CHAPTER - VII

"Institutionalization that means introduction of new knowledge, of new roles, and new power structure requires individuals of unique ability, who through their roles and interactions and power relationships can make a special contribution to the development of a new field of knowledge and practice. The process of institutionalization and of social and cultural change is therefore not easy to plan."

- Karmia Chowdhry (1977)
CHAPTER - VII

LESSONS LEARNED

7.1 Introduction

This is the final chapter of an empirical study which attempts to examine the impact of leadership actions on institution building. While doing this exercise it also attempts to study its utility for both academicians as well as for practitioners.

In this chapter a detailed analysis of the lessons derived from the present study in terms of utility as well as their implications, both at macro and micro levels, has been made.

This chapter consists of the following sections:


When the present study was undertaken, my aim was to find out how the lessons of such a study could help the future institution builders in India and in other developing countries. Therefore, in conclusion I would like to suggest that such empirical studies should be undertaken so that more and more future institution builders can be benefitted and at some stage a set of institution building strategies can emerge.

Unfortunately, at this stage very limited empirical data or experiences of institution builders are available to researchers like myself. I am sure, if someone had collected experiences of eminent institution builders of India like Dr. Bhatnagar, Dr. Bhabha, Dr. Sarabhai etc., it would have been probably easier to help formulate an empirical framework of institution building.
The present work is an outcome of my study of Vikram Sarabhai's leadership actions in creation of a number of institutions in various fields with special reference to ATIRA and PRL. A detailed description of Sarabhai's leadership actions forms a section of the present study.

It is an accepted fact that it is difficult to think in terms of training such eminent personalities. The present study attempts to examine experiences of such a leader like Vikram Sarabhai whose mission was to create conditions for social change through building institutions in different disciplines.

This study does not depend merely on secondary data and interviews of individuals who were associated with Sarabhai in different capacities while he created these institutions but it heavily leans on my personal relations with and observation of Vikram Sarabhai.

7.2 Leadership actions

Case studies of two institutions, namely, ATIRA and PRL, helped the present study in identifying various leadership actions which ultimately resulted in the growth and development of these institutions.

Seven aspects emerged out of the present study which were largely responsible for the creation of the institutions under study.

In this section, an attempt has been made to understand the leadership actions of Vikram Sarabhai in the framework of the process mechanism of GPM of IB (Ganesh 1978, 1979). It would be interesting to understand each leadership action as affecting different processes of IB and, thereby, it would help to know the stagewise growth of the institution with reference to leadership actions.
The process mechanism of GPM of IB posits of four main processes: 1. Birth processes, 2. Development processes, 3. Renewal processes, and 4. Institutionalization processes. The leadership actions of Vikram Sarabhai identified from the case studies of the two institutions under study have been classified according to the relative impact they have on the relevant process. (See Figure-2, p. 156).

Birth processes:

Context appreciation and shaping and mission origination affect birth processes. These leadership actions determine the early growth of the institutions and how the need and objectives of the institutions were identified.

Development processes:

Institution-around-men approach, creation of an appropriate operating culture and creating interacting and overlapping clusters of individuals are leadership actions resulted in the formulation of the core research programmes and creation of an appropriate operating culture for the systematic growth of both academic as well as administrative structures. Creation of interacting and overlapping clusters of individuals resulted in establishment of both internal and external linkages and also in the mobilisation of resources and support.

Renewal processes:

Selection of institutional leadership and change in leadership are of immense importance to the growth of the institutions. This is so because the development of the institutions and the sustenance of the appropriate culture largely depend upon these actions. Many times at the renewal stage institutions fail due to the absence of an appropriate leader.
Leadership actions of Dr. Vikram Sarabhai in institution-building processes

1. Context appreciation and shaping
2. Mission Origination

Development processes

3. Building institution around key people
4. Creation of an appropriate operating culture
5. Creating interacting clusters

Birth processes

Showing care and concern

Renewal processes

7. Creating and nurturing external, interacting and overlapping clusters

Institutionalization processes

6. Choice of new leadership

Figure - 2
Institutionalization processes:

All these leadership actions ultimately pave the way for achieving the necessary impact in the environment. This is an ongoing process and to achieve this stage all the seven leadership actions contribute their mite, especially, those of creating and nurturing relevant external networks for the necessary dialogue, dissemination and impact.

Showing care and concern to people was an in-built aspect of Vikram Sarabhai's personality. He showed care and concern to people at every stage of institutional development.

The seven aspects of leadership actions are: 1. Context appreciation and shaping 2. Mission origination 3. Institution-around-men 4. Creation of an appropriate operating culture 5. Creating interacting and overlapping clusters of individuals 6. Selection of institutional leadership, and 7. Showing care and concern to people. (see Figure-2).

[1] **Context appreciation and shaping:**

A key factor which plays a significant role during the initial stage of an institution is context appreciation and shaping. This aspect describes the birth process according to the process mechanism (GPM) of IB by Ganesh (1978, 1979). Context means an available set of circumstances in a given situation. An effective institutional leader's success in creation of an institution is largely dependent on how he can take maximum advantage of context. For an institutional leader his leadership qualities and his vision are mainly responsible for selection of proper time in which he creates an institution and takes maximum advantage of context. There are numerous examples of leaders failing to achieve prescribed goals inspite of favourable
circumstances or context. The failure can be because of a variety of reasons but ultimately, it is a leadership failure. There are also examples of leaders achieving their missions in the face of most crucial or unfavourable context. This leads us to believe that a leader can succeed in his mission provided he has vision, exceptional personality and a sense of commitment and dedication. All these qualities were abundantly present in Vikram Sarabhai.

In terms of ATIRA and PRL, fortunately, the context was quite favourable which made Sarabhai's leadership actions more effective.

For the sake of this study, context has been interpreted in terms of: 1. Time 2. Need 3. Socio-political factors, and 4. Leadership.

Time:

Before 1947, Europe had seen two major wars. Britain's active involvement in them had adversely affected India's trade and industry to which the British had always been apathetic. In the dawn of independence India was suddenly faced with the problem of renovating its traditional industry and innovating new institutions for scientific and technological research. Models for such institutions were already available in Europe and U.S.A. Thus the year 1947 or the time element provided an incentive as well models for institution building in India.

