CHAPTER III

PYRAMID OF SUCCESS
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R&D and R&D Management from the General Standpoint

The Indigenous Research and Development (R&D) is very essential for the economic development of the country. The R&D being a vital activity has to be undertaken from the initial stage itself, in any organization, and by according it a special status and also appropriately integrating it in to the overall organization. However, it seems that, its management is not as much effective as it could be expected: a phenomenon. As already described, the Government policies in the past were highly regulatory and protective, which in a way failed to motivate R&D, and did not stimulate any major improvement in productivity or quality. With the economic liberalization the scenario has changed totally, thus posing greater threat to the Indigenous R&D; and it appears that in the ultimate reality the Indian R&D is striving to cope up. Thus, today, the R&D management assumes critical importance and hence the focus of the present study.

It was felt very essential at this juncture, in view of the observed fact that the R&D, R&D Management were the topics covered relatively less widely, especially in the area of high technology R&D in Electronics/IT/Telecom, and the treatment being in narrow packets, to conduct an elaborate literature survey and review, as presented in the Chapter I, covering the relevant works done by various scholars, within the country as well as those done in the international scenario. Further, the gamut of topics that were essential in the present study also demanded such a wide and in depth search of what has been done in the area. The above extensive review has been carried out and presented to give the complete picture and also to bring out what exactly has been done so far; as a definitive foundation and to substantiate the novelty and originality of the present research work and to demonstrate its usefulness.

Further, it appears that no real synergistic approach is in place and that the R&D Management has not been studied from the R&D perspective per se and as a means in improving the organizational effectiveness of R&D Institutions: It was felt necessary to have an overall approach to study a given situation in totality, hence the present study.
Initial Work

The outcome of the initial work carried out by the Researcher is presented below:

From the observation of some Research & Development Institutions - primarily the Government funded large Organizations and discussions with sizable number of their Senior Managers who are involved in R&D work the following were noted:

1. The Research & Development is a vital activity
2. It has to be undertaken from the initial stage itself
3. The Indigenous R&D has not been accorded any special status
   (Not just scientific/technical function, but as a management function)
4. At times lesser status compared to other purely in-house activities
   As for this last aspect few managers had expressed slightly different perspective, that is that Business considerations and hence the Marketing (and Finance) are more important. However, they had near unanimity as to the following:
5. The R&D calls for:
   - A strong determination/commitment,
   - Authority to impose self-constraints,
   - Ability to make decisions,
   - Understanding a situation in entirety,
   - A broader perspective and long term vision, and
   - Above all, a wider technical/ scientific proficiency.
6. Most of the Managers felt that only when, above are fulfilled, the R&D could be expected to deliver,
   - High quality and high reliability professional products and technologies
   - That upgradation from time to time is possible
     (as the situation changed/improved with advancement of Technology) and
   - This would also result in commendable commercial results.
7. The health of the R&D community and set up needs to be understood in totality.
Consequently, a series of discussions and personal informal interviews were held with the Managers from these R&D organizations over a period of time, and their organizations and respective R&D groups/teams were visited to have a first hand feel. The following were the observations made in the course of this search, as to the strengths and limitations of the R&D in general, some applicable to other organizations as well:

From a general standpoint the strengths of Indian Institutions are availability of
- excellent and able manpower
- easily trainable work force
- good Laboratories/facilities
- suitable instruments/machinery and
- appropriate methodologies/procedures

The Senior Managers and Scientists/Engineers had slight difference of opinion on the adequacy of the available facilities/Laboratories, yet they had agreement on the fact that they are superior and well equipped as compared to many private firms/companies. Another, factor that was noted was that scientific/technical collaborations were one of the main reasons for these strengths of the R&D as seen in some cases.

Most interestingly, many respondents put forward and stated that there exist a few more reasons for the success of their R&D Labs, which in reality are to be viewed as the core strengths:

1. Sponsorship by the Government
2. Free flow of adequate Funds
3. Freehand in day to day operations (and on focus of research, according to some)
4. and most importantly strong able leaders with great vision.

Besides Funds, the Leader factor was very strongly associated to the success: the first (Funds) for the fact that the results of R&D were quite uncertain, and probability of success (commercial!) would be debatable, and time factor is equally a question mark. As for the Leader the Scientists/Engineers and Managers together affirmed unanimously that but for the visionaries it would not been possible to have made such progress as seen now. The examples include Prof. UR Rao and Dr. Kasturi Rangan of Indian Space
Research Organization; Dr APJ Abdul Kalam for Defense Research, Dr RA Mashelkar of Council for Scientific and Industrial Research, Sam Pitroda for Centre for Development of Telematics, Prof, CNR Rao for Indian Institute of Science, Dr Kota Hari Narayana of Aeronautical Development Agency, and so on. Interestingly, there were number of other such Leaders from non-Government were also quoted by the respondents including NR Narayana Murthy of Infosys, Ajim Premji of Wipro, Ram Durai of Tata Consultancy Services, Kiran Majumdar for Biocon etc. (Ratan Tata and Adi Godrej were also quoted)

On the flip side of the coin while discussing the limitations of the R&D, the respondents mentioned some weak links areas, as follows:

1. marketing know-how (i.e. guesstimating areas of critical importance etc)
2. focus on what is needed (and knowing what is needed –some argued)
3. the timely completion / delivery (of the focused projects/products)
4. coping with the increased demands in the frontier areas
5. commitment to quality
6. dependence on import sources for many materials/instruments,
7. and finally, the attitude itself.

It was noted that the respondents were not unanimous in many of these issues, and according to them Research is end in itself and shall not be viewed like a production function. In other words, these Senior Managers and Scientists/Engineers, being basically from Government R&D were rather averse to view R&D as a commercial oriented activity, and for most of them R&D was a passion. However, they agree that if commercial gains are made the organization would get better funds in future and the R&D could be pursued more rigorously. For them primarily the publication of papers in international journals, presenting their findings/developments in conferences in front of their peers and lately, getting a few patents, has more fascination than making money. Yet some Managers felt that the days of R&D for R&D are no more feasible and that the R&D has to refocus itself towards demand side of R&D for better future of the Organization as a whole, and at the same time can concentrate on supply side of R&D to satisfy their own passionate scientific needs!
When further probed about the Attitude part, a few indicated that this last weak-link could be due to lack of good unification in the Indian industry in general, and felt that possibly because of the following: there are too many people/institutions working at sub-optimal/uneconomically small scale, that too in a disjoint form i.e. there is lack of cohesiveness. The other reasons usually mentioned, especially in component and product/system R&D is the Government’s licensing/funding policy that permitted licenses/permits to too many, the majority of them being in small-scale industry sector, without a good consideration of market forces & requirements. Further, the Government policies were highly regulatory and protective, which in a way failed to motivate R&D or automation, and did not stimulate any major improvement in quality or productivity. These opinions when discussed with Managers from some private companies, agreed but confronted that they were in no position to afford the kind of expenditures and additional uncertainties of R&D. However, these Managers from private sector also agreed that they were getting the requisite R&D and Quality improvement related support from the Government laboratories since they could afford to do so. Now they may have to act.

With the new Government policy on Economic Liberalization and pressure to become self sustaining, many of the Senior Managers and Scientists/Engineers felt that the Government is forcing institutions to be competitive & acceptable in terms of technology, quality, cost, and delivery, both in India and abroad. The pragmatic approach taken by a few institutions has gained wider acceptability over the years, includes examples like ISRO.

It was then felt necessary to talk to a few Managers from private sector (as above); and according to them, the biggest impediment in achieving high quality R&D through introduction of radical concepts is because of the myths or misconceptions that are widely prevalent in industry, especially at the higher level of management:

- R&D is a necessary evil, which has to be tolerated
- R&D program means additional cost.
- Higher quality costs more and means lower productivity
All these have one fundamental reason: Money. The returns on their investments is shrinking already in view of the severe competition, and putting money in the highly uncertain and expensive R&D is not at all a feasible solution, even though desirable. As a viable alternate to the (in house) R&D these companies are working on substituting R&D by economically importing or through collaborations, after the technology/products are developed elsewhere. However, these Managers have a realization that it cannot be true forever. Some feel that emphasis needs to shift to the process of R&D itself.

There were, however some common aspects that some of the Managers from the Government Labs and Private sector, shared to some extent: That is senior management’s point of view about the future vis-à-vis competitors. It was felt by these respondents that, the view needs to shift from being conventional and reactive i.e. mostly catching up to others (MNCs) to being distinctive and far-sighted largely driven by our own unique vision; regenerate core strategies and support the architects designing the future - rather than backing those with maintenance engineers’ mindset viz., working on the present and/or doing only cosmetic improvements.

In general, there was one point where almost all the Managers were sort of unanimous: keep the scientists in a benign state – respect their knowledge but fine-focus on what is needed, in the best interest of the country/organization.

Thence, as a consequence, in the present study, an attempt was made to examine the R&D Management from the general standpoint briefly and to examine the micro level i.e. the R&D Management at an Organizational level, in more detail. Various factors that were affecting management of R&D were studied and suitable remedial steps were identified, that were expected to improve the Organizational effectiveness of the R&D Institutions, and likely to result in they becoming competitive and assuring their ability to survive and also meet the challenges of the current turbulent times.

A word of clarification on the terms Effectiveness and Efficiency is appended in brief at the end of this Chapter.
Factors that affect Management of R&D

At the outset, carrying on with the applied commercial research that results in, as against the pure theoretical/basic research which typically may or may not have the potential to fructify in to inventions/innovations; the useful products and services add value to the scientific achievements and also for the growth if Industry and the Nation. Continuing with a soft option to buy the products from foreign sources, one does not realize, the quantum delays it introduces in and thus affects the indigenous Research and Development. Though research is going on in academic institutions and R&D Labs / Organizations for quite many years, only a few countable products have been productionised in the country. This needs to be corrected and encouraged to speed up induction of current technology indigenous products. Establishing product development and innovation process plan, capability identification, and execution and monitoring is critically essential. The R&D should lead to development of products and services, that in turn would improve the GDP, per Capita Income, and Quality of Life: Quality Innovation will help in making India a developed country as envisaged by our Leaders. With this kind of high expectations on R&D, once again high lights the dire necessity of Performance Measurement in R&D Organizations that would impact and improve the Effectiveness. This preamble reaffirms the criticality of Management of R&D.

From the Initial Work carried out, some progress was made in this direction.

A sizable number of Senior Managers and Scientists/Engineers from a select few Government R&D Institutions and some Private sector companies were the respondents approached during the initial work and the outcome as already presented, formed the foundation for the further study. It was in a way indicative of the factors that affect/aid R&D. However, it was not possible to formulate any conclusions in view of the lack of depth. Hence, it was felt that the study has to be limited to a specific domain, viz., IT/Telecom and find a representative sample and continue the present study. The Domain and the Primary Sample Organization, thus identified are described in great detail in Chapter II. It was noted that the Primary Sample Organization truly represents the high-technology R&D in the country.
The Indian Telecom R&D traditionally was a part of the single mammoth service provider with in the Government, the role and contribution were not adequate enough and hence massive imports were taking place. Then there was an R&D set up available in the country with another giant manufacturing set up also under the same Government ministry. This lead to a kind of monopoly situation and the costs of Telecom equipment and service were prohibitively expensive. At this juncture a new out fit was created – though with in the Government frame work itself, but with a clearer mandate and good amount of autonomy. This new R&D set up (the Primary Sample Organization) revolutionized the way R&D was done and focused on mass deployment of Telecom products all over the country – which were very cost effective and also reliable. The socio economic changes and impact brought in by this set up were a phenomenon. Now, of late, with the sweeping changes including the economic liberalization brought in 1991 that have come in the Telecom sector both technologically as well as politically as policy changes, this set up started facing challenges: putting it differently, the trends of Mobile and WiLL phone presence vis-à-vis land line (where the organization’s core competences were) and the approaches with in the Organization to cope with the current situation were the challenges faced. It was further observed that, in particular reference to the Primary Sample R&D Organization, in today’s competitive environment the challenges were: Reducing product development cycle time, improving market presence & market share, operating under narrow margins, countering unexpected uncertainties: such as, staff attrition, technological, obsolescence, economical/financial, political and social etc., and improving its IPR.

