CHAPTER VII

CONCLUSIONS

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CONCLUSIONS

The conclusions of any study help in the utilization of its results in the field. The conclusions add new dimensions in understanding the phenomenon and inspire further probing in the right direction. The investigation was conducted with an interest to find out 'candoers' and 'can't doers' among engineers for creativity. The investigator realized that "Any small change in a nation's attitude to creativeness can have very beneficial repercussions on its members both corporately and individually."  

1. The first conclusion of this research is about the conducive environment for creativity. If the scores of the two sections are compared, we can distinguish them in a glance. A crude mode of technical section is of 179.00 (7 frequencies) creativity score while commercial sections' creativity is multimodal of 105 and below scores all having maximum frequencies of 3.

The technocrats of technical section prove higher (significance - .01). They have remarkably high disciplined imagination - an indicator of high creativity. All the genius and very superior creatives belong to the technical section.

Tuor, Powell Jones. 'Creative Learning in perspective.' University of London Press Ltd. 1972, p. 102.
2. Another conclusion is concerned with the age group of technocrats and discrimination of the groups' creativity. A crude mode in each age-range group is as follow:

- Young group
- Middle group
- Elderly group

188 (4 frequencies) 139 (5 frequencies) 179 (7 frequencies).

Though everything is not clear from these modes, but one thing is obvious that young group has a mode of highest scores, and this is congruous to the conclusion that young technocrats are highest in creativity in general.

The creativity scores decline in a very systematic pattern (X 203.98, 177.77, 161.56) and produce an evidence that deterioration of creativity occurs in a regular pattern. The results make it very clear that such differences are seen only where creative behaviour occurs more in degree (technical section). Young group is higher in percentage not only in the category of 'genius creatives' but also in categories of 'very superior creatives' and 'superior creatives'.

3. The intelligence levels of technocrats seem pertinent in creativity at least partially. Genius creatives are the technocrats of high intelligence, and not a single high intelligent technocrat happens to be 'below average' creative. But this does not mean that all high intelligent persons are highly creative. Another important conclusion is that though none of the average intelligent technocrat
proves to be a genius creative but a good percentage of them (3.93%, 16.07%) are either very superior or superior creatives. The 'mean' scores of high intelligent technocrats (though only 20 in number) creativity is significantly high than the creativity of average intelligent technocrats (X 247.15, 174.53).

In fact, sections, age-ranges and intelligence levels were treated as the infrastructure for comparison of technocrats for their creativity and this was the main reason why these three variables are considered essential in all the classification made for comparison in connection with each and every variable of this study.

4. Next conclusion is concerned with 'low anxiety versus high anxiety' factor of personality of technocrats and their creativity. The technocrats securing average score 7.84 were classified as high anxious, 5.60 as average anxious and 2.84 as low anxious technocrats. After comparing their creativity this is concluded that anxious (high) group's creativity is maximum. But in overall comparison of creativity of these three groups, quite interestingly it is found that low anxious and average anxious do not differ significantly in their creativity. The low anxious have the mode score of 108 (5 frequencies), 'average' have the mode score of 96 (3 frequencies) and high anxious have the mode score of 179 (7 frequencies).
5. The comparative groups of introvert, average and extrovert technocrats were made on the basis of mean ten scores of 2.70, 5.20 and 7.92. A high F value (64.00 sig .01) clearly proves the differences, introvert being the highest and extrovert being the lowest in creativity ($\bar{X}$ 326.70, 214.88, 161.62). The conclusion is in full agreement of the common characteristics involved in introversion and creativity as established by earlier researches. Introverts secured highest score of 410 in creativity and the distribution of scores was nonmodal while for 'average' four scores-179, 198, 222, 259 (each having 2 frequencies) showed repetition and for 'extroverts' it was bimodal (179, 139 each having 5 frequencies). This is an evidence in support of high S.D. in creativity scores of introverts in comparison to other two groups.

6. Tenderminded technocrats are high in creativity in comparison to 'average' and alert-poised groups ($\bar{X}$ 208.02, 177.07, 130.89 respectively). All the groups differ from each other on .01 level of significance. Tenderminded technocrats' creativity scores have a mode score of 139 (6 frequencies), while 'average' have many scores repeated twice and alert poised have a mode of 179 creativity score (5 frequencies). It is seen that all genius creatives (4 in number) are tenderminded. Except this evidence, no other particular trend could be located.
7. Finally, the conclusions about creativity of subdued, average and independent technocrats are that independent technocrats show remarkably high creativity and significantly differ from 'average' and subdued in creativity. 'Subdued' and 'average' technocrats could be compared with independents only in the norm category of 'below average' as none of the two personality make-up technocrats could achieve higher scores to be categorized in the copper cells. 'Subdued' have no mode (crude) score, average have the score of 105 (3 frequencies) and independents have the score of 179 (6 frequencies).

