DISCUSSION

Age

It appears that the sample consists of principals most of whom are in their productive age of 26 to 40 years. Architectural engineering being a highly developed profession with attendant qualifications of super-specialities, it normally takes a long preparatory period before stepping on a roaring practice. Formal qualification in Indian universities in the fields such as engineering and civil engineering, normally takes 22 years of age. Then, super-speciality training would take two to three years in the case of graduate engineers. By this time the individuals will be completing 25 to 26 years of age, after which they join some companies for acquiring some sort of on-the-job training before setting out to be on their own. Then onwards, for another 15 to 20 years they may have a roaring practice.

In the case of diploma holders which is a level less than graduation, the incumbents will be spending more years than the graduate engineers in 'on-the-job training' phase. In any case they are likely to take more number of years than the graduate engineers before setting out their own independent practice. Under the circumstances it could be reasonably assumed that the sample-members are in their most productive phase of the career.
Education

The qualifications of the principals ranged from diploma in civil engineering to post-graduation in civil engineering. 60.63 per cent of the principals had their graduation in civil engineering at the time of starting their career. One has to complete 10 years of schooling, 2 years of higher secondary and 5 years of engineering (10+2+5) to become a graduate. In the case of diploma holders, one has to complete 10 years of schooling and 3 years of engineering program in polytechnic institutions (10+3). 32.50 per cent had completed their diploma at the time of starting their career. 6.87 per cent of principals had completed their post-graduation in civil engineering. They had to undergo 10 years of schooling, 2 years of higher secondary, 5 years of degree and 2 years of masters degree in civil engineering/architecture (10+2+5+2). Ninety per cent of the diploma holders were either doing their part-time B.E. or A.M.I.E. The motive for acquiring higher qualification among the diploma holders may be to equip themselves in the competitive field. Since it takes longer years for the diploma holders to set up their own construction firms and since many of them have completed their graduate programs through evening colleges, no attempt has been made to treat the graduate engineer and the diploma holders separately.

Experience

The work experience of the principals in the field of civil engineering ranged from 2 to 19 years. The mean and SD for
work experience of the subjects were 8.16 years and 4.54 years respectively. Sixty seven per cent of the subjects had a minimum of 6 years of work experience and 33 per cent had work experience of 2 to 5 years. In the present study the years of experience of the subjects were calculated from the date the subjects started their firms or when they became the principals. The years of experience they had before starting their own firm were not taken account, since no data was collected on that.

Innovative Style and Innovation
The findings of the present study reveal that the principals of the high innovative firms are more innovative than the principals of low innovative firms. The A-I is a cognitive style and it is plausible to conclude that this style is responsible for the innovativeness of the principals. We can recall here three studies by Dershimer (1980), Jorde (1984) and Mudd and Mc Crath (1987) which related KAI scores with specific innovations in the field of education. Further, these results can also be taken as an evidence for the validation of KAI as adapted by Venkatachalam. The latest adaptation of the inventory by Dennis et al (1992) show 13 items which find a place in Venkatachalam's adapted inventory also. As has been already stated the scores of the adapted version differentiates the principals into high innovators and low innovators. This is validated by the construction of the same groups using different method. So, this can be viewed as yet another case of validating the inventory.
It is further shown by the discriminant function analysis that the KAI scores discriminates high and low innovative firms. The result is presented in Table No. 30.

Age and Innovativeness

Whether innovativeness will decline as a result of aging? A typical experimental study or a longitudinal study would alone be providing answer for this question. Such studies are not known to this author. The physiological process of aging may not retard innovativeness in as much as innovativeness being a cognitive style to do things differently. Innovativeness lie in the realm of personality - a pattern of behaviour. Will that change because of aging process? This is an interesting question which needs further research. For the present study, the results confirm the hypothesis that there will not be any difference in the innovativeness of the person because of their age.

Self-confidence and Innovativeness

There are few studies examining the correlation between self-confidence and innovativeness. Anyway, the present author had not come across many references on self-confidence and innovativeness excepting Beene (1985) study using CPI. Self-confidence may connote to self itself from the phenomenological point of view. But, caution has to be exercised in not taking one for the other. Basavanna (1975) says that self-confidence refers to an individuals perceived ability to act effectively in a situation to overcome
obstacles and get things to go alright. The self-confidence expressed in the case of an innovator relates to the actual activity of innovation. That is, idea generation and the process of innovation and not herculean or missionary type of work where all the obstacles are confronted with an unflinching energy marked by a logo or call in life.