To begin with, it appeared that there existed a strong perception that research cannot be quantified and this perception needed to be corrected. A good amount of effort was needed to convince that if norms and/or guidelines are available for Performance Measurement and when they are implemented appropriately they would render as excellent means for evaluating the effectiveness of the R&D Organization, and there by lending it self for further improvement.
As the study was initiated, there was another general negative and detrimental perception to be encountered: Many Institutions were current in the past, and past in the current. This lead the Researcher to explore and question whether the good intentions were converging in to positive tangible outputs or whether the influential minority was in sync with, and/or was adhocism/rule of convenience were creeping in. There were able star performers, but not as many leaders or at the least good managers. The creation of environment conducive for R&D, wherein perfect interdependencies and sensitivity/sensitization towards R&D, become paramount. Finally, technical vision: planning/execution/delivery - all were debatable. All these, in a way, were despite having the state-of-the-art infrastructure, requisite talented manpower and finances. The net out come could be seen in the inordinate delays in project completion and issues with deliverables, large turnover of excellent staff, and some of those remaining feeling trapped or bored in the job, more with a sense of discomfort and meaninglessness. The situation appeared to be characterized by indifferent bottom, indecisive top & confused middle. This was the current scenario, as it was observed, and it became necessary to properly diagnose the ailment, identify its root causes and suggest application of permanent remedies rather than applying quick fix solutions.

A series of detailed interviews and discussions were done with the senior and middle level Managers cutting across complete organization (see Table 2.20; Table 2.8 & 2.9) and the summary out come in a nut shell was captured as shown below:

- For success of any organization, People, Products (or Projects) and Processes are the key elements – in that order. People constitute the organization, they are not just employees/labour – they are capital and productivity of this capital is critical in Knowledge Environment – as is the case at the R&D Institutions. Hence, People have to get precedence over Products. And similarly, Products have to get precedence over Processes, since Processes are only a means, and not ends.

- However, if focus is primarily on Processes, rather than creating an atmosphere that creates inspired employees, such focus causes chaos in the organization:
employees do more planning than doing. Further, this would lead to the growing bureaucracy, which results in emphasis on precedents/procedures, committees with no real authority, a formal hierarchy dictating permissible behaviour, layers of jobs, roles & titles created solely to reinforce rules, excessive compartmentalisation (like location, area of work, Scientists/ Technologists, Hardware/Software, Technical/Admin./non-Technical, Officers/Support Staff, etc.), and paralysed free flow of information, finally destruction of R&D culture!

But then, an organization can still maintain its innovative culture & free information flow, while standardizing & implementing its business processes/practices, thus increasing in efficiency and productivity, that is, balancing creativity and operating discipline is definitely feasible. For this a paradigm shift to ‘people are our greatest asset’, from ‘people are our greatest liability’, is very crucial.

This could be achieved by improving quality of life of employees by providing respect and support from above, beside and below; good wages; and safe physical/emotional environment, with a human touch. Then, the Purposefulness stems from the Focus & Energy being in proper synchronization. Such a Focus can only come from the technical vision and visibly proven commitment from the top. The Energies of research staff and managers then would get channelledized for organizational productivity/ efficiency/effectiveness.

A focus on the big picture, minimization of uncertainty would bring about a sea change in middle managers who would become the early volunteers, positive critics, with useful informal network, and who are versatile and possessing emotional intelligence. They would be the future visionaries and torchbearers, whom the staff and executives can emulate, and thereby perform & contribute. Then only, one can develop well-inspired Leaders.
• Today’s exponentially increased scientific/technological/design complexities can be handled, not with old management methodologies or with mediocrity of attitudes, but only by People Centric new age Management Practices, as a way of life.

• Discussions with other senior staff (officers & non-officers), these findings were affirmed further.

To gather specific statistics, a simple reference questionnaire was prepared and this was used as a guideline for obtaining feedback from a wide cross section of the staff. An attempt was made to have full coverage of all the staff members, to gain the full picture. In the cases when there has been a difference in opinion – though in minority, the staff members who have given such a feedback were interviewed/discussed separately, many a time in an informal setting, to know ‘why’ part of the answer. This was crucial because, there could have been specific reasoning for such a dissent/non-conformity. Even though it was not the intention of the Researcher to reach a hundred percent consensus, the idea of knowing ‘why’, not just ‘what’ was predominant. This was pursued as a better means to understand the actual situation, in totality.

The reference questionnaire shown below was used more as a guideline and not to miss out on any important aspect that would matter. However, as most of the questions were leading types and would not have one right answer, but multiple possibilities, it was felt that it would be more appropriate not to send them by mailers and await responses, and meet personally. In fact, it was felt that certain questions in the above were more relevant for certain level of officers and that few questions are better responded by certain level staff. When sent as a printed copy or as an email it was suitably modified with respect to whom it is being sent and what is expected of them. To give an example, the questions pertaining to the role of top management, road map definition, pruning the projects, review etc. were more relevant for senior managers – not that they are not relevant for staff nor that they can not do value addition. Hence, all the responses were viewed with due respect. In fact, the wide-ranging response helped the Researcher to arrive at the best approach to be adopted to capture the complete picture.
REFERENCE QUESTIONNAIRE

REFERENCE/Dt.
Name
Staff Identification Number
Salary Scale Grade
Responsibility Position Grade
Team/Group/Division/Location

Gender
Date of Birth
Date of Joining the Organization
Educational Qualification at the time of joining
Educational Qualification present
Grade at the time of joining (Salary/Position)

1. Area of your R&D Activities
2. The Domain Details
3. How do you define your R&D Activities
4. How do you rate your development facilities (HW/SW)
5. How good are the Infrastructure facilities (Technical/Service)
6. How do you rate the currency of your R&D efforts
7. How do you see the market/business potential of your project/product
8. What are the likely service considerations/issues you foresee
9. Do you see your project meeting quality requirements as prescribed
10. How about the time/schedule aspects
11. Are your R&D tasks well defined
12. In case problems are encountered how do you resolve
13. Do you have to attend on multiple projects
14. How do you rate the results of your present/past projects (Quality/Cost/Schedule)
15. How do you define success of project
16. How do you define creativity/originality of your projects/works
17. What do you see the IP potential of your projects
18. How do you consider publication potential of your work/results
19. How do you see the knowledge/learning potential
20. How about Trainings/talent improvement
21. What is your opinion on Administrative matters (HR/Admin/Finance/Purchase)
22. How do you rate the Recruitment process
23. How do you rate the Life at the Organization
24. How does it compare with other competitors
25. How much importance do you attach to job satisfaction
26. What about job performance
27. What about Sense of achievement
28. How do you rate performance of your team/group/division
29. What do you think about performance of the Organization as a whole
30. Do you think the Organization could do better
31. In what ways could the performance be improved
32. What factors are critical for good performance of the Organization
33. How do you see the Top Managements role in this
34. How do you rate your immediate superior's role in this
35. How good and useful is the Road Map Definition
36. How effective is the Pruning of Projects
37. How do you view the Review Mechanism
38. How significant is Conducive Environment for R&D
39. How do you rate communication within the Organization (formal/informal)
40. Do you subscribe to gossips/rumours and what is their effect
41. What about interpersonal relationships
42. Are you part of any informal network (formal/informal)
43. How helpful is the knowledge network of yours in performance improvement
44. Do you think Politics are present in the Organization
45. What effects do you foresee of politics/political relationships
46. Do you come across Conflicts
47. How do you rate the conflict resolution mechanism in the Organization
48. What is your definition of Efficiency and Effectiveness in the Organization
49. What is your definition of Mediocrity/Inefficiency
50. Do you think Rationality/Integrity are commonly present
51. What do you think Ideal R&D Organization would be
52. How Integrated is the Organization
53. Do you think there is compartmentalization in the Organization and what kind
54. Do you think there is better way of dealing with them (Technical/non-Technical)
55. How good are the Career Growth in Salary/Scale opportunities in the organization
56. How good are the Career Growth in Position opportunities in the organization
57. Do you think Creation of Parallel/off-line Structures would help experts/scientists
58. What is your thinking on attrition/retention of staff
59. How focussed and product oriented/innovation centric is the Organization
60. Do you feel Sense of Identification & Pride in the Organization

*This reference questionnaire was used more as a guideline/reference, and administered judiciously.*
As a summary of the various responses from the discussions and structured interviews using the above reference questionnaire as a guideline/reference, and administering it cautiously and judiciously in the primary sample organization the following specifics were identified which were expected to be attended to make an R&D institution effective from management perspective. Numerically speaking, the coverage was 6 number of senior managers (all), 15 middle level managers (all), 34 entry level managers (of 44), 7 non-technical managers (all), 3 non-technical executives (all), 124 Engineers/Scientists (of 163), 97 technical support staff (of 126), 33 non-technical support staff (of 44). Thus the total members covered from the primary sample organization were 319 (of total 409).

General outcome of this effort was as follows:

- The People part is the top most priority item that needs to be taken care in any Organisational set up.

- The next priority would be specific initiatives to be taken so as to be able to conduct Organization’s activities for a sustained growth/progress. It was observed that it is not only necessary to develop products/applications/software with appropriate technologies, but also to focus on customer (people at large) orientation keeping in mind the need to provide quality & timely service and life time support to products.

- It was noted that Building core competencies for the organisation’s special needs, looking for so-far untapped markets, developing products which are not just current but well ahead of time – not just leapfrogging, but a substantial quantum jump; competing for not only today’s lead, but also creating future markets/technologies; building state-of-the-art infrastructure (through zero basing and systematically assessing the needs); providing requisite training for operational effectiveness, and having strict financial discipline (with a role shift for Finance from mere bean counting to something much more strategic) were the other crucial areas of concern according the general opinions gathered.
• Building good relations with industry/academics for synergy was identified as a must.

• A cohesive & pragmatic Project Management/Project Monitoring was identified to assume greater importance in the Organisation, more in terms of knowledge management, at this juncture, according to the members.

• It was also generally felt that the nation today expects from R&D organizations, to provide "Technical & Commercial Leverage" for the Government, more so in today's post liberalization economic scenario. (This was contrary to the general public opinion of the ordinary people who feel that the new technology was wastage of national resources, some vehemently asserted and they stressed that the aim should not be to discuss the pros and cons of a new technology but instead the Organization should be trying to "Indianise" any technology so that it was able to cater to the needs of the Indian society at large and aid in bridging the economic & digital divide!)

**Remedial Steps**

As a summary, the following possible remedial steps were identified which needed to be attended to, which in turn would make an R&D institution effective, from management perspective:

1. The Top Management needs to be a Monolith with all its members being collectively responsible for the activities of the Organization. Any staff member, may approach any of the Top Management members to get near identical direction / guidance.

2. The Organizational approach / road map for future (say for the next 5/10 years) need to be committed, and communicated down the line.
3. Pruning of Projects, both in count and quality/commercial need and faster turn around times is essential. This is to be done keeping the organizational priorities in mind and not to be woven around the individuals. Taking up integrated solution kind of projects or going in for a Re-engineering/Value engineering need to be scrutinized very closely, that too in the present context of competition. Outsourcing could be thought of for improved cost/turn around times as a strategic tool (not as an end in itself - it is a double edged sword) and by ensuring that internal competencies are not shifted out.

4. The appropriate review mechanism, keeping in mind point # 1, 2 & 3 as above, needs to be established, so as to meet the project targets.

5. The role and influence of the non-technical / technical Services vis-à-vis the scientific/technical (R&D) teams needs a closer look; conducive environment is a must for an assertive R&D.

6. The integration or de-compartmentalisation, in all terms (Technical vis-à-vis non-Technical etc.) needs to be taken up on priority, both in letter and spirit.

7. The career growth plans/policies for Scientists/Engineers/Support need to be reviewed to be in line with the best of the organizations.

8. The responsibility positions also may be reviewed with due consideration to the longevity of service, technical competence and leadership qualities.

9. Parallel growth path for pure Scientists/ Technologists/Experts, to be worked out, for those who may not fit in to the Managerial cadres. At times it may be necessary to satisfy a few very senior staff members by giving them an appropriate designation/ title, emphasizing contribution in terms of guidance rather than hands on.
10. In Government set up with the constraints on pay and perks, the only tangible way to retain the manpower, is with the good work, in other words, a sense of identification and pride in the Organization's output and recognition.

The above could be summarised as below:

- #1 Monolith Characteristic of the Management
- #2 Road Map Definition
- #3 Pruning of Projects
- #4 Appropriate Review Mechanism
- #5 Conducive Environment for R&D
- #6 Integration (or de-compartmentalisation)
- #7 Career Growth in Salary/Scales
- #8 Career Growth in Positions
- #9 Creation of Parallel (off-line) Structure
- #10 Sense of Identification & Pride in the Organization

The responses from the respondents as number acknowledging the influence and its level of influence, and corresponding percent of respondents for each of the above are listed in the following tables. The responses of Managers, Officers and Non-officers are tabulated separately and as a Total as well. (Tables 3.1, 3.2, 3.3, and 3.4 respectively).