Overall picture of personality as tied up with creativity of the technocrats becomes clearer in the following graph. Maximum creativity is among introverts, then comes tender-minded, then are high anxious and last are the independent persons if only mean scores are scrutinized.

A total view (based on this research) of creativity can be as depicted in the attached graph No. The graph shows highest and lowest points of creativity on three fundamental dimensions as treated in this research - i.e. sections, age-ranges and intelligence. All the variables included in this research for comparing creativity of technocrats are shown in this graph for highest and lowest creativity points, taking into consideration the above mentioned three fundamental dimensions. The most interesting thing one can observe is that in highest points the distance/gap on one
variable is almost equal every where and the three curves are maintaining their proportionate shape, while in lowest points the distance among curves is bigger at the starting points and it is becoming lesser and lesser as the curves proceed towards their last points. This indicates relatively high differences where high creativity of classified technocrats is concerned, but the differences are less in most of the comparisons where the low creativity of the classified technocrats is concerned.

LIMITATIONS:

The research on 'Creativity in technocrats' was conducted with the interest that something worthwhile would come out and would be profitable to the consumers in social/organisational fields. The investigator could locate certain cues sufficiently pertinent for applicability, still this is realized that there exist certain avoidable and unavoidable limitations. These limitations/shortcomings can be seriated as follows:-

1. The unequal numbers of technocrats could be allocated to two sections, resulting into reduction of commercial technocrats or even complete absence of numbers in sub-categories which were formed for probeable analysis. This created problems in comparisons.

2. More age-categories could have been better for drawing conclusions worth wider generalization to the target population.
3. Only 20 subjects were of high intelligence, this again created difficulties in allocating sufficient number to different sub-categories and smaller cells' bifurcations, which led to lop-sided comparisons at many places. Similarly, in case of each personality factor, all the three rubrics do not have sufficient number of technocrats everywhere. For example in 'average anxiety' there are only 15 subjects, in 'introvert category' the number is only 10, under the classification of 'average' in tender-minded emotional versus 'alertpoise' personality factor there are 25 technocrats and finally under 'subdued' only 4 and under 'average' of the same personality factor, there are only 8 technocrats.

These considerations certainly limit the value of the findings the investigator reported. But if the results are entertained with certain reservations a number of benefits can be drawn in actual situations. Its limitations should be kept in mind when one uses the results for diagnosis, prevention or enhancement purposes in organisations.

Further researches can be conducted taking into consideration other coordinates of creativity and also by intentionally removing the above mentioned shortcomings.

**SUGGESTIONS FOR CONSUMERS:**

- The results are applicable to the organisations of high status (in accordance with the sample of this study), and also
to other industrial organisations of the same status as well, but certainly with certain reservations. While applying one must realize that creative climate is most important for creativity. It should be permissive in general. Every one possesses this ability to some degree and it can be increased or decreased through facilitating or anti-creative climate respectively. Opportunities for experienced, inter-personal conducive relations and group dynamics are the components of creative climate. Such an environment should be created in organisations. All self-help stimulating procedures are to be inculcated in one or the other way in organisations.

In addition to the above mentioned point of creative-climate, one should not forget what TAYLOR (1972) remarked, "I have often wondered who were the greatest killers of creativity. At present my strong conviction is that the person himself is the greatest killer of his own ideas . . . one also wonders which is more effective in destroying ideas within itself; an individual or an organisation." Therefore, personal efforts to retain one's creativity is equally important.

Since engineering by its very nature is creative, the engineers can take benefits from the outcomes of this study, through enhancing their creativity, through creating better

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1. TAYLOR, C. W., Climate for Creativity, Pergamon Press, 1972, p. 16
climate in the organisation and through research work emphasising many other coordinates of creativity which could not be included in this research.