Need:

In 1947 the India's textile industry had already gone to pieces due to the British policy of discouraging Indian trade. Even though the industrialists were aware of the technological progress in the west, they were compelled to play the passive role of preservers rather than innovators. India's freedom brought them the first opportunity to make a collective effort to sort out
and solve their problems. Birth of ATIRA in 1947 was one of the solutions. ATIRA's main objective was to modernise traditional textile industry and also to modernize the attitudes and outlook of the industry. In short, the change was expected both in the system as well as in the hardware.

Until 1947 scientific development in India had remained in the state of forced stagnation due to lack of all sorts of resources and facilities. India's political independence made substantial financial support from the Government of India available. India as a developing country had to make progress in science & technology. PRL was established to answer this need.

Socio-political factors:

During the post-independence era, the government of India decided to promote scientific and industrial research in as many fields as possible. This new policy was availed of by scientists like Bhabha and Sarabhai as well as by industrialists like Kasturbhai Lalbhai. On the other hand, support also came forward from the local agencies like Ahmedabad Millowners' Association (AMA) for ATIRA and from Ahmedabad Education Society (AES) and Karmakshetra Educational Foundation (KEF) for PRL. Similarly, Government of Bombay, Government of India and the Council of Scientific and Industrial Research (CSIR) advanced their support. Individuals like Kasturbhai Lalbhai and Vikram Sarabhai exploited their relations with the Government of India and the Atomic Energy Commission for their support.

Leadership:

It was fortunate that during the initial development of ATIRA and PRL two visionaries like Kasturbhai Lalbhai and Vikram Sarabhai were involved in the creation of these institutions. Another favourable aspect was that Kasturbhai Lalbhai was an eminent industrialist and elderly respected leader
of the Ahmedabad Millowners' Association. The Governing Councils of both ATIRA and PRL headed by Kasturbhai Lalbhai consisted of eminent scientists like Bhatnagar, Krishnan, Sarabhai and Ramanathan. This coming together of industrialists and scientists laid solid foundations of these institutions.

[2] Mission origination:

The second very important aspect in institution building process is mission origination. This leadership action is closely connected with the context in which an institution is created. The first aspect 'context appreciation and shaping' becomes meaningful only after mission of an institution is well established. In short, it is the mission which gives birth to an institution.

Sarabhai was very careful in mission origination of institutions he created. Only after a felt-need of an institution made some practical sense, he used to discuss his ideas with a number of individuals connected with the field in which he planned a new institution. Only when he was convinced of the application aspect of an institution he would choose an appropriate context for its formal set-up.

As mentioned earlier, Sarabhai was connected with both textile industry as well as scientific research. It was his connection with these areas as well as his vision and prolonged stay in Europe which convinced him of the need for research in these areas. ATIRA's mission was to modernise a traditional textile industry. And PRL's mission was to develop a second generation of scientists and to establish a School of Physics. By family background Sarabhai was an industrialist and a textile mill owner and by his formal education, he was a physicist. Therefore, it was his involvement, interest, insight and background which helped him in the origination of missions of these institutions. For development and training of future institutional leaders, it is very important that clarity of mission is achieved.
Another aspect of mission origination is that a mission of any innovative institution has to be originated in such a way that in future when it is felt that the institution has achieved a stage of institutionality, it can be redefined and modified. In short, there should be a scope of renewal or redefinition of mission. For example, when ATIRA was started, its original mission was to modernise a traditional textile industry, and now ATIRA has slowly shifted towards innovation in textile technology. Similarly, PRL started with research programmes in Atmospheric Physics and Cosmic Rays. At the present PRL is involved in the areas as diversified as Aeronomy, Archaeology, Astronomy, Astrophysics, Hydrology, Nuclear and Plasma Physics etc. Thus, it is not the total change in the original mission but it is widening the boundary of the original mission. In this way Sarabhai believed that mission origination was a more crucial aspect of beginning of institution building activity.

[3] Institution-around-men approach

This was one of the most important and effective leadership action of Sarabhai whose IB philosophy was the same as that of Homi Bhabha and of the Max Planck Institutes in Germany. According to Bhabha (1966,p.6):

"The Kaiser Wilhelm Society shall not first build an institute for research and then seek our the suitable man, but shall first pick up an outstanding man and then build an institute for him."

Sarabhai built both ATIRA and PRL with same philosophy in which he ignored a pre-designed organization chart concept of recruitment during the early years of institutions.

It is very interesting to know what Homi Bhabha observed in relation to how the Council of Scientific and Industrial Research was established in India.
According to Bhabha (1966, p.5):

"A Planning Officer was appointed for planning the work and building of each laboratory. The plan was usually drawn upon the basis of the work of similar laboratories abroad, divided into divisions and sections, and an estimate of the staff required made on the basis. An attempt to fill the posts was then made on the basis of advertisement and invitation also in the case of the senior-most appointments. While this method of setting up a laboratory might give reasonably satisfactory results in which science is already an important activity and a large number of scientists already exist in the universities and in other public and private laboratories and research institutes, it has serious disadvantages in a country in which organised science is still in its infancy and the number of available outstanding scientists limited. It either results in an outstanding scientist being taken away from a university or another research institute, or it results in a mediocre one, satisfying the so-called minimum qualifications, being appointed to posts requiring originality, initiative and leadership. A result of following this method has been that a number of good scientists have been drawn away from the Universities into the national laboratories, leaving the universities weaker thereby."

Thus case studies of both ATIRA and PRL describe that in these institutions Sarabhai first identified the core research group of individuals and then built institutions around them.

As Chowdhry (1977, p.15-16) observed:

"To the planning officer of the CSIR laboratory, the plan was primary, the person secondary; to the planners of TIFR and ATIRA, the persons were primary and the plan secondary. The result of this very fundamental
difference in approach to institution building is a whole set of different attitude, motivations, commitment of people – the intervening variables that influence the productivity and creativity of organisations, and consequently their success or failure."

[4] Creation of an appropriate operating culture:

Sarabhai (1974, p.76) observed: "the appropriate operating culture — is created by the attitudes and assumptions of the men in it rather than by formal organizational structures."