The number of respondents in Managerial level were 6 number of senior managers, 15 middle level managers, 34 entry level managers, and 7 non-technical managers; making a total of 62. Similarly, the numbers of respondents in the Officers level were 124 Engineers/Scientists and 3 non-technical executives making a total of 127. The Non-officers included 97 technical support staff and 33 non-technical support staff, making the total to 130. Thus the total members covered from the primary sample organization were 319, in all.
Table 3.1
Responses of Managers

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Element</th>
<th>% Respondents (Weighted Average)</th>
<th>No. of Respondents (out of a Total of 62 Managers)</th>
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</thead>
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<tr>
<td>#1</td>
<td>Monolith Characteristic of the Management</td>
<td>93.5</td>
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<td>#2</td>
<td>Road Map Definition</td>
<td>88.7</td>
<td>55</td>
</tr>
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<td>#3</td>
<td>Pruning of Projects</td>
<td>87.1</td>
<td>54</td>
</tr>
<tr>
<td>#4</td>
<td>Appropriate Review Mechanism</td>
<td>90.0</td>
<td>56</td>
</tr>
<tr>
<td>#5</td>
<td>Conducive Environment for R&amp;D</td>
<td>82.2</td>
<td>51</td>
</tr>
<tr>
<td>#6</td>
<td>Integration (or de-compartmentalisation)</td>
<td>80.6</td>
<td>50</td>
</tr>
<tr>
<td>#7</td>
<td>Career Growth in Salary/Scales</td>
<td>75.8</td>
<td>47</td>
</tr>
<tr>
<td>#8</td>
<td>Career Growth in Positions</td>
<td>77.4</td>
<td>48</td>
</tr>
<tr>
<td>#9</td>
<td>Creation of Parallel (off-line) Structure</td>
<td>67.7</td>
<td>42</td>
</tr>
<tr>
<td>#10</td>
<td>Sense of Identification &amp; Pride in the Organization</td>
<td>58.0</td>
<td>36</td>
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</table>

Source: Field Data
Table 3.2

Responses of Officers

<table>
<thead>
<tr>
<th>SI No.</th>
<th>Element</th>
<th>% Respondents (Weighted Average)</th>
<th>No. of Respondents (out of Total of 127 Officers)</th>
</tr>
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<tr>
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<td>Monolith Characteristic of the Management</td>
<td>95.3</td>
<td>121</td>
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<td>#4</td>
<td>Appropriate Review Mechanism</td>
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<td>#6</td>
<td>Integration (or de-compartmentalisation)</td>
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<tr>
<td>#7</td>
<td>Career Growth in Salary/Scales</td>
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<td>#8</td>
<td>Career Growth in Positions</td>
<td>76.4</td>
<td>97</td>
</tr>
<tr>
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<td>#10</td>
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Source: Field Data
Table 3.3
Responses of Non-Officers

<table>
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<tr>
<th>Sl No.</th>
<th>Element</th>
<th>% Respondents (Weighted Average)</th>
<th>No. of Respondents (out of Total of 130 Non-Officers)</th>
</tr>
</thead>
<tbody>
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Source: Field Data
Table 3.4
Responses of Total Respondents

<table>
<thead>
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<th>SI No.</th>
<th>Element</th>
<th>% Respondents (Weighted Average)</th>
<th>No. of Respondents (out of Total of All 319 Respondents)</th>
</tr>
</thead>
<tbody>
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<td>Appropriate Review Mechanism</td>
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<td>271</td>
</tr>
<tr>
<td>#5</td>
<td>Conducive Environment for R&amp;D</td>
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</tr>
<tr>
<td>#6</td>
<td>Integration (or de-compartmentalisation)</td>
<td>81.5</td>
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<td>#7</td>
<td>Career Growth in Salary/Scales</td>
<td>80.9</td>
<td>258</td>
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<td>#8</td>
<td>Career Growth in Positions</td>
<td>74.9</td>
<td>239</td>
</tr>
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<td>#9</td>
<td>Creation of Parallel (off-line) Structure</td>
<td>70.5</td>
<td>225</td>
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<tr>
<td>#10</td>
<td>Sense of Identification &amp; Pride in the Organization</td>
<td>62.7</td>
<td>200</td>
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</table>

Source: Field Data
"PYRAMID OF SUCCESS" MODEL

From the Table 3.4 above, it was obvious that the Ten elements (requirements to be fulfilled) as above that were considered to have influence and effect the performance of the organization in that stated order of priority.

Based on the results of the study so far, a simple Model [© Sreenath Settur] depicted as the "Pyramid of Success"- containing the above TEN elements, prioritized, and sub-categorized as Generic, Career, Project and Review requirements, was suggested for efficient and effective management of R&D at the Organizational level. (Please see Figure 3.1 "Pyramid of Success")

The "Pyramid of Success" figure has four layers starting from the widest at the bottom containing four elements (blocks), the next layer containing three and the subsequent layer with two and the top most layer containing one element.

The groupings are as follow:

Generic Requirements # 1, 5, 6 & 10

#1 Monolith Characteristic of the Management
#5 Conducive Environment for R&D
#6 Integration (or de-compartmentalisation)
#10 Sense of Identification & Pride in the Organization

Career Requirements # 7, 8 & 9

#7 Career Growth in Salary/Scales
#8 Career Growth in Positions
#9 Creation of Parallel (off-line) Structure

Project Requirements # 2 & 3

#2 Road Map Definition
#3 Pruning of Projects

Review Requirements # 4

#4 Appropriate Review Mechanism
Figure 3.1. Pyramid of Success

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Requirements:-

Generic: # 1, 5, 6 & 10
Career: # 7, 8 & 9
Project: # 2 & 3
Review: # 4

Where

#1 Monolith Characteristic of the Management
#2 Road Map Definition
#3 Pruning of Projects
#4 Appropriate Review Mechanism
#5 Conducive Environment for R&D
#6 Integration (or de-compartmentalization)
#7 Career Growth in Salary/Scales
#8 Career Growth in Positions
#9 Creation of Parallel (off-line) Structure
#10 Sense of Identification & Pride in the Organization
Necessary and Sufficient Conditions

A general description of the concepts of the Necessary and Sufficient Conditions was presented in the Chapter I. The Definitions and Examples could be recalled for quick reference as follow:

Definition of "Necessary condition": A condition A is said to be necessary for a condition B, if (and only if) the falsity (non-existence/non-occurrence) [as the case may be] of A guarantees (or brings about) the falsity (nonexistence/non-occurrence) of B.

Definition of "Sufficient condition": A condition A is said to be sufficient for a condition B, if (and only if) the truth (existence /occurrence) [as the case may be] of A guarantees (or brings about) the truth (existence/occurrence) of B.

Examples of Necessary and Sufficient Conditions:

1. Paying tuition fee is necessary but not sufficient for graduation from the University.
   
   Necessary: One can't graduate without paying tuition fee.
   Not sufficient: Paying tuition fee is not enough to ensure that one graduates.

2. Being able to run a 4-min. mile is sufficient but not necessary for being physically fit.
   
   Sufficient: Being able to run a 4-min. mile guarantees that one is physically fit.
   Not Necessary: Being able to run a 4-minute mile is not required for being physically fit: One can be physically fit without being able to run a 4-minute mile.

3. Satisfying all the academic requirements and paying all fees is both necessary and sufficient for being eligible to graduate.
   
   Necessary: One can't graduate unless he satisfies all the academic requirements and pays all the fees.
   Sufficient: If one does satisfy all the academic requirements and pays all his fees, then he is eligible to graduate.

Similarly, "Today's being neither Saturday nor Sunday is both a necessary and a sufficient condition for today's being a weekday."

With this knowledge, all the ten elements/requirements of the Pyramid of Success — categorized as the bottom two (Generic & Career) layers and the top two (Project & Review) - were studied to explore how they would affect and influence the improving performance and effectiveness of the organization: presented below:
The Generic Requirements represented in the lower most layer of the pyramid, contains the requirements viz., Monolith Characteristic of the Management, Conducive Environment for R&D, Integration (or de-compartmentalisation), and Sense of Identification & Pride in the Organization. Each of these when carefully analysed in an organisational setting would reveal that their mere presence couldn't bring about any outcome whatsoever from the R&D organisation (for that matter in any organization). However, if they are not present or present at a level less than the critical minimum, they would have a very negative influence on the members of the organisation, and as an end result would cause jeopardy.

The Definition of "Necessary condition" as above could be applied on this: The condition A (the Generic requirements) would be necessary for a condition B (viz., the performance/effectiveness of the organization) if and only if the falsity (non-existence/non-occurrence of Generic requirements) of A guarantees (or brings about) the falsity (nonexistence/non-occurrence) of B (the performance/effectiveness of the organization). It could also be noted by applying the definition of "Sufficient condition": A condition A (the Generic requirements) is not sufficient for the condition B, (viz., the performance/effectiveness of the organization), because the existence/occurrence of A does not guarantee or brings about the existence/occurrence of B. Thus theGeneric requirements form only necessary conditions, but not sufficient conditions.

As it was shown earlier, there could be many more necessary conditions. The next layer viz., the Career Requirements: Career Growth in Salary/Scales, Career Growth in Positions, and Creation of Parallel (off-line) Structure for those who aspire for such fall in the other necessary conditions. It could be argued in the same logic above, and could be easily shown that the nonexistence/non-occurrence (or its less than adequate presence) would result in and bring about nonexistence/non-occurrence or degradation of the organizational performance there by its effectiveness. On the contrary the existence/occurrence does not guarantee or brings about existence/occurrence of organizational performance or thereby its effectiveness. Thus the Career requirements also form only necessary conditions, but not sufficient conditions.
Now the next two top layers viz. the Project Requirements Road Map Definition and Pruning of Projects; and the Review Requirements viz., Appropriate Review Mechanism could be analyzed. It could be easily shown that the nonexistence/non-occurrence (or its less than adequate presence) of these three elements would result in and bring about nonexistence/non-occurrence or degradation of the organizational performance there by its effectiveness. However, it could also be seen that these three conditions are sufficient for condition B i.e., the organizational performance there by organizational effectiveness since their mere existence/occurrence guarantees (and there by brings about) the truth existence/occurrence of the organizational performance and thereby the organizational effectiveness. In fact, they appear to have direct linear relationship, i.e. more and more the fulfillment of these three requirements more and more the positive out come in the organizational effectiveness. In a hypothetical situation, from a given level of existence these three (individually or together), if their level comes down, the organizational effectiveness may come down by equivalent proportion only; it may reduce efficiencies substantially, but under no circumstances it would turn out negative.

On the contrary the Generic Requirements and Career requirements fall by certain level (individually or together), the effect would be much more out of proportion, and if the level comes below a critical level it may turn out to be an out and out negative scenario. This critical level would vary depending on the type and magnitude of the organization, but also would vary depending on the location and culture as well. These issues would be discussed in greater detail later in this Chapter.

Thus it could be seen that the Project Requirements and Review requirements form and satisfy both the necessary and sufficient conditions; where as the Generic Requirements and Career requirements form and satisfy only the necessary conditions but they do not satisfy sufficient conditions.

This is akin to the Maslow's hierarchy of Needs in many ways, and the hierarchy in this case is Generic, Career, Project and Review layers in that order, at an Organizational level. A discussion on the “Pyramid of Success” Model and the Maslow’s hierarchy of Needs is appended at the end of this Chapter.
Correlation

A general description of the concepts of the Correlation Analysis and its computation and interpretation was presented in the Chapter 1; the brief could be recalled for quick reference as follow:

Correlation is a statistical technique that can show whether and how strongly pairs of variables are related. There are several different correlation techniques. The most common type is called the Pearson or product-moment correlation. When working with quantities correlation provides precise measurement; whereas working with rating scales, (one cannot assume the mid-points of the scale "good" is exactly half way between "excellent" and "fair"); as is the case in the present study, correlations do provide general, yet accurate, indications.

The main result of a correlation is called the correlation coefficient (or "r"). It ranges from -1.0 to +1.0. The closer r is to +1 or -1, the more closely the two variables are related. If r is close to 0, it means there is no relationship between the variables. If r is positive, it means that as one variable gets larger the other also gets larger. If r is negative it means that as one gets larger, the other gets smaller. While correlation coefficients are normally reported as r = a value between -1 and +1, squaring them makes then easier to understand. The square of the coefficient (or r square) is equal to the percent of the variation in one variable that is related to the variation in the other. After squaring r, ignore the decimal point. Eg. An r of .5 means 25% of the variation is related (.5 sq =.25).

With this knowledge, all the ten elements/requirements of the Pyramid of Success - categorized as the bottom two (Generic & Career) layers and the top two (Project & Review) - were studied to explore how they would affect and influence the improving performance and effectiveness of the organization and how exactly they correlate in that. After much experimentation and deliberation, it was found that the Correlations at the individual element level would not give truer picture and that as the layers they would give an accurate picture (i.e. the top two (Project & Review) layers and the bottom two (Generic & Career) layers correlate). Findings presented below:
The Correlation computations were done as follows: For the Bottom Two Layers i.e. the Generic Requirements (# 1, 5, 6 & 10) and the Career Requirements (# 7, 8 & 9) the correlations were computed using the data for the Managers (62 members), Officers (127 members) and Non-Officers (130 Members) and as a total of all Staff members (319). These are represented in the Tables 3.5 to 3.8 respectively, for various levels of influence.