The present study shows that the high innovators have more self-confidence than the low innovators. Self-confidence as delineated above could be accepted as a psychological characteristics of an innovator. Further, studies isolating the professional abilities at work in an innovative process and studying self-confidence through these abilities will be very much necessary to understand the nature of relationship between self-confidence and innovativeness.

Locus of Control and Innovativeness
The attempt to know whether the principals of high and low innovative firms will fall on the continuum of internality and externality was prompted by the consideration that innovator being an original person will give more importance to his own thinking than to the comments of others. From this angle it looks very obvious that innovative people will be necessarily internals. The result supports the hypothesis. But if we look little different it is not so obvious for - 'I am my own master and I need not be an innovator'. Innovation is the style of mind to invent, bring something new, re-fashion two things in hitherto unknown ways
or methods. Internality is purely a personality variable bordering on one's belief systems. How do they really relate when the former is a cognitive variable while the later is a personality variable? The concept of intellectual efficiency proposed by Gary Groth and Marlet (1984) provides a link. Intellectual efficiency is marked by a tendency to be competent, to be clear in thinking and to make efficient use of the potentials one possesses. It is very much tempting to think that innovativeness may be an intellectual efficiency and is tempered by internality.

The principals of high innovative firms have scored significantly less on the chance-scale of the Internal External Locus of Control Inventory than the principals of low innovative firms. A perusal of the items of the chance scale shows that individuals who believe in the power of the unknown forces in general will score more on this scale. In the human population irrespective of race, there is a mental image regarding the best things people get in their life - people who are lucky will receive the best out of life - People who are not lucky will, not only not get the best things, but also suffer because of misfortune. The image of 'Lady luck', showering the choicest choices on some people is well spread in the population that it is very difficult for many to disbelieve the phenomenon of luck. In Greek mythology a divine being with blind folded eyes is said to be wandering aimlessly stretching her hands. Whoever or whatever happen to come in contact with her hands will be the
blessed to receive all the good things of life. This mythological story vindicates randomness of 'luck. Probably this meaning had undergone a twist and we have now in the place of 'lady luck', a divine being who is deliberate in his/her target. This thinking holds life as preordained and people will have it only as fate desires it. The author is not aware of whether the mental image about luck just described could qualify to be one of the archetypes as postulated by Jung. An innovative person by the very nature of demands on him has to be an integrated person also. The self of the person has to stand as a single core for coming out with inventions. Any split in the self will reduce the force and sense of purpose in the self. Resistance to any external pressure or manipulation provides the means to maintain self-consistency. This is what is called the will to act. Assagioli provides the metaphor of helmsman of a ship to explain this point. The challenge by the helmsman is to sail steadily despite of the pull and pushes caused by wind and current. When the person is self directive, then the self is filled with the necessary condition to attain mastery, concentration, persistence and determination. Clark E Moustakas (1977) says that "within each person is a core of being, last strong hold, so to speak, that resist attempt to push the person away from the self to change the individual to meet others expectations and demands. When we force a person to behave to our own values, when we impose convictions on the other person, we stifle creativity and the will to explore and actualize". To wind up the discussion,
it is suffix to say that an innovative person cannot afford to believe in luck, since such a belief will take the initiative, the sense of purpose and perseverance out of himself.

The results of analysis of variance of the scores on the powerful others scale show that the principals of high innovative firms heed less than low innovators to "powerful others". Powerful others in the present study might represent a wide spectrum of people starting from the financiers, rich clients, reputed colleagues, office bearers in professional associations, government officials involving in granting permission to plans, electrical engineers, structural engineers etc. However, the author is not sure which of the "powerful others' were mentally imagined by the respondents at the time of answering the items of the questionnaire. As an innovator being an integrated person cannot help resisting the influence of powerful others.

Values and Innovativeness

The characteristics of an innovator and a person with theoretical value is shown by the following table.

<table>
<thead>
<tr>
<th>An Innovator</th>
<th>The Theoretically valued Person</th>
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<tbody>
<tr>
<td>a. Original ideas</td>
<td>a. Discovery of truth</td>
</tr>
<tr>
<td>b. Disagreement with group</td>
<td>b. Scientific temper</td>
</tr>
<tr>
<td>c. Create rather than improve</td>
<td>c. Intellectual</td>
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While making the assumption forming the basis for the hypothesis, it was proposed that there will not be any significant difference in the theoretical value between high and low innovative firms principals. This assumption does not hold good as vindicated by the results. Then how could we explain the present result? Innovativeness being more a style of mind than the result (product) that style may be thought of as a close alley of theoretical value.

