such as:

i. Published material, books, etc.
ii. Information from Library
iii. Policy Documents and records
iv. Internet, etc.

c. The information from the Research Employees was obtained through a questionnaire based on 5 point Likert scale. Validity Test done using Cronbach Alpha.

1.21.4 Sampling Design:

i. Sampling Method: Non Probability Sampling
ii. Sample Type: Convenient Sampling
iii. Total Population form the above institutes 225 – Samples selected 142, using Krejcie and Morgan sample size table.
iv. Table 1.20.1 showing the numbers of sample selected from each of the research institute (Population).
Table 1.20.1: Institutes selected for research study and sample selection.

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Name of the Institute</th>
<th>Total Research Employees</th>
<th>Selected for study</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>National Centre for Radio Astrophysics (NCRA)</td>
<td>27</td>
<td>17</td>
<td>62.96%</td>
</tr>
<tr>
<td>2.</td>
<td>Inter University Centre for Astronomy and Astrophysics (IUCAA)</td>
<td>35</td>
<td>22</td>
<td>62.85%</td>
</tr>
<tr>
<td>3.</td>
<td>National Centre for Cell Science (NCCS)</td>
<td>34</td>
<td>22</td>
<td>64.70%</td>
</tr>
<tr>
<td>4.</td>
<td>National Institute of Virology (NIV)</td>
<td>32</td>
<td>20</td>
<td>62.50%</td>
</tr>
<tr>
<td>5.</td>
<td>Agharkar Research Institute (ARI)</td>
<td>28</td>
<td>18</td>
<td>64.28%</td>
</tr>
<tr>
<td>6.</td>
<td>National Aids Research Institute (NARI)</td>
<td>16</td>
<td>10</td>
<td>62.50%</td>
</tr>
<tr>
<td>7.</td>
<td>Indian Institute of Tropical Meteorology (IITM)</td>
<td>53</td>
<td>33</td>
<td>62.26%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>225</td>
<td>142</td>
<td>63.11%</td>
</tr>
</tbody>
</table>

1.21.5 Data Analysis Methods:

i. For Central tendency of the data Statistical Technique like Mean, Mode
ii. For Dispersion of data: Standard Deviation & for Volatility of response Coefficient of variation is used.
iii. Testing Hypothesis: Non parametric data - Chi Square & KS test
iv. Software used : MS Excel and online Calculators
v. Results are interpreted in the way of Tables, Graphs and Pie charts
vi. Five (5) point Likert Scale questionnaire, sent to Research Employees was codified in numerical format for statistical analysis.
1.22 Problem Questions:

i. Why research employee choose career in such institutes and what are their goals?

ii. What are the problem areas for Research Institute to create more research facilities and other limitations?

iii. Why these people work for lesser money when they have other opportunities which may give them more money?

iv. Are they able to develop their working life in such organizations?

v. What are the monetary and nonmonetary benefits they get?

vi. Do they go abroad for getting more money? What are other reasons for leaving research organizations?

vii. What should be done to retain them in India?

1.23 Scope of the Study:

There are some fundamental research institutes carrying out various types of research in the country. Very few of them are in the private sector. Some of them are in Public sector while majority of them are of the government. Typically two types of research institutes one can find; one in the applied research and the other in fundamental or basic/pure research. In fundamental institutes also you find few institutes do theoretical research and on the other hand few institutes have state of art research facilities to practically carry out research.

This study is limited to the selected research institutes particularly in the field of fundamental research and which are Autonomous Bodies functioning under various department of Government of India. All these selected research
institutes are from Pune. These institutes are selected based on the convenience sampling. Since this may be the first time that such kind of research study is conducted on the topic, the information will be limited to samples from these institutes.

Though the study involves task of finding the factual information, the data is based on the inputs given by different types of researchers.

1.24 Impact of the Study (Expected):

The study is important based on all statistical analysis carried out and concluded positively. Significance of the study will be for both who wants to pursue career, and for those who are already in the research institute for their career development. For Institutes, it will help to know reasons for retention of such talented employees. Following are some points:

1.24.1 For Students/Candidates and Research Employees:

i. They will get detailed information about choosing a career in research organization

ii. They will get information about monetary, non-monetary benefits available in selected research organizations.

iii. Information about HR practices followed in selected organizations for career development and retention of research employees.

iv. Reasons given by employees who left such organizations.

1.24.2 For selected Research Institutes:

i. They will come to know the improvements required in their HR practices

ii. Information about areas of improvements in Retention programmes.

iii. Study will help them to redesign their career development, retention plans and HR practices.

iv. They will try to attract more employees and retain research
employees in their organizations

1.25 Selected Research Institute:

i. National Centre for Radio Astrophysics (NCRA)
ii. Inter University Centre for Astronomy & Astrophysics (IUCAA)
iii. National Centre for Cell Science (NCCS)
iv. Agharkar Research Institutes (ARI)
v. National Aids Research Institute (NARI)
vi. National Institute of Virology (NIV)
vii. Indian Institute of Tropical Meteorology (IITM)

1.26 Chapter Scheme:

1.26.1 Chapter 1: Introduction – This chapter gives details about the topic selected for research. It described about Research Institutes and Research Employees. It has elaborated careers of research employees and their career development. It also describes various human resources practices followed in research institutes. It talks about functioning of research institutes, role of the government in establishing research institutes and monetary funding. This chapter also deals with career development and retention programmes followed in research institutes.

1.26.2 Chapter 2: Literature Review - This chapter has reviewed books and journals about career, career development and retention. It also go through the career development of employees, theories of career, career development, strategies for retention, etc.

1.26.3 Chapter 3: Profile of Research Institutes – Chapter three deals with the detailed information about research institutes selected for this research study. It gives information about their nature of research activities, organization chart, overall functions of its departments, vision, and future plans.
1.26.4 **Chapter 4: Research Methodology** – This chapter four describes the scientific method used to carry out this research study. Measures of central tendency, dispersion and volatility of responses, etc. have been worked out using statistical tools. Since the data is non-parametric, Hypothesis testing is done using Chi Square Test and Kolmogorov-Smirnov test for one sample data assuming uniform distribution.

1.26.5 **Chapter 5: Data analysis and Hypothesis Testing** – Chapter five gives detailed information about the data analysis. It includes the statistical and descriptive analysis presented in Graph, Pie-chart, Bar Chart, Tables, etc. The qualitative data was codified numerically to work out using statistical formulae. This helped in analyzing in descriptive statistics. This chapter also helped in finding the outcome of the study.

1.26.6 **Chapter 6: Findings and Conclusion** – Chapter six describes the findings and conclusion based on the data analysis and hypotheses testing in Chapter five. We could find that Research Employees are more concerned about research work, job satisfaction, research facility, flexible working hours, job security, etc. They work with passion for the country.

1.26.7 **Bibliography, References and Appendices** – This includes the references of books and journals referred and reviewed in this study, in APA format. Appendices also include the instrument i.e. questionnaire, publications, photographs, etc.

**1.27 Conclusion**

Introduction chapter included information about research topic taken for this research study. Enough information about Research Institute, Research Employees, Career of Research Employees and Career Development of Research Employees is given in this chapter. Chapter one also gives information about how research institutes function, role of the government in establishing and funding these organizations, etc.