Similarly for the Top Two Layers i.e. the Project Requirements (#2 & 3) and the Review Requirements the correlations were computed using the data for the Managers (62 members), Officers (127 members) and Non-Officers (130 Members) and as a total of all Staff members (319). These are represented in the Tables: 3.9 to 3.12 respectively.

Each of the Table (3.5 to 3.12) indicates two columns of data x vs y i.e. the numbers for the Generic vs Career requirements OR the Project vs Review Requirements OR the Generic & Career requirements vs the Project & Review Requirements, as the case may be, for Managers (62), Officers (127), Non-Officers (130) OR All Staff (319). The two columns of data (x vs y) is represented as a rating scale viz., the degree of how strongly Influences are (1,2,3,4 or 5 OR 0-20%, 20-40%, 40-60%, 60-80% or 80-100% OR equivalently with mid points such as 10%, 30%, 50%, 70% or 90%): to put in other words, the number of respondents' perceived degree of correlation on the influence of x and also y at that level. The Statistical Analysis done on these data is also indicated viz., the Means, the Variances, the Regression Coefficients, the Covariance, and most importantly the Correlation Coefficient (r) and its square (r^2). The relation as a curve fitted line for x vs y is also indicated as an equation.

As part of correlation report statistical significance is also shown: In Statistics "significant" means probably true (not due to chance). When statisticians say a result is "highly significant" they mean it is very probably true. Significance levels show how likely a result is due to chance. The most common level, used to mean something is good enough to be believed, is .95. This means that the finding has a 95% chance of being true. However, this value is shown as ".05," meaning that the finding has a five percent (.05) chance of not being true, which is the converse of a 95% chance of being true.
Table 3.5
Generic vs Career Requirements
Responses of Managers

<table>
<thead>
<tr>
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<th>Y</th>
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Source: Field Data

Statistics

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<td>Regression X on Y</td>
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</tr>
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Lines

\[ x = 12.400000 + -0.898734(y - 12.400000) \]
\[ y = 12.400000 + -0.959459(x - 12.400000) \]
Table 3.6

Generic vs Career Requirements

Responses of Officers

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<td>x</td>
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<tr>
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<tr>
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Lines

\[
x = 25.400000 + -0.822605(y - 25.400000)
\]
\[
y = 25.400000 + -1.126025(x - 25.400000)
\]
## Table 3.7

**Generic vs Career Requirements**

**Responses of Non-Officers**

<table>
<thead>
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<th>X</th>
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Source: Field Data

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\[
x = 26.200000 + -0.545752(y - 26.000000) \\
y = 26.000000 + -1.359935(x - 26.200000)
\]
Table 3.8
Generic vs Career Requirements
Responses of All Staff Members

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Source: Field Data

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\[ x = 63.800000 + -0.739706(y - 63.800000) \]
\[ y = 63.800000 + -1.187846(x - 63.800000) \]
Table 3.9
Project vs Review Requirements
Responses of Managers

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<tr>
<td>Covariance X and Y</td>
<td>19.840000</td>
</tr>
<tr>
<td>Regression Y on X</td>
<td>0.673913</td>
</tr>
<tr>
<td>Regression X on Y</td>
<td>1.284974</td>
</tr>
<tr>
<td>Correlation X and Y “r”</td>
<td>0.930570</td>
</tr>
<tr>
<td>Square of Correlation</td>
<td>0.866</td>
</tr>
<tr>
<td>Significance p</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

Lines

\[ x = 12.400000 + 1.284974(y - 12.400000) \]
\[ y = 12.400000 + 0.673913(x - 12.400000) \]
Table 3.10
Project vs Review Requirements
Responses of Officers

<table>
<thead>
<tr>
<th></th>
<th>X</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>10</td>
<td></td>
</tr>
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<td>16</td>
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<td></td>
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<td>30</td>
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Source: Field Data

Statistics

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<tr>
<td>Mean Y</td>
<td>25.400000</td>
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<td>143.840000</td>
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<tr>
<td>Variance Y</td>
<td>95.840000</td>
</tr>
<tr>
<td>Covariance X and Y</td>
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</tr>
<tr>
<td>Regression Y on X</td>
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<tr>
<td>Regression X on Y</td>
<td>1.148164</td>
</tr>
<tr>
<td>Correlation X and Y</td>
<td>0.937211</td>
</tr>
<tr>
<td>Square of Correlation</td>
<td>0.8784</td>
</tr>
<tr>
<td>Significance p</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

Lines

\[ x = 25.400000 + 1.148164(y - 25.400000) \]
\[ y = 25.400000 + 0.765017(x - 25.400000) \]
Table 3.11

Project vs Review Requirements

Responses of Non-Officers

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
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<tbody>
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<td>37</td>
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Source: Field Data

Statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Mean X</td>
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<tr>
<td>Mean Y</td>
<td>26.000000</td>
</tr>
<tr>
<td>Variance X</td>
<td>82.400000</td>
</tr>
<tr>
<td>Variance Y</td>
<td>34.000000</td>
</tr>
<tr>
<td>Covariance X and Y</td>
<td>49.400000</td>
</tr>
<tr>
<td>Regression Y on X</td>
<td>0.599515</td>
</tr>
<tr>
<td>Regression X on Y</td>
<td>1.452941</td>
</tr>
<tr>
<td>Correlation X and Y “r”</td>
<td>0.933306</td>
</tr>
<tr>
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<td>0.8711</td>
</tr>
<tr>
<td>Significance p</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

Lines

\[ x = 26.000000 + 1.452941(y - 26.000000) \]
\[ y = 26.000000 + 0.599515(x - 26.000000) \]
Table 3.12
Project vs Review Requirements
Responses of All Staff Members

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>36</td>
</tr>
<tr>
<td>46</td>
<td>56</td>
</tr>
<tr>
<td>84</td>
<td>81</td>
</tr>
<tr>
<td>89</td>
<td>84</td>
</tr>
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<td>77</td>
<td>62</td>
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</tbody>
</table>

Source: Field Data

Statistics

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Mean X</td>
<td>64.000000</td>
</tr>
<tr>
<td>Mean Y</td>
<td>63.800000</td>
</tr>
<tr>
<td>Variance X</td>
<td>623.600000</td>
</tr>
<tr>
<td>Variance Y</td>
<td>308.160000</td>
</tr>
<tr>
<td>Covariance X and Y</td>
<td>415.600000</td>
</tr>
<tr>
<td>Regression Y on X</td>
<td>0.666453</td>
</tr>
<tr>
<td>Regression X on Y</td>
<td>1.348650</td>
</tr>
<tr>
<td>Correlation X and Y &quot;r&quot;</td>
<td>0.948057</td>
</tr>
<tr>
<td>Square of Correlation</td>
<td>0.8988</td>
</tr>
<tr>
<td>Significance p</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

Lines

\[
x = 64.000000 + 1.348650(y - 63.800000)
\]
\[
y = 63.800000 + 0.666453(x - 64.000000)
\]
Table 3.13 and 3.14 respectively indicate the summary of Tables 3.5 to 3.8 and Tables 3.9 to 3.12 viz., the Generic vs Career Requirements and Project vs Review Requirements. Table 3.13 and 3.14 thus represent all the Correlation Coefficients “r” as computed above, at a glance. The square of the Correlation Coefficient is also indicated.

**Table 3.13**

*Correlation Data for Generic vs Career Requirements*

<table>
<thead>
<tr>
<th>Level →</th>
<th>Managers</th>
<th>Officers</th>
<th>Non-Officers</th>
<th>All Staff Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td>V</td>
<td>Correlation Coefficient “r”</td>
<td>-0.928601</td>
<td>-0.962431</td>
</tr>
<tr>
<td>Square of Correlation Coefficient</td>
<td>0.8623</td>
<td>0.9263</td>
<td>0.7422</td>
<td>0.8787</td>
</tr>
<tr>
<td>Statistical Significance</td>
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<td>&lt; 0.05</td>
<td>&lt; 0.05</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

*Source: Field Data*

**Table 3.14**

*Correlation Data for Project vs Review Requirements*

<table>
<thead>
<tr>
<th>Level →</th>
<th>Managers</th>
<th>Officers</th>
<th>Non-Officers</th>
<th>All Staff Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td>V</td>
<td>Correlation Coefficient “r”</td>
<td>0.930570</td>
<td>0.937211</td>
</tr>
<tr>
<td>Square of Correlation Coefficient</td>
<td>0.866</td>
<td>0.8784</td>
<td>0.8711</td>
<td>0.8988</td>
</tr>
<tr>
<td>Statistical Significance</td>
<td>&lt; 0.05</td>
<td>&lt; 0.05</td>
<td>&lt; 0.05</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

*Source: Field Data*
It could be seen from the Table 3.13 that the Correlation Coefficients for Generic vs Career Requirements are negative, but displaying a strong correlation. Similarly, it could be seen from the Table 3.13 that the Correlation Coefficients for Project vs Review Requirements are positive, but displaying a strong correlation, in fact across all levels. The inference from these findings was that the top two (Project & Review) layers correlate positively, and the bottom two (Generic & Career) layers correlate negatively.

Further it was noted that there was a strong Correlation between these two sets as well viz., the Bottom Two Layers (Generic and Career Requirements) and the Top Two Layers (Project and Review Requirements), hence the correlations were computed using the data for the Managers (62 members), Officers (127 members) and Non-Officers (130 Members) and as a total of all Staff members (319). These are represented in the Tables: 3.15 to 3.18 respectively.

Table 3.19 represents all the Correlation Coefficient “r” as computed above at a glance. The square of the Correlation Coefficient is also indicated. Table 3.19 indicates the summary of Tables 3.15 to 3.18 viz., the Generic & Career Requirements vs Project & Review Requirements.

It could be seen from the Table 3.19 that the Correlation Coefficients for the Generic & Career Requirements vs Project & Review Requirements were positive, and displaying a strong correlation, in fact across all levels. The inference from these findings was that the bottom two (Generic & Career) layers and the top two (Project & Review) layers correlate positively. This was a very significant finding, since the bottom layers being and fulfilling the necessary conditions only, their being positively correlated to the critical top two layers would synergistically enhance the performance and thereby the effectiveness of the organization. This inference was very encouraging, as it paved way for further efforts towards integrated approach.
### Table 3.15
Generic & Career Requirements vs Project & Review Requirements

**Responses of Managers**

<table>
<thead>
<tr>
<th>X</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>7</td>
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Source: Field Data

**Statistics**

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<td>Mean Y</td>
<td>12.400000</td>
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<tr>
<td>Variance X</td>
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<td>Variance Y</td>
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<tr>
<td>Covariance X and Y</td>
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</tr>
<tr>
<td>Regression Y on X</td>
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</tr>
<tr>
<td>Regression X on Y</td>
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</tr>
<tr>
<td>Correlation X and Y “r”</td>
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</tr>
<tr>
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<td>0.8244</td>
</tr>
<tr>
<td>Significance p</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

**Lines**

\[ x = 12.400000 + 0.990494(y - 12.400000) \]
\[ y = 12.400000 + 0.832268(x - 12.400000) \]
Table 3.17
Generic & Career Requirements vs Project & Review Requirements
Responses of Non-Officers

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>10</td>
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Source: Field Data

Statistics

<p>| | |</p>
<table>
<thead>
<tr>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Mean X</td>
<td>26.000000</td>
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<tr>
<td>Mean Y</td>
<td>24.000000</td>
</tr>
<tr>
<td>Variance X</td>
<td>70.000000</td>
</tr>
<tr>
<td>Variance Y</td>
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<tr>
<td>Covariance X and Y</td>
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<td>Regression Y on X</td>
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<tr>
<td>Regression X on Y</td>
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<tr>
<td>Square of Correlation</td>
<td>0.9444</td>
</tr>
<tr>
<td>Significance p</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

Lines

\[
x = 26.000000 + 0.876744(y - 24.000000)
\]
\[
y = 24.000000 + 1.077143(x - 26.000000)
\]
Table 3.19
Correlation Data for
Generic & Career Requirements vs Project & Review Requirements

<table>
<thead>
<tr>
<th>Level</th>
<th>Managers</th>
<th>Officers</th>
<th>Non-Officers</th>
<th>All Staff Members</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Correlation V</td>
<td>Correlation V</td>
<td>Correlation V</td>
</tr>
<tr>
<td></td>
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<td>0.973255</td>
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<tr>
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<td>0.9444</td>
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<tr>
<td></td>
<td>Statistical Significance</td>
<td>&lt; 0.05</td>
<td>&lt; 0.05</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

Source: Field Data

The Conclusions that could be drawn from the findings as above are:

i. the Ten elements as above have influence and effect the performance of the organization in the stated order of priority

ii. the bottom two (Generic & Career) layers form necessary conditions,

iii. the top two (Project & Review) layers form both necessary and sufficient conditions

iv. the top two (Project & Review) layers correlate positively,

v. the bottom two (Generic & Career) layers correlate negatively

vi. the bottom two (Generic & Career) layers and the top two (Project & Review) layers correlate positively

Effective Management of R&D at the Organizational level

It was interesting to note the observation that emerged, rather unanimously, was that the present status at the R&D institution (projects/products) called for a great deal of introspection. The counter-productive inter-divisional conflicts were expected to be brought under control for the efficiency of the organization. The training, both in recruitment and while serving and infrastructure development were expected to be substantial – the approach suggested was, ‘maximisation’ rather than ‘optimisation’.
All the Technical Managers were unanimous in their opinion that the review mechanism employed at the R&D institutions heavily relied on the drive and initiative of the Project/Product Managers concerned and it had always been like chasing a moving target. In other words, a review always was and became a static presentation on the status as on that day of review, in general, indicating another probable date of completion, and a set of problems—both internal and external—which are enunciated in justification of the delay. At times, they were issues, less of resource management, but more of communication (attitude/ego) problem. Further, reducing tensions and inducing/establishing smooth working relationship with in R&D and between R&D and Service Groups - by bridging the gaps was felt to be the need of the hour. One was expected to empathize with all groups/staff (rather than policing or just being a passive facilitator) and amicably resolve the issues keeping in mind the targets and organizational priorities.