Drucker (1985) described the process of innovation as a "specific instrument of entrepreneurship". Miller Frisen (1982) considered product innovation as a main criterion for entrepreneurial activity. Anderson (1959) said innovation and creativity are synonymous and he saw an entrepreneur as a creative person.

One component of an economic man may be his innovativeness. The motive for an economic man is to surpass others. Achievement motive has been demonstrated by Mc Clelland (1969) as an acquired motive and motivating economic achievement is a current issue repeatedly discussed. The items measuring economic value deals with production of goods, accumulation of wealth, comparison with others etc. Whereas the innovative personality of an innovative person is an inborn quality. How do they go together? Economic

d. Fresh perspective on old problems
d. Interested in observing objects and reasons
e. Cope with several ideas at the same time
motive may be a learned one, but one of the strategies for an economic man is taking calculated risk. Once risk-taking is accepted, innovation is decided as a strategy. However, the results do not support this thinking. The mean scores of economic value of the principals of low innovative firms is higher than the principals of high innovative firms. Since, we have no idea of the role played by risk-taking behaviour, we could not come to a definite conclusion.

The results show that the principals of high innovative firms have more aesthetic value than those of low innovative firms. The civil engineering is one branch of technology which has lot of scope for aesthetic finishings in interior and exterior, shape, space planning, layout, material and their blend. So much of input by the suppliers through the advertisement reach the builders. These are converted into aesthetically pleasing architectural masterpieces by the engineers. It is not clearly known whether the relationship between these two variables is due to the closeness of the psychological distance between them or a sheer professional coincidence.

The social man and the innovator are different from each other. For a social man, social interest is the predominant motive. For an innovator, to innovate is the predominant motive. A social man may introduce few innovations in his work for the upliftment of society. But he is not going to work on innovation itself and perfect it. For example, a social man may be interested in eradicating malaria in an
area. He may resort to some innovative approach for educating the people about malaria. He may seek the help of different experts for getting a design for that purpose, but he may not be directly interested in the process of diffusion. This hypothesis has been validated by the results.

While making the assumption itself it was shown that few studies reported earlier did not show any conclusive evidence regarding the existence of relationship between religiosity and innovativeness. In the present study also an attempt was made to study the relationship between these two variables. The result shows that they are not related. One intriguing question is whether at all innovative dimension and religiosity dimension have some commonness at least at the manifest level. For answering the question we have to reflect a little on what constitutes hindu religion to which all the members of the sample belong. Now there are two approaches in hindu religion. And before proceeding further it may be stated that the items of religious value scale have been scrutinized and all the religion specific items were changed into secular items. However, it was expected that since the sample consisted of hindus only the effect of that would have been present in their response. There are two approaches for religion. One is surrendering to god and another is realizing the divinity in one's self. There cannot be any quarrel for an innovator with the second
preposition. In the Hindu scripture, **Bahavat Gita**, one sloka translates itself as "Do your duty, reward is not thy concern". The interpretation for this sloka can take any of these above two approaches. Under the first approach, human being is expected to carry out the duty assigned to him and God will give the suitable reward. In the second approach, the man is told that any expectation about the reward of his act should not be there as it will stifle the effort since such thinking will involve ego. Here, man is expected to 'exist' in his work. This is, what an innovator will be, while at innovation. However, the items in the scale put more emphasis on the first approach to religion. So, it was expected that innovativeness and religion will not be related. The results confirm this.

The need for power has been described by Mc Clelland et al. (1976) as "the desire to have impact, to be influential and to control others. Individuals high in n-power enjoy being "in charge", strive for influence over others, prefer to be placed in competitive and status-oriented situation, and tend to be more concerned to prestige and gaining influence over others than with the effective performance" (Mc Clelland, 1976). A reading of the items of the scale shows that the need for power and the political value are more or less same. The investigator has not come across studies relating n-power

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**Bagavat Gita** is a Hindu scripture which is accepted as one of the best exponents of Hindu religion.

**Sloka** means a couplet - a form of poetry in which Gita is narrated.
and innovativeness and as such the lack of relationship shown in the result is yet another evidence in the same line.