Technological changes occur rapidly and aspiring young technocrats are expected to learn creativity and to enhance creativity for industrial production.
SUMMARY

This research dealt with engineers. In fact this is the field where they might reveal artistic as well as scientific phases of creativity. A successful technocrat should be an artist as well as a scientist. Thus the main aim of this research work was to find out cues of differential creativity in high standard organisations where highly and similarly qualified engineers do not see closer to each in professional behaviour of creativity, where most of them are engaged in routine work with repeat problems with repeat solutions.

On the theme "Creativity in technocrats," the questions posed while comparing technocrats for creativity in general were:

1. In what way does the profile of the creative and non-creative technocrats differ from each other?

2. What might be the antecedental factors, at least partially tied up with higher and/or lower creativity?

3. How an engineer can proceed towards a fully functioning person?
The hypotheses were formulated on the basis of empirical phenomena and normative aspect was left for 'suggestion' by the investigator.

The concepts involved in the research were well defined. These were:

1. The concept of technocrats, with special reference to commercial and technical sections. These sections were defined on the basis of the duty allocations.

2. The concept of age is a public one, still to make the investigator's position clear about the chronological or mental age, it was defined.

3. The concept of intelligence.

4. The concept of personality.

5. The concept of creativity.

The plan and the research was made after the pilot work on 54 technocrats. The design was comparative of ex post facto nature. The following items of comparison were planned for the research:

1. Creativity of technocrats in commercial and technical sections.

2. Creativity of technocrats of 3 age-range groups.

3. Creativity of technocrats of 2 intelligence levels.
4. Creativity of technocrats having different values in 4 second-order personality factors (16 PF).

The variables as is clear from the above mentioned comparative groups, were assigned classifications or values on the basis of pilot work and review of the literature:

1. **SECTIONS** : Varied in 2 ways; commercial and Technical.

2. **AGE** : Varied in 3 age-ranges, making 3 groups:
   - Young Group : 23 to 30 years,
   - Middle Group : 30+ to 39 years,
   - Elderly group : 39+ to 55 years of age.

3. **INTELLIGENCE** : Varied as high intelligence and average intelligence.

4. **PERSONALITY** : Varied in 12 ways, each personality factor on 3 values, low scored, average scored and high scored.

A few variables were kept in mind or controlled to make the sample homogenous in certain respects.

The sample size was 300, partially selected randomly and partially included on availability basis:
<table>
<thead>
<tr>
<th>Group</th>
<th>Age-range</th>
<th>Population Total</th>
<th>Population selected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Commercial</td>
<td>Technical</td>
</tr>
<tr>
<td>1. Young Group</td>
<td>23 to 30</td>
<td>45</td>
<td>715</td>
</tr>
<tr>
<td>2. Middle Group</td>
<td>30+ to 39</td>
<td>40</td>
<td>774</td>
</tr>
<tr>
<td>3. Elderly Group</td>
<td>39+ to 55</td>
<td>42</td>
<td>880</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>127</strong></td>
<td><strong>2369</strong></td>
</tr>
</tbody>
</table>

Instruments or tools used were:

1. Interview schedule - Form 'A' and Form 'B'
2. W.P. Alexander's Pass Along Test of Intelligence.
3. CATTELL's 16 P.F. Inventory.
4. Torrance's 'Creative Perception Inventory and Verma-Saxena's-Corner Test of Creativity.'

In order to collect data a planned research strategy was used where preference was given to the technocrats' own convenience or the convenience of their organisation. The data was collected in many sittings.

Finally the data was organised and tabulated as the initial stage of data processing. All total raw scores and number of technocrats were included in the tables. Another
chapter is allocated for hypotheses testing, discussion and interpretation. The descriptive statistics were 'mean', 'S.D.' and coefficient of variation. For inferential work significant differences of 'means' (F/t), of standard deviations (D), direct difference of mean (D), and differences of percentages (Z) were used. The results disconfirmed all null hypotheses and directional hypotheses were maintained.

The results showed that:

1. Overall technical section is higher in creativity than the technocrats of commercial section.

2. Young age group is on the top of creativity when compared with the other two age-range groups. Creative behaviour becomes lesser and lesser as one observes test performances from young to middle group and from middle to elderly group.

3. All top most creatives are of high intelligence but even average intelligent technocrats are very superior and superior creatives. It is established in a way that not only high intelligents prove high creatives always.

4. Creative behaviour is higher in high anxious, introvert, tenderminded and independent technocrats in comparison to other technocrats having other values on 4 second-order personality factors.