Creation of an appropriate operating culture was considered as one of the most important requirements for the starting and development of an institution by Sarabhai. This operating culture is connected mainly with two aspects of an institution: 1. Academic and 2. Administrative. The main objective of an operating culture is to help achieve mission of an institution. There are different approaches available to achieve mission.

Churchman (1968, p.13-14) summarized four schools of thought that makes the system approach:

i. The advocates of efficiency; they claim that the best approach to a system is to identify the trouble spots, and specially the places where there is a waste, e.g., unnecessarily high costs, and then proceed to remove the inefficiency.

ii. The advocates of the use of science in approaching a system; they claim that there is an objective way to look at a system and to build a "model" of the system that describes how it works. The science that is used is sometimes mathematics, sometimes
economics, sometimes "behavioural" (e.g., psychology and sociology).

iii. The advocates of the use of human feelings, i.e., the humanists; they claim that systems are people, and the fundamental approach to systems consists of first looking at the human values: freedom, dignity, privacy. Above all, they say, the systems approach should avoid imposing plans, i.e., intervention of any kind.

iv. The anti-planners, who believe that any attempt to lay out specific and "rational" plans is either foolish or dangerous or downright evil. The correct "approach" to systems is to live in them, to react in terms of one's experience, and not to try to change them by means of some grandiose scheme or mathematical model. There are all kinds of anti-planners, but the most numerous are those who believe that experience and cleverness are the hallmarks of good management.

Vikram Sarabhai's philosophy in terms of creation of an appropriate operating culture is largely based on holistic systems approach. Churchman also, in describing various schools of thought mentioned many aspects of systems approaches which were part of Sarabhai's approach also. Sarabhai always thought and did everything while keeping 'men' in centre of activities.

Sondhi (1980, p.142) described:

"He (Sarabhai) firmly believed that to start a new activity or organisation neither government patronage nor money is required. What is crucial is the human resource. Therefore, he was always on the look out for talented persons. He believed that a person created his own work. Jobs can never be filled but only 'created'. "
Selznick (1937) mentioned the embodiment of values in an organisation structure, similarly Clark (1972) mentioned the creation of organisational sagas. Pettigrew (1977) observed a need of the creation of organisational culture.

When Vikram Sarabhai founded scientific and technological R & D institutions like ATIRA and PRL, he had mainly concentrated on three approaches which ultimately resulted in creation of an appropriate management systems in these two institutions. These are: 1. Institution-around-men approach 2. Ignoring pre-conceived organisational chart, and 3. Horizontal control through discussions. The purpose of applying these 3 approaches was also suggested by Churchman (1968).

These approaches helped the core researchers who were also mission-carriers to develop themselves in a direction which made meaning or sense to them. Sarabhai ignored a vertical hierarchical control system and emphasised an organisation in which horizontal control through discussion was appreciated. For the auditors and the accountants of ATIRA and PRL the importance of scientific research or missions of institutions are primary but for the auditors and the accountants of CSIR, accounts inquiries, the rules and the procedures of sanctioning finance are primary. In short, this refers to the difference between a holistic systems approach and a compartmentalisation type of approach.

Chowdhry (1977, p.16) observed:

"The differences in the two approaches result in different working cultures and thus in the morale of the people and in the mood of the institution. This working culture, mood, or morale is difficult to cultivate in an organization where the approach is a predetermined master plan and the people have to fit into this master plan. The organization-
around-man approach conveys to the scientists concerned their central role in building the organization. With such an approach, commitment to one's own as well as to organizational goals becomes feasible.

Another very important aspect that helped in creation of an appropriate operating culture in these institutions was his selection approach.

Sarabhai decided to recruit fresh and young scientists who had no previous work experience elsewhere but were trained in scientific method. He believed that young scientists with the knowledge of scientific methodology will yield more positive results than those who had previous work experience whose approach would be to repeat what they had done elsewhere. He strongly believed that new innovative institutions which are established to bring social change with the help of science and technology need young scientists with fresh thinking to achieve institutional goals through their creativity. Instead of previous work experience, he advocated training as one of the important methods to direct the young and fresh minds towards innovations. These young scientists, engineers, and technologists were given freedom of work and autonomy. Sarabhai believed that to get results through creative work and thinking, freedom of work and trust were inevitable. This was because of his belief that any type of control blocks the growth of new institutions and thereby development of individuals.

In creation of appropriate administration for scientific organisations Sarabhai had similar views as of Bhabha. Bhabha (1966) described this approach:

"The type of administration required for the growth of science and technology is quite different from the type of administration required for the operation of industrial enterprises, and both of these are again quite different from the type of administration required for such matter..."
as the preservation of law and order, administration of justice, finance, and so on. It is my personal view, which is shared by many eminent foreign scientists, that the general absence of the proper administrative set-up for science is a bigger obstacle to the rapid growth of science and technology than paucity of scientists and technologists, because a majority of the scientific research and development is even more important than the administration of industrial enterprises, and I am convinced that it cannot be done on the basis of borrowed knowledge."

What Bhabha suggested is a different type of culture and the need of training scientists, engineers and technologists to develop a second generation of this professionals so that India will not have to rely on foreign know-how but can become self-reliant in these important fields. Both Bhabha and Sarabhai's approach for national development through science and technology remained the same.

Another important factor which helped Sarabhai in creation of appropriate administrative practices in these institutions was his recognition of the need for autonomy. He favoured rules and regulations only when they are required and certainly not at the cost of autonomy. As Chowdhry and Sarabhai (1968, p.17) described:

"An appropriate social culture can also be transferred by appointing persons from a different working 'culture'. In this connection, the appointment in a key position or in large numbers at lower positions, or competent Government officials whose experience is primarily derived from routine administration, in research organisations or in industrial enterprises is very questionable even though many of these organisations are established as autonomous in the legal sense, administrative practices are introduced which
negates the formal autonomy granted. The existing government procedures of selection, promotion, evaluation, budgetary controls, buying of supplies and equipment are highly appropriate to the effective functioning of scientific laboratories and industries involving complex technologies.