In conclusion, the responses are presented in a snap shot picture and suggested that:

- All the elements of the “Pyramid of Success” - Generic / Career / Project / Review requirements (#1-10) need due consideration.
- The Generic and Career issues were broad in nature and hence called for a global approach. The solution to these would make any R&D Institution a structured and healthy organization.
- The Project issues starting from a clear definition of a Road Map for future, besides a judicious Pruning would be a rewarding exercise.
- An Appropriate Review Mechanism suitably evolved to oversee the Projects closely for fruitfulness of the efforts, would be essential.
- The success of R&D would depend both on the Project and Review, because they form the necessary and sufficient conditions, where as the other two, Generic and Career, would form basic needs, meaning that their mere presence was not adequate enough for success, yet their absence would be detrimental.
- Finally, the Project Monitoring (or Project Management) role, as a function, needed to be emphasized in the Organization and requisite positional value with commensurate authority and appropriate empowerment is provided for an efficient and effective performance.
**Conducive Environment for R&D**

The realistic Environment in any Organization is far from ideal and has a lot of aberrations, so to say. The present study tried to bring out a lot that is not recorded per-se in the management literature and attempts to throw light on to what is latent or unseen. Hence an endeavour is made to present the various aspects that go unnoticed in an organization that never the less has a direct bearing on the People and there by on the Performance of the R&D Organization, in general. The benign conducive environment is difficult to be defined, and so this is covered under the subheads that constitute and/or affect the environment and thereby the performance, directly and/or indirectly: These subhead areas are: Communication (Gossip & Rumours), Interpersonal Relationships, The Politics and Political Relationships, Conflict and The Inefficiency and Mediocrity. These topics are discussed in detail for both the negative and positive effects they are likely to have. The coverage is maintained at a generic level and specific examples that indicate to the source organization are avoided as far as possible, so as to maintain confidentiality requirements of the Organizations. Further, at this juncture it is essential, though, to state that there is a lot of undercurrent cross interaction existing all through, and there is no absolute right or wrong here. And a near Ideal approach is also indicated, for completeness and as a viable goal to be attempted. **The full discussion on this important topic of conducive environment is appended at the end of this Chapter.**

**Performance Measurement**

Building great Organization is very difficult. Great Organizations only can attract the best employees. They get highest valuation. During the study, it has been demonstrated that Performance Measurement is highly critical. As such the Performance measurement remains a vexing problem for all firms and more so for R&D organizations. However, the Organizations at times get torn between financial performance and running a great business. Yet it is essential to balance both. It is here that Performance Measurement and Performance Management comes in. It has been attempted to study the Performance Measurement from various perspectives such as Finance Perspective, R&D Process Perspective, R&D Management Perspective, Organizational Effectiveness Perspective, General Perspective and finally from an Integrated approach Perspective. **More details in this regard are presented in the next chapter, Chapter IV.**
Organizational Ethnography

As the study progressed, it was strongly felt necessary to study the current prevailing situation of the organization to understand it fully so as to capitalize with in this challenging zone. An attempt was made to further the study in a fashion that was radically away from traditional means. This was, primarily in view of the certain inadequacies experienced in applying such techniques. Hence Organizational Ethnographic approach.

As already discussed in the Chapter I, the understanding of the organization, has further prompted the need for an integrated approach that would cover all the relevant areas concerning the R&D vis-à-vis the performance and productivity of the organization; and have a direct bearing on the effectiveness of industrial R&D. The creativity process in R&D (which primarily depends on the intellect, personality and general ability of individuals), does not lend itself easily to scrutiny by quantitative means. Similarly, the areas of motivation, leadership, group dynamics, and interface and relationships with external environments are also domains, which do not get captured realistically. At the same time the fundamental assumption of rationality in the organizations appears to be only a myth and an Ideal situation; instead the private agendas of individuals seem to be omnipresent. These could be looked at as political activities in side an organization that have an unexplained, yet very serious influence. These considerations and issues further justified the application of the Ethnographic approach, in the study of an R&D Organization.

A Brief Comparison

By its definition, the Ethnography is the systematic, organized and detailed description of a particular culture and includes the procedures through which such information is collected. In other words, the term ethnography refers to both the research procedures and the descriptive results and thus encompasses both the means and the ends. The origins of Ethnography can be traced to cultural anthropology (i.e. the study of the patterns of thought, behaviour and artifacts of a given culture), from which it draws its
concepts and methodological bearings. Consequently the internal differences and nuances in an organization would shape the organizational life more powerfully than the so-called blanket 'corporate culture'. While at it, it is important to note that the culture factor and holistic approaches in the end are expected to relate to the success of the organization; and further, rather than taking a pro-management orientation, the Ethnography describes the more realistic 'native view points'. While applying Ethnography to study of organizations three distinct types of ethnography are feasible, viz., Comprehensive, Topic Oriented and Hypothesis Oriented Ethnographies: here Comprehensive approach is used.

Typically social scientists/organizational analysts are often confronted with questions as to the sample size, nature of hypothesis, mode of analysis and so on. Such do not make sense in Ethnography, because here the researcher assumes a learning role, and he does not go out to test a hypothesis, rather the researcher is interested in understanding the group of people; and he strives to interpret what he observes from the conceptual stand points of the 'natives' of the culture, that too after spending a long duration say, a year.

The main stream mode of inquiry in organizational studies in the Indian context is primarily the Survey based hypothesis testing research, where in the hypothesis is either supported or challenged, the correlations/interrelationships are established, or the previous findings are confirmed or questioned: but fail to represent the actual story! There are basic differences between Survey and Ethnographic approaches in terms of the research design (in Survey mode maximum stress is placed here), the tools used, the nature of interaction between the researcher and the group studied (in Survey mode it is rather impersonal/external, where as in Ethnography it is participant observation, and the time frames are larger). The other differences include the concept of organizational culture and the use of the findings obtained (an Ethnographer spends more time here). However, after understanding the relative strengths of both the quantitative and qualitative research (e.g. survey and ethnography etc.), methods, it was strongly felt that, both qualitative and quantitative methods are necessary in the present study and hence applied in a complementary manner, so as to derive maximum benefit from the study.
The Application:
Thence, an attempt has been made to demonstrate the evidence of the potential of the Ethnographic approach by its application in the study of R&D setting of the Organization in question. Through this study substantial qualitative insights were gained about the reasons for the success as well as failures of the R&D setup.

This ethnography is not merely an idiographic statement of the (in)effectiveness of Organization, since it was able to fully capture the factors leading to its performance. The Suchitra's model was also valuable in serving as a conceptual framework to initially guide fieldwork in this case. In reality a comparative study between her study and the present one yielded further insights into the typical causes of failure of public-sector R&D teams, but at the same time provided a scope for improvement path. The understanding of the strengths of both survey and ethnographic research, they were used to complement each other: this aspect made a better value addition in the present study.

The central thesis of Suchitra's ethnography was that centralized administration, excessive bureaucracy; authoritarianism at various levels in the hierarchy coupled with professional mediocrity and an apathetic superior could seriously vitiate the quality of life and work of an R&D team. This influence could manifest itself in severely strained interpersonal relationships, distinct lack of identity as a group and poor self-images of team members, apathetic attitudes towards work and a low quality of work. These findings were validated in the present study and a comparative detail provided. It was important to note that this new insight has been possible only through the extended fieldwork, during which considerable difficulties were experienced owing to the relationships and the confidentiality needs in the Organization. The experiences led to the conviction that there were no inadequacies in the study of such settings, especially in relation to ethnography.

Through a comparative analysis of the individual, group and institutional factors that impinge upon team effectiveness and productivity, another perspective on the native of and reasons for the relative success of the organization (vis-à-vis failure of Indian public-sector R&D teams as in Suchitra's case).
The Findings and Comparative details:
The major themes in the ethnography of the R&D Organization in question as a comparison to the public sector R&D team studied by Suchitra were in contrast, that resulted in positive performance. These are presented here:

1. Centralized administration (yet people sensitive) Manifest in:
   - Project selection process being smoother being participative
   - Personnel selection process was also smooth, but slightly out of phase

2. No Bureaucracy (Flexible style of functioning is present) Indicated by:
   - Minimal obsession with written communication, (of late increasing)
   - No rigid division of labour, resulting in:
     • Ample role clarity in the projects and the organization,
     • Awareness of the overall policies of the organization
   - Moderately Rigid working schedules, but staff permitted free access.

3. Authoritarianism Reflected in:
   - the conduct of seminars (where huge money was involved)
   - fairly realistic demands of the divisional heads
   - reasonable attitude of the heads
   - manner of writing project reports, etc.
   - project leadership by the heads
   - conference attendance, etc., for all the technical staff
   - lack of the Top Management’s authoritarian style of functioning and domineering personality was actually a problem, in certain ways.

4. Empathy of the superior, Manifest in very focused supervision of project work and due to:
   - no transfers of the heads in general
   - managerial and technical role in their present roles

5. Strained interpersonal relationships at times caused by:
   - apathy of few of the superiors,
   - differential access of team members to the heads,
   - authoritarian manner of functioning of few heads and reflected in:
     • avoidance of interaction with team members,
     • extremely long periodic (weekly) meetings
6. Less cohesiveness characterized by (in some groups)
   - markedly different opinions of members regarding team size/formation
   - differing responses to communication study
   - negative characterization of group work,
   - lack of accountability and shared responsibility
   - little interaction among members,
   - insecurity in discussing sensitive issues,
   - preference for written to oral communication
   - lack of pride in themselves and their work

7. Apathetic working lives, apparent from the lack of concern regarding delays and quality of work and compounded by: (in the new setting, of late)
   - less involvement in project selection/ prior interaction/ communication
   - need for retraining for each project
   - frequent change in priority
   - working on multiple projects concurrently
   - inflexible timetables
   - delay in decision making/procrastination
   - belief that neither hard work nor intelligence/creativity count as much as manipulative behaviour.

8. Poor self-images as a result of:
   - less decisive control
   - awareness of discrimination during selection/promotion.
   - Comparison with those who left for MNCs

9. Professional competence and yet lack of drive reflected in
   - primarily on job training only,
   - lack of in house job mobility
   - expectations of cushy jobs and perquisites; and security
   - lack of opportunities commensurate with abilities

10. Leadership in Technical, Managerial and PR areas: not demonstrated well manifested in lack of credibility and increased staff attrition (of late)
In conclusion:

The R&D Organization in question was studied closely applying a rather unconventional and non-quantitative method to the extent feasible. It was also conclusively noted that the deficiencies as arrived at and enumerated by Suchitra, were true in their negative effect. But at the same time, if they are minimized and/or positive environment is existent in the Organization, then there would be a tremendous success. This was the case with the R&D Organization in question.

This Ethnography study was conducted with an idea to understand the ethnography of the organization, as it is present and to see by changing the environment settings if improvement could be effected. This objective was met. However there was one critical gain made during the study i.e. the shortcomings felt in the beginning of the work were plugged and essentially the latent feelings and reasoning of the respondents could be understood and learnt. In other words, rather than just getting the socially acceptable responses and numerical results, the inner details as to why one is responding in the given fashion, in a given context were learnt. Further, the aspects as described in detail in the section on Conducive Environment would not have been possible at all. That marks the Success of the present study and approach.