Interpersonal Trust and Innovativeness

The result shows that the above hypothesis is to be accepted. Interpersonal trust held as a learned behaviour by Rotter (1967) is likely to be randomly distributed among the high innovators and the low innovators. So, in such a situation a null-hypothesis would have been in order. But an alternate hypothesis has been framed based on the thinking that an innovator-principal will be exercising trust in others and still be watchful about it. May be this phenomenon is reflected in the scores. The principals might develop the ability of interpersonal trust over a period of time as a sequel to certain reinforcements they have received on occasions when they reposed trust in others.

Size and Innovation

In the literature, conceptions differ of what the size is. Few authors (Loveless and Bozeman, 1983; Kaluzny et al., 1974) assume the size as the resource available in the organization. Few authors take the size of budget (Mylinger, 1968) as the size and many others, as the number of full time staff in the organization (Blau and McKinley, 1979). In the present study the number of people working in organization was taken as the base for determining the size of the organization. The result shows that there is a difference on account of size in the innovativeness of the
firm. Size is positively related with innovation. One plausible explanation is that an organization which has several members may automatically provide ample scope for cross fertilization of ideas giving birth to innovation.

Structure and Innovation

The structural complexity is of two types: horizontal and vertical. A high horizontal complexity is marked by more number of sub units or task specialization. The high vertical complexity is based on several layers of hierarchy and authority. An organization which is high in horizontal complexity and low in vertical complexity has been reported to support innovation. Similarly, very low formalization and decentralized decision making will also support innovation (Burns and Stalker, 1961). Similarly, a large number of vertical authority and centralized decision making are generally thought to impede innovation (Dunning and Sincoff, 1980). However, as has been reported in review of literature, findings are mixed in this area. One possible reason is that the structural requirement may vary from innovation to innovation in terms of product and process. The chi-square value show that there is no significant difference between high and low innovative firms on structural complexity. It also holds the same for the number of division responsible for primary activities of design and production and the number of additional staff units engaged in supportive activities. But regarding task diversity, the results imply that innovative organization have excess
subdivision of task and responsibility. By excessive differentiation an organization can diversify the channel of communication within the organization for a new idea, resulting in innovation, and for having close relations etc. and ultimately getting credit for the organization. The results also negate the hypothesis that there will not be any significant difference between the high innovative and low innovative firm on formalization. It is evident from researches (Aiken, 1967; Blau and McKinley, 1979) that formalization, especially impersonal recruitment procedures reduces the likelihood of innovation.

Work-culture and Innovation

The chi-square value 18.07 is significant at 0.01 level. That means there is a difference between high innovative and low innovative firms with regard to work-cultures. Further, the results of discriminant analysis reveals that the work cultures - innovative/creative, service, responsible cultures, predict 79 per cent on innovative firm. The work cultures that are predominant in high innovative firms are, 'inclination to undertake creative and new work', 'interest in exhibiting artistic talents', 'efforty to blend traditional styles with modern design', 'aptitude for planning and generating new ideas', 'keenes for getting new ideas from client', 'positive attitudes for challenging work', 'sensitivity in building according to clients financial position', 'involvement in ensuring satisfaction of client', 'concern for providing interior decoration',
'commitment in keeping punctuality at work' and 'dedication in providing prompt service to client'. The work cultures that are predominant in low innovative firms are, 'managing good standard of living', 'motivation in taking client who are financially sound', 'interest in taking work at cities', 'keeness in taking major projects', 'anxiety for using ones own building materials', 'attempt in raising status in society', 'motivation in developing a technique through which labour cost can be reduced', 'special concern in building churches and temples', 'building houses for one community', 'anxiety in planning according to Manajadi Shastra, over commitment to time limitation', 'concern of quality', 'appreciation from people', and 'preference in taking one project at one time'. If we reflect over the different cultures as enunciated by the different items seen so far, we can soon find that the work cultures prevailing in high innovative firms are dimensionally different from those of low innovative firms. May be the firms become innovative as the result of prevalent cultures. A study conducted by Venkatchalam and Saleendran (1990) among scientists has evidenced the necessity of favorable conditions for the potent but delicate plant of innovativeness to flourish. Linkages between work climate and innovative behaviour are reported by Baker and Freeland (1972) and Sapolsky (1967). Similar findings have also been documented that creative thinking, an important components of the innovation process, is significantly enhanced by establishing a conducive work climate (Andrews (1975), Taylor, (1963, 1972), Thistlewaite,
Environment and Innovation