Thus, creation of an appropriate operating culture in the two institutions under study was of immense importance to Sarabhai. It also emphasised the importance of both academic as well as administrative practices as equally necessary segments of mission of an institution. For Sarabhai, trust, autonomy, horizontal control, commitment, creativity, freedom of work, holistic approach were important factors which ultimately resulted in creation of appropriate operating cultures for the two institutions.

[5] Creating interacting and overlapping clusters of individuals

Another important leadership action of Sarabhai in building institution for social change was creating interacting and overlapping clusters of individuals. In ATIRA and PRL he created such interacting and overlapping clusters of individuals with whom he interacted and through whom he interacted with others. Boissevain (1974) also described the concept of network which is close to present research.

In both the institutions, Sarabhai was an elected member of the Council, he was de facto Director and he also represented the core research group of scientists. For Sarabhai development of young scientists of the core research group was very important because this group was supposed to play the role of creating critical mass which ultimately helped the growth of institutions.
Sarabhai (1974) described the implications of a critical mass in institutionalizing change from an example "three raised to the power of eighteen":

"What it means in dynamic terms is quite dramatic. If a person spreads a gossip to just three others and the same is passed on by each of them to three others, and so on in succession, in just eighteen steps almost the entire population of India would share the spicy story. Note that if each step takes one hour, 90 percent of the people hear the gossip for the first time only during the seventeenth and eighteenth hours. Indeed during the whole of the first 80 percent of the time, the process affects merely 11 percent of the population. Even though each individual is partaking in the chain reaction exactly like all the others who preceded him, that is, he receives information from one person and passes it to three others, the social impact at a late stage of development hits like an avalanche."

Similarly in the process of institution-building there is a chain reaction when individuals in key positions committed to change become a part of "three raised to the power of eighteen." The concept of creating a critical mass has a direct impact on institutional growth. In short, the core group of individuals is constantly engaged in a process of regeneration and tries to enlarge the core group or generate more groups which ultimately strengthen the core base of an institution.

Beckhard (1975) mentioned about the creation of critical mass. As discussed earlier, creating interacting clusters helped Sarabhai in the growth of these institutions both internally as well as externally.

As Chowdhry (1972, p.17) elaborated Sarabhai's role in interacting clusters:

"Wherever Dr. Vikram Sarabhai went he created living intellectual
networks of overlapping clusters in a community so that the members of such clusters became 'carriers' of new ideas and were able to perform innovative tasks within their professions and communities.

[6] Selection of Institutional leadership:

A very important aspect of Sarabhai's IB philosophy was selection of an institutional leader. His own experiences as an institution builder describe his role as a leader at every stage and process of institutional growth. His constant involvement, interaction and interference at every stage of the institutional growth was of immense consequence. This is amply discussed in the two case studies presented in this study. Both institutions under study grew directly under his guidance. Apart from the other aspects of IB he was much concerned with the selection of an institutional leader. Sarabhai's main concern in the selection of an institutional leader, apart from his educational and research experience, was the candidate's human qualities, or in other words, his understanding of human beings. He strongly believed in the importance of humanitarian approach of a head of an institution.

Other very important aspects he considered necessary in the growth and nurturing of an institution were trust and mutuality. He gave trust to all the people who worked under him and similarly received trust from them. This give-and-take of trust between him as Director and the staff helped strengthen the integrity of the staff on one hand and in creating a sense of commitment towards achieving goals of the institutions on the other. It was due to the quality of trust that he was able to encourage the young scientists to experiment new innovative ideas.
In discussing his understanding of mutuality, Sarabhai mentioned:

"The concept of 'mutuality' as used by Erik Erikson has great meaning for me. 'Mutuality' is important not only when international aid is involved, when collaborations are involved, but in our various relationships with people." - (Chowdhry, 1972).

Kasturbhai as Chairman of ATIRA and PRL councils gave trust, support, freedom of work and autonomy to Sarabhai and similarly Sarabhai also transferred trust, support, freedom of work and autonomy to the core research staff. This sense of mutuality helped both Sarabhai and core research staff of ATIRA and PRL to work independently and with initiative.

Chowdhry (1977, p.105) defined institutional leadership role:

"The leadership of men who create new institutions and leave an imprint of their personality is of crucial importance." Leadership is defined here as "the manner in which the leader's assumptions concerning the task and the motivation of people are translated into an operating and working system."

This describes a need of vision as a very important characteristic of an institutional leader. Most recent studies on leadership by Zaleznik (1977) and Bennis (1982) also indicate the need of vision in successful leaders.

As mentioned earlier, Sarabhai's philosophy of selecting a new leader was focused on his understanding of human beings. It was like Greenleaf's (1977) concept of 'Servant-leader'. This concept has two meanings: 1. Leader's commitment towards institution and 2. Leader's understanding of people. According to Greenleaf, these two aspects were responsible in the success of an institution.
Another very important point of Sarabhai's leadership style was that he never believed in giving power to the core research staff working under him. And he mentioned that power cannot be given. But he believed that while completing any important task when power is needed it was automatically given for the successful completion of a time-bound task. In short, he believed that the power is not given but it can be taken as a part of the responsibility entrusted.

[7] Showing care and concern to people:

Sarabhai's philosophy and his image of a leader was that a leader should be able to show care and concern to the people who work under him. This type of an informal relationship ultimately results in achieving goals of an institution. It is worth mentioning that no group or association of employees from any of the two institutions under study had approached Sarabhai for any demand. This was because before they thought of any demand all their needs were provided for by Sarabhai. This is perhaps the remarkable leadership quality of Sarabhai which made him an exceptional institutional leader of our time.

Chowdhry (1970, p.154) observed:

"----- the All India Textile Association invited Sarabhai in 1955 to be their President. It was the first time in their history that a millowner was invited to become one of them, a person they could trust to voice their sentiments and beliefs."

This also shows Sarabhai's leadership quality and also how mutual trust helped both leader and employees in trusting each other.

Many important R & D research assignments were entrusted to PRL during
a time of national emergency, when staff of PRL worked almost day and night. But none had approached Sarabhai with a request of overtime or compensatory leave or any extra facility. This was due to their trust in Sarabhai as their leader. This resulted in an excellent management-employee relationship in these institutions.