Summary of the work done

Thus in this Chapter, the R&D and R&D Management from the general standpoint have been explained. This followed by the Initial work carried out at a select few organizations has been explained which served as the foundation for the subsequent in depth work. Various Factors that affect management of R&D were arrived at based on the various structured discussions and formal/informal interviews employing a reference questionnaire. The remedial steps that would help in improving the organizational effectiveness in an R&D Organization also have been presented. This lead to the proposal of the Model - “Pyramid of Success” (© Sreenath Settur 2002) which formed the basic framework of the present thesis and the suggestions on the Effective Management of
R&D at the Organizational level have been elaborated, based on the quantitative methods employed. The "Pyramid of Success" model and the Maslow's hierarchy of needs have been compared with the specific reference to the Knowledge Worker in the context of R&D Organizations. The critical role and influence of the Conducive Environment for the R&D with all its manifestations also explained in detail. Then a brief on the Performance Measurement has been indicated. Finally, the Organizational Ethnography as applied to the present sample R&D Organization has been presented, with details about the learning made and the value addition that was derived by applying this unconventional quantitative method successfully, in a triangulation mode that is applying it in a complementary fashion along with the quantitative technique already employed.

It has also been shown that

1. the Ten elements as above have influence and effect the performance of the organization in the stated order of priority
2. the bottom two (Generic & Career) layers form necessary conditions,
3. the top two (Project & Review) layers form both necessary and sufficient conditions
4. the top two (Project & Review) layers correlate positively,
5. the bottom two (Generic & Career) layers correlate negatively
6. the bottom two (Generic & Career) layers and the top two (Project & Review) layers correlate positively
7. the Pyramid of Success Model as proposed is valid and aids in improving effectiveness of the organization

The findings have been very encouraging and were in conformance to the proven facts and more importantly have been quite useful and applicable as well as acceptable in the sample organization and in similar organizations.
APPENDICES
TO CHAPTER III
Efficiency and Effectiveness

(A word of clarification)

Efficiency typically means and actually results in saving time, money or effort where as the Effectiveness means how well the job gets done and results in the quality of the output. The Effectiveness is being 'how well the job satisfies the intended purpose or goal'. Efficiency and Effectiveness do not mean the same thing! In fact, they are often natural enemies. Often it is that you can have one, or the other, but not both - unless one is very lucky or ready to spend a lot of money.

Being efficient means one spends less time or money or effort on something, but often do not get all three types of efficiency and which one is aimed for, depends on what one is trying to achieve. Similarly, being effective means doing the job well, and hence, the output (finished product) is of high quality. It is a rare and delightful occasion where a solution to a problem is both efficient and effective; one usually has to decide which is preferred, because usually one cannot have both. In some organizations, efficiency is important and with little wasted time, money or effort, they achieve more business, and quality is secondary, as long as it is acceptable to the customers. In other organizations, effectiveness is critically important and efficiency is secondary. In the real world, most organizations are in between, and must constantly and judiciously make judgment about what is more important for a particular system: effectiveness or efficiency - or some degree of both. The decision will often be determined by their organizational priorities/goals. Some organizations are more willing to sacrifice quality for efficiency; some do the opposite and they value effectiveness over efficiency: to them, quality is everything, and they sacrifice efficiency to achieve it. Here, the quality of the finished product/service counts for everything, and no scrimping and saving could justify a reduction in quality. Such products/services are usually expensive, but customers are willing to buy them for their quality.
With the R&D Organizations this decision/judgment is equally tricky. It is not really possible to state what is important, it could only be stated in relative terms: The effectiveness is more critically important in R&D, where as the R&D related activities need to be giving more stress on efficiency. Especially in commercial and/or high technology fast track areas this approach is highly beneficial.

The improvement in organizational effectiveness in terms of its R&D performance / productivity that is very crucial for the success of any organization in today’s highly competitive environment, constitutes the expected outcome of the present study. This implied that it was imperative to understand the various factors/parameters that constitute/affect or impact/influence the R&D performance/productivity; how to measure and effect improvement in the performance, the applicability/acceptability, and validity of the same. To begin with, the typical ways in which research output may be evaluated was, with reference to output-input relationships that depend on the measurement of the amount and economic value of R&D outputs or as the effectiveness of the R&D program. The measurement of the economic value depends on the valuation of the technology. R&D Productivity parameters in case of R&D Institutions could also be in terms of increased market presence and increased market share, in general, and Technology development, in particular. The R&D output measure as technology asset or intellectual property rights could also be expected to create a barrier to the entry of other firms into the organization’s business.

Thence, the present study addresses all these issues and aims at evolving a helpful model.
“Pyramid of Success” Model and the Maslow’s hierarchy of Needs

There appears to be some similarities between the “Pyramid of Success” model and the Maslow’s hierarchy of Needs, hence a brief description is presented hereunder.


Maslow’s theory of personality has influenced a number of different fields; this wide influence is due in part to the high level of practicality of Maslow's theory. This theory accurately describes many realities of personal experiences. Maslow is a humanistic psychologist. Humanists do not believe that human beings are pushed and pulled by mechanical forces, either of stimuli and reinforcements (behaviorism) or of unconscious instinctual impulses (psychoanalysis). Humanists focus upon potentials. They believe that humans strive for an upper level of capabilities. Humans seek the frontiers of creativity, the highest reaches of consciousness and wisdom. This has been labeled "fully functioning person", "healthy personality", or as Maslow calls this level, "self-actualizing person." Maslow has set up a hierarchic theory of five levels of basic needs. These include needs for understanding, esthetic appreciation and purely spiritual needs. In the levels of the five basic needs, the person does not feel the second need until the demands of the first have been satisfied, nor the third until the second has been satisfied, and so on.

Maslow's basic needs are as follows:

- Physiological Needs
- Safety Needs
- Needs of Love, Affection and Belongingness
- Needs for Esteem
- Needs for Self-Actualization
When all of the foregoing four needs are satisfied, then and only then are the needs for self-actualization activated. Maslow describes self-actualization as a person's need to be and do that which the person was "born to do." It is not always clear what a person wants when there is a need for self-actualization.

The hierarchic theory is often represented as a pyramid, (please see figures below) with the larger lower levels representing the lower needs, and the upper point representing the need for self-actualization. Maslow believes that the only reason that people would not move well in the direction of self-actualization is because of hindrances placed in their way by society. He states that education is one of these hindrances.

In the similar fashion, the Pyramid of Success model also identifies four layers (though not Five!) starting from Generic requirements, to Career, then Project and finally Review requirements. They altogether follow similar hierarchical needs for the organizational level.

Another interesting paper, by Andrew Herrington, deals with the Maslow's hierarchy and the knowledge worker revolution, as is the case of R&D workers. This article connects Maslow's well known explanation of human actions to the changes that are going on in society at present to make an argument for the way that knowledge workers can best be managed in the interests of achieving the best results for the business and provides a background of understanding for developing the tools for leading and motivating Knowledge Workers. It can be argued that as society has progressed with economic development individuals have climbed Maslow's hierarchy. It can be reasonably hypothesized that Knowledge Workers must be looking for motivation from the highest levels of the triangle - Self-Actualization.

Most Knowledge Workers have no need to worry about their physiological, security, and safety needs, so these basic, low-level needs no longer motivate their actions, although the needs are always present. Many people are today motivated primarily by social, esteem, and self-actualizing needs. At the highest level are self-actualizing needs. People
seek to achieve their highest potential through professional, philanthropic, political, educational, and artistic channels. These needs, according to Maslow's concept, become important only when all social and ego needs have been satisfied. These factors leads to the increasing need for people to be treated 'highly individually' if they are to be well motivated. When added synergistically so that a top quality team is created 'on a roll', then the team becomes almost unbeatable. Teams operating at this high performance level represent the peak in human efficiency, creativity and innovation. Hence the creation of business environments designed to engender and support such teams is increasingly a major objective for businesses that want to remain competitive.

In the "The Knowledge Worker" revolution, as being seen in high technology R&D, this phenomenon has two major components:

(i) The shift of creative power in a business from the few senior people to the many individuals that create unique knowledge within the business, under the leadership and motivation of the senior people.
(ii) The change in attitude of employees as their education level has increased and their security has increased over the last 50 years.

There is enough evidence to support the hypothesis that Knowledge Workers are self-actualizing. Evidence also shows that there is gradual but pervasive changes in what Knowledge Workers want out of life, and the basic direction of these changes is, to some extent, predictable.

The primary reason for this discussion on the Maslow’s hierarchy of needs and the proposed Pyramid of Success Model is only to draw similarities in approach. At the same to stress the fact for achieving effectiveness in an R&D Organization, the Generic needs have to be met as the fundamental step, and later once the Career related factors are then the Staff would be ready to perform their best. The next two level viz., Project and Review requirements would follow, in that order.
It should be reiterated that, the success of R&D would depend both on the Project and Review, because they form the necessary and sufficient conditions, whereas the other two, Generic and Career, would form basic needs, meaning that their mere presence is not adequate enough for success, yet their absence would be detrimental. Finally, the Project Monitoring (or Project Management) role, as a function, needs to be emphasized in the organization and requisite positional value with commensurate authority and appropriate empowerment be provided for an efficient and effective performance.

Digressing a little, the following may be noted:

According to a survey result published recently (13-3-2006, Tol), the Decision making power and public recognition, not money, turns on new age CEOs/Managers. Interestingly, The Economist also reiterates a similar sentiment (reprint 29-3-2006, Tol): with a more specific stress on the knowledge worker situation. According to this article, the Knowledge workers need a totally different kind of organization and ironically, fifty percent of these are still modern versions of the old-style factory workers. Then, knowledge workers can thrive only if the organization can provide the key three elements: leadership, talent and culture. Stephen Covey states that Leadership is not a position, but it is a choice; he reiterates that, “People follow footsteps and align themselves to team goals when the leader is not acting like a pain; and the leader demonstrates the moral authority, not formal authority” He is also of the opinion that even today, the view of people and management practices is rooted in the industrial age which treats people like things. (17-3-2006, Tol).

The respected IT industry leaders like NR Narayana Murthy stress the need for the following five: Skill, Intelligence, Swiftness, Creativity and actually practicing these; but appears to put more stress on leadership and process. He is also primarily reiterating the requirements of leadership, talent and culture. Azim Premji of Wipro also agrees on this, but stresses on the talent part i.e. no compromise on technical competence.
According to Sam Pitroda, Chairman of National Knowledge Commission, the Language and Communication skills (and soft kills) have come to play an important role in knowledge based economy, and keeping in mind the global demands.

The 1960 Classic, “The Human side of Enterprise” by Douglas McGregor, remains the landmark even today. The two management styles documented by McGregor, viz., Theory X and Theory Y are valid even to this day. The Theory X, assumes that “the average human being has an inherent dislike of work and will avoid it if he can” and hence needs to be whipped into order and obedience. Theory Y on the other hand assumes that “the expenditure of physical and mental effort in work is as natural as play or rest” and hence intrinsically motivated. According to The Economist (reprint 5-4-2006, Tol) McGregor’s ideas seem particularly germane today when the organizations are coming to realize that, they need to shift even more from Theory X to Theory Y; more so in knowledge worker dominant IT/Telecom R&D.

Ultimately, the Happiness Quotient, “Long term happiness depends on contentment and having the freedom to do what you want”, puts in nutshell what a knowledge worker in R&D expects.

Thus, this demonstrates the genesis, acceptability and applicability of the Pyramid of Success Model proposed in this report, more specifically in a high technology R&D environment. Even though one may assume many things about the existence or fulfillment of certain lower level needs it becomes paramount that they are explicitly addressed and taken care of so that the higher level needs could be focused. The various elements in the proposed model judiciously cover all these aspects successfully. Thus the Model is in line with the established thinking (Maslow and McGregor) as well as Modern thinkers and Industry Leaders. The model upon appropriate implementation in any R&D organization would help in improving its effectiveness.
Need Motivation to Satisfy Need

Maslow's Hierarchy of Needs

Figure 3.2
Hierarchy of Needs
(1990's eight-stage model based on Maslow)

- Transcendence
  helping others to self-actualise

- Self-actualisation
  personal growth, self-fulfilment

- Aesthetic needs
  beauty, balance, form, etc.

- Cognitive needs
  knowledge, meaning, self-awareness

- Esteem needs
  achievement, status, responsibility, reputation

- Belongingness and Love needs
  family, affection, relationships, work group, etc.

- Safety needs
  protection, security, order, law, limits, stability, etc.

- Biological and Physiological needs
  basic life needs - air, food, drink, shelter, warmth, sex, sleep, etc.

Figure 3.2a
Conducive Environment for the R&D
(A detailed Discussion)

While the present study was under progress the critical role played by the need for Conducive Environment for R&D (#5 in the Pyramid of Success Model), became very obvious. This requirement formed one of the essential basic Generic needs, meaning that its mere presence was not adequate enough for success, yet its absence would be detrimental. Based on the extensive study carried out at the primary sample organization, and at a few other organizations, the following observations/findings were arrived at:

The Organizations are composed of People. People create policy, define strategic goals, assign tasks and carry them out. Ultimately, the Performance and Productivity and therefore the Success of an organization depend on its People. Personal factors at the individual, group and organizational level are extremely important. Here, it needs to be understood that the R&D Management is radically different and needs a treatment commensurate with the importance. Further, for the scientist and engineer, the art of dealing with people, inter-personal skills, etc. do not often come naturally but must be learnt. A great deal of trust and sensitivity are expected as prerequisites. Thus a strong dependence on the congenial and conducive environment assumes critical importance as a factor for Improved Productivity, and an attempt is made to establish it in this section.