Recent studies of excellent organisations by Peters and Waterman (1982) also reported that it was showing care and concern and trust which was mainly responsible for the success of the world-best organisations.

In this way the body of IB philosophy is supported by the framework of these seven leadership actions. Normally, all these actions cannot be expected to be performed by a single leader. However, Vikram Sarabhai was an exceptional human being and could effortlessly work the miracles that he did.

7.3 Multiple leadership roles vis-a-vis interacting clusters

The most important aspect of Sarabhai's IB activities was his multiple leadership roles vis-a-vis interacting clusters. Sarabhai's multiple leadership actions have provided very interesting experiences both for academicians as well as future institution builders.

To understand his multiple leadership roles vis-a-vis interacting clusters, it is very important to view his personality from different angles. Though the present study describes his role in building two institutions it also examines his other responsibilities at institutional, national and international levels. The main objective of this exercise is to study how his multiple leadership roles boosted the task of national development through the use of science and technology. This was largely achieved by creating interacting and overlapping clusters of individuals at different levels.
As a scientist he was responsible for directing PRL's scientific research programmes and supervising his Ph.D. students in Cosmic Rays. He was a regular visiting scientist at the Nuclear Science Laboratory of M.I.T., U.S.A. He was the chief architect of Indian Space Programme. He was Chairman of both Atomic Energy Commission and Electronics Committee.

As an industrialist he was mainly responsible for the establishment of a number of industries centered around chemicals and pharmaceuticals and operations research. This industrial complex consisting of about 10 industrial units was established by him in Baroda as a family owned industries.

As an institution-builder, he was responsible for creation of more than 35 institutions in various fields, i.e., textile research, scientific research, management education, science education, industries and development research institutions etc. (see Annexure-4).

Apart from his national responsibilities, he was also connected with a number of international organisations, i.e., International Atomic Energy Agency, Committee for Space Research of U.N., Pugwash Committee for disarmament, Ekistic Centre for human settlement and many other scientific research societies.

While being associated with all the activities, Sarabhai's main task was to benefit the national development of India and other developing countries. By interrelating all these activities with each other, he successfully achieved international collaborations and created many national and international projects. While creating many institutions he identified and utilised human resources for the benefit of the country. Figure-3 projects his individual leadership development which had horizontally widened his activities from
<table>
<thead>
<tr>
<th>Institution</th>
<th>National</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>Council</td>
<td>Council &amp; Policy Making</td>
<td>Policy Making &amp; Innovations</td>
</tr>
<tr>
<td>Member</td>
<td>Council Member - PRL</td>
<td>Chairman - INCOSPAR, AEC, EC</td>
</tr>
<tr>
<td>Founder</td>
<td>Chairman - INCOSPAR</td>
<td>President - IAEA</td>
</tr>
<tr>
<td>Scientist</td>
<td>Member - Electronics Committee</td>
<td>Chairman - COSPAR</td>
</tr>
<tr>
<td></td>
<td>Chairman - AEC, EC</td>
<td></td>
</tr>
<tr>
<td>Faculty</td>
<td>Faculty &amp; Planning</td>
<td>Planning &amp; Collaboration</td>
</tr>
<tr>
<td>Professor and Head of the Cosmic Rays Department - PRL</td>
<td>Director - PRL</td>
<td>Chairman - ISRO</td>
</tr>
<tr>
<td>Visiting Scientist - MIT</td>
<td>Secretary - DAE</td>
<td>Chairman - ECIL</td>
</tr>
<tr>
<td>Researcher</td>
<td>Researcher &amp; Implementation</td>
<td>Implementation &amp; Institutionalization</td>
</tr>
<tr>
<td>Physicist</td>
<td>Computer Centre - PRL</td>
<td>SITE, INSAT, SLV finalised</td>
</tr>
<tr>
<td>Established ATIRA, PRL, AMA, DARPTANA and other Industries of Sarabhai Group</td>
<td>TERLS, SSTC, EPEL, CSC, IIMA established</td>
<td>ESCES, SHAR, ARVI, VECP, FBR, NCA, ISSP, ECIL established</td>
</tr>
<tr>
<td></td>
<td>TERLS dedicated to UN</td>
<td></td>
</tr>
</tbody>
</table>

Figure - 3
### Abbreviations used in Figure-3

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATIRA</td>
<td>Ahmedabad Textile Industry's Research Association, Ahmedabad</td>
</tr>
<tr>
<td>PRL</td>
<td>Physical Research Laboratory, Ahmedabad</td>
</tr>
<tr>
<td>AMA</td>
<td>Ahmedabad Management Association, Ahmedabad</td>
</tr>
<tr>
<td>DARPA NA</td>
<td>Darpana Academy for Performing Arts, Ahmedabad</td>
</tr>
<tr>
<td>INCOSPAR</td>
<td>Indian National Committee for Space Research, Ahmedabad</td>
</tr>
<tr>
<td>AEC</td>
<td>Atomic Energy Commission, Bombay</td>
</tr>
<tr>
<td>EC</td>
<td>Electronics Committee</td>
</tr>
<tr>
<td>DAE</td>
<td>Department of Atomic Energy, Bombay</td>
</tr>
<tr>
<td>SSTC</td>
<td>Space Science &amp; Technology Centre, Trivandrum</td>
</tr>
<tr>
<td>TERLS</td>
<td>Thumba Equatorial Rocket Launching Station, Thumba</td>
</tr>
<tr>
<td>EPEL</td>
<td>Electronics Prototype Engineering Laboratory (BARC), Bombay</td>
</tr>
<tr>
<td>CSC</td>
<td>Community Science Centre, Ahmedabad</td>
</tr>
<tr>
<td>IIMA</td>
<td>Indian Institute of Management, Ahmedabad</td>
</tr>
<tr>
<td>IAEA</td>
<td>International Atomic Energy Agency, Vienna</td>
</tr>
<tr>
<td>COSPAR</td>
<td>Committee for Space Research - UNO</td>
</tr>
<tr>
<td>ISRO</td>
<td>Indian Space Research Organization, Bangalore</td>
</tr>
<tr>
<td>ECIL</td>
<td>Electronics Corporation of India Limited, Hyderabad</td>
</tr>
<tr>
<td>SITE</td>
<td>Satellite Instructional Television Experiment</td>
</tr>
<tr>
<td>INSAT</td>
<td>Indian National Satellite</td>
</tr>
<tr>
<td>SLV</td>
<td>Satellite Launching Vehicle</td>
</tr>
<tr>
<td>ESCES</td>
<td>Experimental Satellite Communications Earth Station, Ahmedabad</td>
</tr>
<tr>
<td>SHAR</td>
<td>Shriharikota Range, Shriharikota</td>
</tr>
<tr>
<td>ARVI</td>
<td>Arvi Earth Station, Arvi</td>
</tr>
<tr>
<td>VECP</td>
<td>Variable Energy Cyclotron Project, Calcutta</td>
</tr>
<tr>
<td>FBR</td>
<td>Fast Breeder Reactor, Kalpakkam</td>
</tr>
<tr>
<td>NCA</td>
<td>Nuclear Centre for Agriculture, New Delhi</td>
</tr>
<tr>
<td>ISSP</td>
<td>Indian Scientific Satellite Project, Bangalore</td>
</tr>
</tbody>
</table>
institutions (1947-1957) to national (1957-1966) and finally international (1966-1971) levels. At institutional level he played his multiple leadership role in council, faculty and research programmes by creating interacting and overlapping cluster of individuals. At national level he played his multiple leadership roles in council and policy making, faculty and planning, research and implementation. At the international level the three interacting clusters related to policy making & innovations, planning & collaboration, implementing & institutionalization. Thus, three sets of interacting clusters at different levels and in different spans of time worked effectively.

During the first decade of PRL, the main scientific research was centered around two areas, namely, 1. Atmospheric Physics and 2. Cosmic Rays. As a member of policy making body he fully supported the scientific research programme of PRL in Cosmic Rays. As Director he implemented it and as a researcher he not only carried out the programmes but also developed young scientists to continue research in this field. All this was possible during the first decade of PRL.

During the second decade, he as a member of council which was a policy making body and Director of PRL envisaged of Indian Space Programme and a proposal was sent to the Government of India after the successful launching of world's first Sputnik by the Soviet Union. Immediately the Government of India accepted Sarabhai's proposal and the Department of Atomic Energy headed by Dr. Bhabha set up the Indian National Committee for Space Research and appointed Sarabhai as its Chairman. The headquarters of INCOSPAR was decided to be the PRL. Thus, PRL's scientific research programme was nationally recognised. During this period Sarabhai selected Thumba near Trivandrum (Kerala) as a site for the Thumba Equatorial Rocket Launching Station known as TERLS.
And on November 21, 1963 the first rocket was successfully launched from the TERLS. This was the decade when a number of Space Technology and R & D centres were established in Trivandrum, Ahmedabad, Sriharikota and Bangalore.

During the third phase, i.e., between 1966-1971, Sarabhai was made Chairman of the Atomic Energy Commission, Indian Space Research Organisation (ISRO) and the Electronics Committee. He was also elected as Vice-President and Scientific Chairman of the UN Conference on Peaceful uses of Outer Space held at Vienna in 1968. He convinced UN to sponsor TERLS as an international rocket launching facility which was agreed upon and the Prime Minister Smt. Indira Gandhi dedicated TERLS to the UN. National projects like SITE, INSAT and SLV were finalised during this phase. This was not only starting of Indian Space Programme but also recognising PRL as the cradle of Indian Space Programme. The students who completed their doctoral and post doctoral research under Sarabhai were entrusted national responsibilities to head various space centres. Thus, it is a story of growth and development of PRL, young scientists, Indian Space Programme and international collaborations in space research.

It is worthwhile to mention that all these development took place in a short span of 25 years. But the example I have narrated is of the development of Indian Space Programme only. Sarabhai was responsible for carrying out similar national programmes in different fields during the same period.

This is how Vikram Sarabhai played his multiple leadership roles at institutional, national and international levels.

One more important aspect of Vikram Sarabhai's multifaceted personality
was his role at the top level decision-making body in India. Shri L.K. Jha, who worked as Prime Minister's Secretary, narrated Sarabhai's role in an unpublished article.

Jha (1985) described Sarabhai's role:

"When Dr. Sarabhai became Chairman of A.E.C., India was under strong pressure to sign the Nuclear non-proliferation Treaty the Government was determined to resist. He raised with me the question whether we cannot think of some alternative which would help fulfil the objective of non-proliferation, not by making the have-nots sign a treaty under which they would subscribe to and accept discriminatory treatment against themselves but by a different kind of a treaty which would make non-nuclear powers feel secure from nuclear threats, even without possessing any capability of nuclear retaliation.

Time and again we met to ponder over this problem, and I am not being modest when I say that it is he who was responsible for evolving an alternative approach, while my role was injecting comments and suggestions drawing upon my own very different background."

Jha (1985) continued:

"Our first task was to get the approach accepted by the Government of India. First, a Committee of Secretaries and then a cabinet committee pondered over it. Finally, the two of us were authorised to go to various capitals, armed with a letter from Prime Minister Indira Gandhi to the heads of government concerned, starting with Moscow, to gain support for our proposal.

So, Vikram and I embarked on our mission which took us to Moscow, Washington, London and Paris. We had meetings and discussions
in the USSR, USA, UK and France with the heads of Government as well as Cabinet Ministers in charge of defence and foreign affairs. I would only conclude by saying that the very fact that the proposal went as far as it did brings out the brilliance and versatility of Vikram Sarabhai's mind.

This was Vikram Sarabhai's multiple leadership role as well as multifaceted personality. In short, it was a sense of care, concern and commitment of Vikram Sarabhai towards national development and international peace. His ultimate goal in this mission was to avoid conflicts between the developing and the developed countries. It also describes his vision, initiatives and leadership style and actions. As he once said that nothing is impossible if right efforts are made.