Upon further close scrutiny during the study, it was found that the element #5, viz., Conducive Environment is the most influential factor especially in Knowledge Environment – as is the case in R&D, and more particularly when absent it displays the most and long lasting damage and has very adverse impact on the R&D Organization and its performance. Establishing a Congenial and Conducive Environment for R&D appears to be the Key to successfully handle today's exponentially increased scientific/technological/design complexities, with a human touch, with a People Centric approach.

The Symptoms and Effects
It became imperative to identify and understand what the implications are if a conducive environment is not present, further more, because it is far more difficult to study the problem from the other side.
Typically, there arises a general feeling that the institution was current in the past, and past in the current! The good intentions may not be converging to positive tangible outputs. People do not get respect and/or support from above, beside and below. There may not be a safe physical/emotional environment. Then, in general Processes may be getting precedence over Products/Projects and over the People as well. There may be prevalent feeling that “people are our greatest liability”. The Creativity Process in R&D that primarily depends on the Intellect, Personality and General Ability of Individuals lends itself more easily to be negatively influenced in such Environment. Old management methodologies, inefficiency, mediocrity of attitudes, broken down communication channels, wide spread rumours and gossip, presence of political activity, conflicts and so on could also be rampant, and on the rise.

For success of any organization, the three key elements: People, Products (Projects) and Processes, in that order, are very crucial. In an unhealthy scenario in an organization, though Processes are only a means, and not ends; and even though it is well known that People constitute the organization, and these People being the intellectual capital of the organization and productivity of People being critical in the R&D Institutions, yet Processes do get precedence over People. However, it was noted that, in the R&D set up, if focus is primarily on Processes, rather than creating an atmosphere that creates inspired employees, such focus causes chaos in the organization: employees do more planning than doing. Further, this would lead to the growing bureaucracy, which results in emphasis on precedents/procedures, committees with no real authority, a formal hierarchy dictating permissible behaviour, layers of jobs, roles & titles created solely to reinforce rules, excessive compartmentalization (like location of work, area of work, Scientists/Technologists, Hardware/Software, Technical/Administration/non-Technical, Officers/ Support Staff, etc.), and paralyzed free flow of information, finally destruction of R&D culture! In such a case, the R&D organization can not maintain its innovative culture & free information flow, fails in standardizing & implementing its business processes/practices, thus definitely causing a critical decrease in the efficiency and productivity.
Though ideal conditions are not always expected, the fundamental assumption of Rationality in the Organizations appears to be only a myth and an ideally Ideal situation; instead the private agendas of individuals seems to be omnipresent, which would be culminating as Political activities in side the organization, and have an unexplained, yet very serious influence. It was further noted that in an R&D organization, in general, the individuals engaged in R&D are not really strong in the area of human relationships, and would have learned the management considerations, if at all, on job only. Hence the role of R&D does not generally get appreciated to the degree it deserves. This tendency could lead, at the minimum to serious resource wastage and/or even threaten the very existence of the organization, on the other extreme.

Good process and continually improving that process are admirable natural goals. Good technical staff will focus on them whether told to or not in a congenial environment. However, on the other hand, in the guise of standard processes people will miss chances to take important shortcuts, particularly on overstuffed projects, standard process will be observed rigorously as long as it generates sufficient work (basically not useful) to keep everyone busy. And it is also noted that the short-term productivity fixes would be attempted regularly, even when everybody knows that Productivity improvement comes only from long-term investment. Similarly, they will only work on optimizing successes rather than attempting to contain the current failures that improve overall performance.

In a non-Conducive environment, rather than successfully performing, the R&D units indulge in more formal reviews, less scientific goal orientations, higher formality of structure and more formal coordination mechanisms that inhibit significant interactions. Conflict will be settled via confrontation. The technical manager ignores all personal factors at his peril.

Then, the biggest impediment comes in the form of not being able to achieve high quality R&D, not to mention introduction of radical concepts, this especially happens at the higher level of management, more so, because of the myths or misconceptions that become widely prevalent in a polluted non-congenial organization. At the same time, the
senior management's point of view also gets skewed about the future vis-à-vis needs being by and large conventional and reactive (mostly catching up to others/competitors) to rather than being distinctive and far-sighted largely driven by own unique vision; degenerates core strategies and does not support the architects designing the future, rather they back maintenance engineers working on the present and/or doing only constant fire/cosmetic improvements; and keep the scientists/engineers in a non-benign state – with no respect for their knowledge and no fine-focus on what is needed. The situation appears grim always and the necessity to properly diagnose the ailment, identify its root causes and apply permanent remedies is missing and to worsen things unmindfully applying quick fix solutions alone will be done. Further, the sense of identification and pride in the organization's output/outcome and recognition that the only tangible way to positively exploit people's performance also remains a dream only. In other words, the situation could be characterized as indifferent bottom, indecisive top & confused middle.

From the above it is amply clear as to the negative effects of the lack of benign conducive environment in the organization. Conversely, it is seen that the conducive environment forms an essential prerequisite and the Environment of the R&D Organization in which People are performing influences and impacts their performance to a very high degree.

These considerations and issues further justified the direction of the study. The understanding so far gained and certain inadequacies experienced earlier have prompted the need for a totally different approach to study an Organization's Environment vis-à-vis the Performance and Productivity of the Organization and having a direct bearing on the effectiveness of industrial R&D.

Prof. CNR Rao, Former Director of Indian Institute of Science, and Scientific Advisor to Prime Minister of India, has written to the Prime Minister on the sorry state of R&D in the country, and its steep decline and the remedial steps that need to be taken up on top most priority. One of the serious suggestions includes keeping the Science and Technology and R&D free from all bureaucratic influences; and giving the R&D the respect it deserves, besides the requisite funds and freedom. (Source: Times of India, 22-07-2006)
CONDUCTIVE ENVIRONMENT

The realistic Environment in any Organization is far from ideal and has a lot of aberrations, so to say. This study tried to bring out a lot that is not recorded per-se in the management literature and thus attempts to throw light on to what is latent or unseen.

Hence an attempt is made to present the various aspects that go unnoticed in an organization that has a direct bearing on the People and there by on the Performance of the R&D Organization, in general. The conducive environment is difficult to be defined, and so this is covered under the subheads that constitute and/or affect the environment and thereby the performance, directly and/or indirectly: These subhead areas are The Communication (Gossip & Rumours), Interpersonal Relationships, The Politics and the Political Relationships, The Conflict, The Inefficiency and Mediocrity. These topics are discussed in detail for both the negative and positive effects they are likely to have. The coverage is maintained at a generic level and specific examples that indicate to the source organization are avoided as far as possible, so as to maintain confidentiality requirements of the Organizations. Further, at this juncture it is essential, though, to state that there is a lot of undercurrent cross interaction existing all through, and there is no absolute right or wrong here. And a near Ideal Case is also indicated, for completeness and as a viable goal to be attempted.

The Communication and Interpersonal Relationships

This section tries to investigate an important topic in Organizational behaviour that hitherto, has not received enough attention — informal communications and interpersonal relationships, from an entirely different perspective, which includes grapevine activity, rumour and gossip. It is seen how this topic can illuminate potential new insights in a range of related areas in Organizational behaviour including attention to a number of individual-level and Organizational-level variables.

The term informal organization refers to the set of interpersonal relations in the organization that affect decisions but which are not included in the formal hierarchy.
There are two important functions of interpersonal relations: information exchange and the exercise of influence and there are Three individual needs viz., task achievement, task integration and personal development. The Communication is the medium. From the point of view of the organizational performance, these are required to aid and reinforce the R&D environment and shall become a culture. It has been noticed very clearly both positive and negative influences are possible. First, the positive aspects are described:

a. Technical Communications – this involves the exchange of information relevant to task achievement and is concerned with information stars.
b. Boundary Spanning – this is the provision of information from the outside environment.
c. Grapevine – this is the exchange of information relevant to personal development.
d. Problem Solving – this function is concerned with the exercise of influence on task achievement and involves various forms of collaboration.
e. Resource Allocation – the exercise of influence on task integration with the outside environment.
f. Socialization – the exercise of influence on personal development.

The basic structural unit of informal organizations and communication is the individual role and involves interpersonal relationships. The interconnection among individuals by role transactions creates role networks that involve individual throughout the organization. It has been found that participation in the informal organization is high skewed creating degrees of centrality, clusters and cliques and reciprocal roles. Some individuals are active in more than one role network while others are relatively isolated. Lateral hierarchies characterize informal organizations and some individuals attain higher degrees of status and influence in the informal organization regardless of their status in the formal organization. Five factors are important in strengthening and determining patterns of interaction in informal organizations:

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• Physical Proximity: Interpersonal relations are more likely between individuals who are physically close. There is an exponential decay in frequency of communication between people. About two-thirds of the likelihood of communication disappears with 100 feet between people and another two-thirds expression with another 100 feet (Allen, 1977).

• Professional Proximity: Other things being equal, R&D personnel are more likely to seek contact with colleagues of similar professional backgrounds. Such contact may provide security but as has been shown earlier interaction with persons of differing expertise and background is associated with higher technical performance.

• Task-created Proximity: Other things being equal R&D personnel will interact with persons working on the same task in preference to those working of different tasks.

• Social Proximity: R&D personnel who have social contact are more inclined to engage in work-related discussions on the job.

• Formal Organization: Created Proximity – R&D personnel will tend to interact with personnel in the same unit in preference to personnel in other organizational units.

Successful R&D Management involves the recognition and use of the informal organization as well as the formal organization. The manager may choose to organize around key individuals who have achieved high status in the informal organization or around key functions and roles. The lateral hierarchy may be utilized to integrate the isolates by encouraging them to interact more with their colleagues. The manager may wish to develop more key individuals. Finally, the manager may wish to take advantage of physical proximities to organize the informal organization. It is also to be noted that too much overt manipulation of the informal organization is likely to be counterproductive since it will become identified with the formal organization.

It has been evidently found, during our studies that existence of Informal organizations and communications in R&D have very high degree of positive influence on the
productivity improvement in the Organization. It is also worth noting that Star Performers do develop information star networks, which help the Organization besides individuals. Even though it has been found that the correlation between idea generation and organization rewards is close to zero, these star performers do not get demoralized! Then, in an R&D set-up, Star Performers in general exhibit the following characteristics:

i) They read far more than do their colleagues,
ii) Their readership of technical journals is far greater than that of the average technologist,
iii) They have a much higher level of formal education,
iv) They publish more,
v) They have a higher degree of patent productivity,
vi) They attend more scientific meetings.

vii) They are chosen more often by their peers as technical discussion partners,
viii) They enjoy higher degrees of credibility,
ix) They appear to be better able to connect seemingly unconnected ideas.

Thus existence and functioning of these star performers, regardless of their formal status, is very important for the flow of information throughout the R&D groups (information acquisition and information sharing processes) and in enhancing the R&D Productivity.

The negative side of the story is equally interesting. In this context, it is highly appropriate to learn and understand the rumour and gossip that will allow us to appreciate more fully an integral aspect of Organizational behavior. It is not entirely transparent whether rumour and gossip are in fact independent or mutually dependent phenomena. There are both similarities and differences between the two forms of communication. Both rumour and gossip are characterized by spontaneity; seldom are such communication forms planned. Both also deal with topical information and typically require the hearer to 'believe' the message even if they harbour some doubts as to its authenticity. These structural elements help maintain interest in and reliance upon the rumour or gossip, as they help individuals 'make sense' of otherwise ambiguous events.
However, there are some differences between rumour and gossip. The basis of a rumour is unsubstantiated information while there is typically some presumption of ‘factuality’ surrounding gossip. Moreover, the parameters of rumour tend to be much wider than gossip since its message attracts more universal interest; gossip is more likely to occur in a context of ‘privacy’ and through and with friends or trusted acquaintances. For its part, gossip might be more likely in situations where there are high levels of intra-Organizational competition between members. In sum, we could see that both the Organizational context and a range of individual variables/factors are significant factors that help explain rumour and gossip.

A further line of inquiry was to explore the role played by technology in rumour and gossip. While e-mail and electronic bulletin boards have emerged as widespread forms of communication in recent years, the extent these are mediums for rumour and gossip is debatable. Besides the moral dimension of rumour and gossip, the individuals’ resistance to any recording of their utterances, the electronic channels were less popular, in that sense, but we could not entirely rule out about this. It could follow that the frequency, structure and dynamics of rumour and gossip are simply manifested differently in contexts (computer technology) other than face-to-face settings.