As Kane (1972, p.20) described:

"Vikrambhai was the type of person who would produce at least a dozen ideas a day. He knew most of them were speculative or unrealistic. But he went on producing them, nevertheless. May be that was his way to keep up his mental agility and sharpen perceptiveness. And the successes or failures that followed, he took them all in his stride. One day he remarked "Kane, these foreigners do not really understand the meaning of Gita's 'Karmanye Vadhikaraste'. What it implies is, keep aloof enough so that you can judge every issue objectively."

Another very interesting example of Vikram Sarabhai's multiple leadership role was narrated by Shri P.N. Haksar who also worked as Prime Minister's adviser.
Haksar (1976) delivering the first Vikram Sarabhai Memorial lecture of the Indian Institute of Management, Ahmedabad, narrated the following example:

"I remember once in pursuit of this deed of partnership which we solemnly executed and signed, he said to me, soon after I became a member (of the Atomic Energy Commission of India), in an agitated mind: 'What is happening to this country? Are we sending it down the drain? I said: 'Well, possibly we might be. But what is the matter?' He said: 'The Ministry of Communications has signed a contract or is about to sign a contract with RCA giving them a turnkey job for India's first earth station to be built up at Arvi.' He felt that we would do it, that he could do it, that our scientists and our engineers could do it. It was a shame that this was being handed over to a foreign firm on a turnkey basis. I naturally scratched my head. It was too big. I rang up the then secretary of the Ministry of Communications and asked him. He told me the usual story that they had made detailed enquiry, that it could not be done, that we had no competence, that we had a time-bound programme. Even if it could be done it would be late by six months, so on, and so forth. Since I could not let down my partner, Vikram, I had to think quickly as to what can one do about this in our country? One goes to the Prime Minister. It so happened that the Prime Minister understood the message, and we had a meeting with the Ministry of Communications in their full regalia. Vikram was diffident, nervous, angry, red in his face, and trembling almost, but at any rate he won, and though we had the psychological support of RCA in the electronics part of it, it was left to Indian engineers to design and build the Arvi Station."
This is not only an interesting example of his commitment towards national development but it also clearly indicates his trust in scientists, engineers and technologists of India who are capable of accepting any challenging task.

This is how his multiple leadership roles helped him in creating a number of institutions so that country should not look outside for professional scientists, engineers and technologists. That is why he always emphasised 'training' as one of the most important aspects of institution-building.

7.4 Leadership Model and Implications

This section is largely based on Ganesh and Joshi (1983) in which a leadership model emerge out of Vikram Sarabhai's institution building philosophy and leadership actions which resulted in creation of ATIRA and PRL, two institutions under study. (See Figure-4, p.183).

Vikram Sarabhai's leadership actions in creation of ATIRA and PRL, devoid of the mystique that surrounds leadership, do offer insights which are more widely applicable by less endowed personalities. One of the ways of understanding the impact of leadership actions on institution building is to outline the essence of Dr. Sarabhai's actions. This can be done around three guiding strategies he used, as evident from the data in the chapters of case studies of ATIRA and PRL. These three strategies rest on one single pivotal value. The pivotal value is the primacy and centrality of an individual. The three guiding strategies he used to build institutions around this pivotal value are:

1. **Networking strategy** or creating interacting and overlapping clusters internally as well as externally to produce both a vision for the
Organizational strategy

Manifestations of strategy of caring

Approachability
Communication/feedback
Administration as service to core tasks

Manifestations of organizational culture

Organic structure
Flexible systems
Humane style

Staffing:
Recruiting young people and inducting them
Skills: Training/development emphasis

Impact of leadership strategies and actions on institution building and organization development

Figure - 4
institution as well as to translate the vision into actions in terms of research programmes and projects;

2. **Trusting strategy** or creating a climate of trust providing freedom of action to the individuals, ensuring autonomy and emphasising horizontal control; and

3. **Caring strategy** or creating a climate of caring through emphasising the approachability of the leader, through open channels of communication and through emphasising the role of administration as support to the core tasks of the institution.

Sarabhal was able to translate these strategies into actions because of the multiple roles he played vis-a-vis both the external environment of the institution as well as the internal environment of the institution. These roles were both formal as well as psycho-social. Thus, Professor Pisharoty (in Yashpal 1980, p. 94-95) of PRL says:

"He was a master in managing people. He would give half-a-dozen different problems to half-a-dozen different people. Each would be made to feel that he was Dr. Sarabhal's favourite and, therefore, had been entrusted with the problem nearest to Dr. Sarabhal's heart.

Nilliyateasou nayl mayyamayam
Itisma sarvaha kalitabhiramah Narayaneeyam
(He is deeply interested in me, and me alone. Thus thought everyone and remained joyous and happy.)

However, as far as Dr. Sarabhal was concerned, all were equal to him, none he disliked, none he favoured. It was

Samoham Sarvabhuteshu
Na me dweshosti nacha me priyah - Gita
The work of Peters and Waterman (1982) also emphasises the importance of vision as well as that of an organizational culture built on trust and caring in the excellent organizations. One of the ways of understanding the strategy of creating interacting and overlapping clusters in excellent organizations covered in the study is to look upon the linkages such organizations establish with the users as well as with various functional people within the organization. Therefore, it is interesting that the model that emerges as a result of examining the leadership actions of Vikram Sarabhai in respect of creation of two research institutions closely parallels the experiences of the impact of leadership actions on excellent business organizations. Kotter's recent study of fifteen general managers also supports the point that leaders use 'agenda setting' and 'network building' strategies to achieve the organizational ends. (Kotter 1982, p.59-94).

Therefore, the model that has emerged appears to have a wider applicability in terms of leadership actions and their impact in diverse organizational settings. Figure-4 summarises the model and highlights that the leadership actions may be focused in three ways, namely,

1. Externally orientated leadership actions,
2. Internally orientated leadership actions, and
3. Interface leadership actions.

The externally orientated actions enable mobilisation of support and resources for the institution around a vision through creation of interacting and overlapping clusters in the environment. Internally orientated leadership strategies and actions enable creation of organic structures horizontal control systems and styles of functioning which emphasise symbols and rituals which reflect the autonomy and the freedom of action for an
Individual in the organization. The interface leadership actions enable both the development of an institution through attracting people to a vision and through establishing mechanisms of research, dialogue, dissemination and transfer (Ganesh, 1979).