Further, it has been found that the method or mode of information transmission influences the nature, structure and dynamic of rumour and gossip in Organizations. A combination of research techniques enhances understanding of the antecedents and consequences of rumour and gossip in Organizations. As the scenarios between any two employees implied, rumour and gossip through the Organizational grapevine (this generically being the exchange of information relevant to personal development, and used in a positive connotation) is an organic and typically unwieldy practice. Linear models of communication therefore, with their assumption of a passive receiver, seem less relevant for examining such ‘small talk’; and it is much more dynamic as for the relationships among participants and is highly iterative nature in such communication processes, for instance, appear more crucial.
It was also significantly apparent that these negative communication processes become predominant whenever the formal communication channels are broken down for various internal reasons and/or whenever any unexpected external factors that influence adversely the organization or its employees, arises. The danger in such situations is that if it is not curtailed, it will have spiraling effect.

The R&D Management needs to be always cautious of such negative influences and at the same time attempt to reap the positive gains of informal communication channel.

The Political Relationships

The subject of politics in organizations is complex and a full treatment cannot be presented here. However, the existence of politics has implications for problems at the R&D interface and some inputs will be presented. Much of the R&D Management literature assumes rationality but the reality of organizations is different and politics in the sense of power and influence must be considered even if political actions are not intended. Political action describes acts carried out on the basis of self-interest and not with the well being of the company in mind. It is interesting to enumerate some of the ways in which political action manifests itself. Empire building within the organization is a well-known phenomenon. Posturing to those with power for career advancement is also widely practiced. Conflict not rooted in genuine differences of opinion is often met. Much of this action provides the undercurrent for life in organizations and is not overt. An example of political action that is obvious where the CEO, when he has only two years to retirement, who exhibits an over zealous path or is a model of inaction.

It could be noted that at least three systems operate within companies: the formal organization, the career system and a system of social relationships Here the aspects other than the formal structure are examined. These aspects such as ethnic, societal, experience and outside relationship factors lead to “private agendas” within the organization and consequently to political action. Political actions may lead to an organization, which only sees what it wants to see in the external environment. The processes by which
information is transferred within the organization are not neutral; information is often censored and changed by the manner in which it is transmitted. Political relationships may also be seen in the formal structure. It may be noted that the interface is very important in these relationships. The power and influence structures in the company are important in determining what activities are legitimate.

None of the theories of organizations effectively deal with the irrational act at the micro level and this is because irrationality is tied to an individual and a specific situation and is maximized at the interfaces. Here irrationality at the local level is taken as a conflict not only with the goals of the company but also with the rational goal structure of the individual. Irrationality stems from emotion (greed, jealousy, fear, revenge) and has no place in general theories of the organization. Similarly, the assumptions of rational model in Organizations are also to be re-examined to verify whether the Goals are consistent and consensually shared; the decision process is orderly and substantially rational; the norms of optimization; the Extensive and systematic information search; the Cause-effect relationships being well known (at least probabilistically); the Decisions flow from value maximizing choice; and the Underlying ideological theme of efficiency and effectiveness. However, Political actions do occur in companies, both at individual level and Organizational level. Fortunately, just as it is very rare for true organizational rationality to be achieved, so it is rare for actions to be purely political in nature. The very survival of the organization is usually a constraint limiting action that is entirely for self-interest.

The subject of politics in organizations could be viewed as Power and Influence. The Power could be Physical power (threat of physical coercion), Resource power, Position Power, Expert Power, Personal power and Negative Power (i.e. the illegitimate use of power). The bases of power described as above allow the individual to exercise one or more methods of influence. The methods of influence are two classes: overt and unseen. The Overt methods of influence are: Force, Exchange (this includes bargaining and negotiating), Rules & Procedures, and Persuasion. The Unseen methods are Ecology (environment) and Magnetism (compliance, identification and internalization).
Internalization is very valuable in those situations where great commitment is needed, as in the R&D Organizations; where Expert Power is the one that influences. This situation is one that of Authority, not just the Power rested with the R&D Manager.

Successful R&D Managers rarely make precise goal announcements, so as to avoid, the feeling of Centralization, Focus for Opposition, Rigidity and Security and lack of Flexibility. Broad & generalized goals are often more effective, promotes cohesion, create identity and enthusiasm. The announcement of specific goals at the right moment can create desired short-term action and be quite effective.

Conflict and Pathological Politics

The Conflict and Conflict Resolution are discussed in the literature, typically meaning Politics. In reality, it forms a small subset in this wider topic. Whenever there are multiple parties to a development effort, there are bound to be conflicting interests and in that sense R&D is particularly conflict-prone. At the same time it was observed that most R&D organizations have poor conflict-resolution skills. But the Conflict deserves respect, because the Conflict is not a sign of unprofessional behavior. The solution in such cases is to declare up front that everybody’s win conditions will be respected, and by making sure that win conditions are elicited at all levels in the Organization. Since it is well known that Negotiation is hard, but mediation is easy, it is highly suggested that in cases of possible or envisaged conflict scenario, the parties are to be encouraged to move into mediation mode up front to resolve conflict.

Pathological politics can crop up anywhere, even in a healthiest R&D organization. The defining characteristic of pathological politics is that goals of personal power and influence come to override the natural goals of an organization. This can happen even when the pathological goal is directly opposed to the organizational goal. Among the bad side effects of pathology: It becomes highly unsafe to have a leanly staffed R&D teams on a project. Further, there is no guarantee that pathological politics won’t affect, even though one is not indulging himself in such activity. At Individual level, it cannot be
expected to cure politics from beneath, and one should not waste his time or jeopardize
his position by trying to resolve. Sometimes, only option is to bide time, waiting for the
problem to resolve itself, or for a good opportunity for moving on. Miracles may happen,
but one cannot count on them.

Anger and contempt in management are contagious. When upper management is
abusive, lower management mimics the same behavior (much like abused children who
go on to become abusive parents). Managerial contempt is supposed to act as a goad to
get people to invest more in their performance. It is the most frequent “stick” of carrot-
and-stick management. But there is no evidence that contempt has even caused anyone
to perform better. A manager’s use of contempt to goad workers is more a sign of the
manager’s inadequacy and indicative of his mediocrity, than of the workers’.

The only approach in such situations is: Making things as much transparent as feasible in
the Organization, and establishing a congenial environment and training the R&D
Managers in interpersonal relations and conflict avoidance, mitigation and resolution.

The Inefficiency and Mediocrity

This is an area that is not really treated per se in standard Management literature and even
though it is generally accepted that when effectiveness and efficiency are accomplished
in an organization, then there is no scope for Inefficiency and Mediocrity. In fact,
effectiveness and efficiency of the People and of the Process are assumed to be present
and are true prerequisites in almost all the cases we have come across. But reality is far
from the ideal expectations.

A ‘Mediocre’ is neither very good nor very bad; it is ordinary, average, not good
enough, and inferior. The word is often used disparagingly. The Webster’s New
World Dictionary defines ‘mediocrity’ as the quality or state of being mediocre;
mediocre ability or attainment and a person of mediocre abilities or attainment.
The present study of various R&D Organizations, (including the primary sample organization) gave an opportunity to look at the chaotic, messy state of affairs, in some organizations in general, revealed that this can be traced to the growth in the number of mediocrities there. Right from the appointments up to the Management, it is mediocrity that rules the roost. The mediocrity octopus has a deadly stranglehold in quite a few areas in the R&D, Support, Administrative and Management affairs of the Organizations. We came across some good examples.

In reality, there is nothing mysterious about it, for mediocrity is myopic and it suffers from an incurable malady-the I-complex. No one in the world is haughtier than a man of mediocre capacity once raised to power! The trail of disasters such leave behind will need years to be set right. Mediocrities often achieve good positions, not in spite of this, but because of it. This seems irrational, for it has always been agreed that the outstanding quality in top man is his willingness to shoulder responsibility! But is it true?

When a mediocrity gets a post, he is so afraid of making mistakes and getting reprimands that he takes the utmost pains to avoid making them. He never takes initiatives, which may blow up, in his face. Thus, he stands out as a model of correctness! He is usually a yes-man. He flatters his superiors. Such a combination of assets built up over the years, commends itself to the institutional hierarchy and promotion comes to him as if he deserves it. A sizable number of institutions employ these mediocrities because it is difficult to find a man of independent mind who is bold enough to argue a case with heads of the departments. Nodding necks are welcome because they are stretchable.

As such, Mediocrities are strongly averse to men brighter than themselves. They are terribly afraid of being outsmarted, hence the consideration that some of the mediocrities already in seats are averse to engaging bright men because they believe that the latter may outstrip them in promotion or take initiatives which might rebound on them. There is a world of difference between a competent hand and the
man who has just reached the top position. A majority of mediocrities wear a mask. The trouble with climbers is that their nefarious influence is apparent to everyone except themselves. So the hidden agenda is to browbeat the brighter ones around them. He spends most of his time concealing his own weaknesses. With the mediocrity everything seems to run apparently smoothly, according to plan, and other never realize what improvements could have been effected if the mediocrity had not been so smart.

Another serious effect is the tremendous loss of time caused by them. A mediocre man on the bottom rung of the ladder always goes to his immediate superior with a minor problem and asks for instructions, instead of deciding the matter himself. In other words, he tries to pass his responsibility on to the man above him at every stage (reverse delegation is the correct nomenclature). The secret to success for the mediocrity is, knowing whom to blame for their failures. If the superior is also mediocre, he attempts to shift the burden to the next one above him. So, the game of passing the buck goes on, wasting valuable time and reducing efficiency. By the time the decision has been taken and travels down to the lowest rung, the whole thing becomes a farce. The bigger the concern, the greater the amount of time lost in this manner. Add this waste of time to the waste of money and you get a picture of the inefficiency, which stalks many institutions.

The mediocre boss also ruins many careers in his misplaced zeal to promote the career of his favourite mediocrity, making all the bold and competent in the lower reaches who find themselves being led by men less competent than themselves, drop out of the race in sheer frustration: the wanton delay is the tactic employed here. The mediocre boss always attempts the just opposite of what Aristotle has said; “the worst form of inequality is to try to make unequal things equal!”

In the long run and depending on the number of mediocrities employed, and more so with the presence of mediocrities in top posts, the invisible sabotage is often the real reason behind the collapse of what was basically a sound institution.
One Senior Manager characterized and likened the mediocrity to the Cockroaches: the Cockroaches can survive in any type of severe/harshest environmental conditions on this earth. Their survival is such an unparalleled singularity that, it baffles biologists to the core (and the housewife too); and the Cockroaches are the only longest living species on the planet earth defying all the Darwinian theories of survival of the fittest. Could their survival be termed as success: yes, only from their point of view. The mediocre in an organization is no different. The only way to minimize (if not eradicate) the Cockroaches is by having bright light and warmthness – like sunshine: the only killer of the Cockroaches. Likewise to minimize Cockroaches of the organization and to protect serenity in the set up, the system within an R&D Organization needs to be fully transparent and the Managers need to be constantly vigilant.

A Typical (near) Ideal Environment and Culture

A typical set of characteristics that ensure a near ideal environment that is based on culture, rather than rules & regulations is presented here. Then Organization would provide its employees an environment that is sensitive, congenial, and conducive for R&D. The paradigm shift to “people are our greatest asset” is complete and it is totally People Centric.

In conclusion: The existence of strong dependence on the congenial and conducive environment that assumes critical importance as a factor for Improved Productivity of the People in R&D Organizations have been studied in depth, and an attempt is made to establish it in this report. Here, it is also understood clearly that the R&D Management requirements are radically different and their need for a treatment commensurate with the importance. Further, for the People viz., scientists and engineers, the art of dealing with people, inter-personal skills, must be learnt. A great deal of trust and sensitivity are expected as prerequisites. Ultimately, the People Centric culture and Congenial and Conducive Environment are the factors that influence/impact the People's and Organization's Success.
A near Ideal situation would typically encompass:

Commitment to Society
Commitment to Mission
Commitment to People
Commitment to Excellence and Professionalism

Under the head Commitment to People, the following aspects are included:

Delegation and Accountability based on Trust
Improved quality of work life
Egalitarian Work Culture
Personalized Services
Encouragement to creativity, innovation, initiative and self-development
Emphasis on team building
Performance based appreciation, recognition and rewards
Freedom and flexibility of operation
Providing opportunities for growth and development
Multi-skill, multifunctional responsibilities, job rotation, job enrichment
Access to state of the art equipments, tools and facilities
Participation and involvement
Open door policy
Effective formal and informal communication
Direct access to Board members and senior officials
Welfare and Recreational facilities for staff and family members

Under the head Commitment to Excellence and Professionalism, following are included:

Individual based key result areas
Periodic appraisal and review
Rewards based on individual and group performance
Broad based decision making process
Transparency in decision-making.
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