In effect, the interface leadership actions map the environment on to the organization and the organization on to the environment.

In both the case studies ample evidence of actions of Vikram Sarabhai is shown in respect of these three categories of leadership actions through multiple roles in the ATIRA and the PRL settings. He continued to play similar roles in respect of the numerous institutions he founded during his brief life time.

The important lesson that any institution builder can learn from a study of Vikram Sarabhai's leadership style and actions are the following:

1. In order to develop institutions it is important to place an individual at the center of all the institution building efforts. The task of transforming and transactional leadership is to provide a vision with which a number of individuals will identify and to provide meaningful exchange relationships.

2. Leadership actions have to constantly nurture trust, creating interacting and overlapping clusters both within and outside the institution. Any default on any of these is likely to result in breakdown of the "institutional" aspects of the organization resulting in its decline and decay.

3. It is important for an institution builder to identify and play multiple formal and psycho-social roles both within and outside the institution.
While this is not a new point because various writers have talked about the multiple roles that have to be played by chief executives, their link with the institutional element is rarely emphasised. Decline in performance of institutions could also be traced to inadequate roles, both formal and psycho-social, to translate externally orientated, interface and internally orientated leadership strategies for institution building (Ganesh 1972).

While organization culture has always been emphasised as being critical to the development of institutions, the importance of building in trust and caring has not been adequately emphasised in the writings. This is, in the words of Peters and Waterman (1982), "back to the basics."

It is expected that this study will stimulate examination of experiences of practitioners in a new light and generate insights without being cluttered with jargon which tends to confuse rather than enlighten. The work of Sune Carlson (1951), Mintzberg (1973), Rosemary Stewart (1967, 1970) and, more recently, that of Kotter (1982) are all examples of such research in respect of managers. The work of Rosemary Stewart and others (1980) in respect of National Health Service in U.K. moves the research setting on to non-profit organizations as does the work of Kotter and Lawrence (1974). It is also possible to develop a very quick check list of institutional health through an examination of any institution on four aspects, namely:

1. existence of a shared vision;
2. number, nature and scope of interacting and overlapping clusters, both externally and internally;
3. trust as evidenced within the institution and as evidenced by the institution vis-a-vis its public and as evidenced by its various
publics vis-a-vis the institution; and finally

4. caring as evidenced by concern for performance in the institution, existence of multiple channels of communication, approachability of leaders and the centrality of the primary task of the institution as evidenced by the attitude of the administration.

On the basis of a quick diagnosis, it is possible for institutional leadership to initiate actions on one or more fronts to reinstate the individual at the centre of institution building. This is an imperative not because it is theoretically fashionable, but because it makes good practical sense whether one is in business or whether one is in a scientific or a research institution. This study is an effort to urge both theorists and practitioners to move in this direction so that many more candles may be lit than are snuffed out through ignorance and narrow self-interests.

7.5 Issues for further research

This is the last section of the last chapter. When the present research was started it looked as if I would be able to contribute to both social-sciences and the behavioural sciences which was far too ambitious. I conclude the present research with a number of issues identified while working on it.

1. Context appreciation and shaping:

An institutional leader is presented with two alternatives when he thinks of building an institution for social change. They are: 1. To identify appropriate context for the starting of a new institution. 2. To generate necessary context for the beginning of a new institution. For a leader like Sarabhai, both alternatives helped him. He
demonstrated his capability of identifying appropriate context as well as generating necessary context for a new institution. This was possible largely due to his multiple leadership roles and his networks.

Tandon (1980, p.113) described this phenomenon:

"In Government all doors were open to Vikram, and support was easily forthcoming."

2. An important responsibility of a head of an institution is to create a critical mass to preserve, protect and simultaneously nurture the operating culture to maintain its identity during the leadership change and also during other environmental changes (which are constantly occurring), and to maintain its identity and spread its boundaries even while the institution grows in all directions.

3. It is extremely difficult to create conditions in which unique combinations of individuals (visionaries and exceptional personalities), contexts and circumstances take place.

4. Individuals with vision and exceptional personality have created institutions of excellence, but that is due to the special coming together of people, events and circumstances which help translate their visions into actions. Is it possible to produce such experiences by any individual or group?

5. Originating, changing, renewing and reshaping of earlier mission is an extremely difficult and delicate task and there are more chances of killing the mission rather than bringing expected results.
Another very important aspect which needs special focus is routinization. Though this aspect has been indirectly covered in the above mentioned issues. A brief discussion would not be out of place.

When institution builders build innovative institutions for social change they generate certain processes which at later stage become rituals in the environment and also become needs. Their working style of operation assumes that behavioural changes should precede psychological changes. There are dangers in this assumption, especially, in the case of leadership change and environmental change (Ganesh 1976).

When leadership change takes place, the new leader may be an administrator, a manager or an entrepreneur. He might be interested in maintaining status quo rather than in innovations. Thus ends the earlier culture created by an innovative leader and certain rituals are continued which are meaningless without an appropriate operating culture and thus routinization take place.

I am not interested in a detailed discussion about the two institutions under study after Sarabhai's demise. Because he was quite clever in identifying leaders for his institutions even while he headed the institutions, change of leadership had negligible impact on the environment. But what I conclude is that it is an extremely difficult situation when leadership change takes place and in a number of examples original missions are no longer kept in view.

It is very important to document a number of institution building activities going on in developing countries and it is also extremely important to prepare case studies of institution building experiences of institution builders.
Through this exercise if new institutions are not built, at least, the old institutions will be preserved and run.

Though all the chips fell in place in the case of Vikram Sarabhai's IB activity we cannot expect the same favourable factors to accrue to the advantage of another institution builder. However, numerous institutions have come into existence since the birth of ATIRA and PRL. They have been and will be subjected to institutional crises which call for an expert yet delicate handling. Such situations can be effectively dealt with by studying Sarabhai's experiences and by adopting his IB philosophy. I only hope that builders, leaders and managers of all these myriad institutions would draw fruitful lessons from the examples set by Dr. Vikram Sarabhai and try to imitate the golden principles of institution-nurturance in a selfless effort for national development.

* * * * *