The environmental characteristics measured in the present study were based on how many of the following consultants the firm employs for getting professional help: (a) structural engineers, (b) mechanical engineers, (c) electrical engineers, (d) acoustical engineers, (e) lighting designers, (f) estimators, (g) landscape architects, (h) graphic designers, (i) specification consultants, (j) planners, (k) material specialists, (l) interior designers, (m) traffic consultants, (n) food service consultants, and (m) industrial specialists (Blau and McKinley 1979). The result show that high and low innovative firms differ on the above environmental complexity. Environment in general can be conceived to play the following role. Supplying the needed information for innovation, feedback from the market about the function of the present product and the need for prospective products, the supply of resources, financial, political and so on. Sometimes, a new legislation may trigger a change. In the present study the results agree with this thinking.

Correlates of K A-I

Behaviour is a product of interaction between environmental stimuli (context) and relatively enduring dimensions of individual difference (personality traits). The sources for individual differences are intellectual and spatial
abilities, personality traits and cognitive styles. Cognitive styles are described as the manner in which an individual prefer to perform mental actions (McKennna, 1984). The styles of cognitive behaviour as proposed by Kirton (1976; 1984) marks most important advancement in this area. He attributed the theory of Adaption-Innovation and linked it to more basic descriptions of personality (originality, conformity, and efficiency). A question arises in this context: 'Is A-I style is different from personality' or in other words what is the relationship between KAI and personality. Brunswick (1956) provided a 'lens model' and Petrinovich (1979) revised the model. The model has two parts (1) KAI style summaries preferences or emotions about behaviour which are the result of personality traits, and (2) that these preferences are predictive of actual behaviour. A considerable number of researches have investigated the relationship between KAI scores and variety of personality scales and found that innovators have a significant positive relationship with sensation seeking and change (Carne and Kirton, 1992; Kirton and De Ciantis, 1986; Goldsmith, 1984; 1986), De Ciantis, 1987); extroversion (Kirton, 1987), self-esteem (Goldsmith, 1985; Goldsmith and Matherly, 1986; Keller and Holland, 1978), Self-confidence (Beena, 1985), risk-taking (Kirton, 1987; Goldsmith, 1985) and negatively related with neuroticism and social desirability (Kirton, 1987; Goldsmith and Matherly, 1986), dogmaticism and need for structure (Kirton, 1987), capacity for status, introversion (Beene, 1985). Studies on relationship of KAI with variables
like Locus of control, Interpersonal trust, Values and Self-confidence are not available. In the present study an attempt is made to fill the gap that exist in these areas and the results revealed that KAI scores are significantly correlated with (a) Self-confidence (0.63), Interpersonal trust (0.51), Internal locus of control (0.59), Theoretical value (0.66), Aesthetic value (0.71), Social value (0.52), Religious value (-0.32) and chance (-0.46). These results show that high KAI scorers have more Self-confidence, Interpersonal trust, Aesthetic value, Social value and less belief in control by chance, and religious value when compared to low KAI scorers. These variables may be thought of as traits of personality and they may interact to produce the KAI style.

Discriminant Function Analysis

The psychological variables so far considered have been found to be related to innovativeness. However, a useful step will be to find out the best discriminator among these variables between the high and low innovator.

The results of discriminant function analysis revealed that the discriminant function was significant at 0.01 level with a canonical correlation of 0.6209. This discriminant function, which emerged at an acceptable level of significance, indicated that the two groups which were compared were samples from two different population. This suggests that the principals of the high innovative firms and
principals of the low innovative firms may be two distinct groups.

The discriminant function also indicated that the Kirton Adaption-Innovation, Interpersonal trust, Internal locus of control, Economic values, and Self confidence were the best discriminants between the two groups. These scales were associated with the high positive and negative standardized coefficients for the discriminant function, and are graphically presented in Fig 1. As compared to the principals of the low innovative firms, the principals of the high innovative firms tended to score higher on Kirton Adaption-Innovation, Interpersonal trust, Internal locus of control and Self-confidence and lower on Economic values. Conversely, the principals of the low innovative firms tended to score higher on Economic values and lower on Kirton Adaption-Innovation, Interpersonal trust, Internal locus of control and Self-confidence as compared to the principals of the high innovative firms. It is quite obvious that the discriminant function provide us with relative rather than absolute description of groups. In other words, they provide us the knowledge of those variables which maximally discriminate between groups rather than description of the groups themselves. Further the results of discriminant analysis reveals that the Kirton Adaption-Innovation, Internal locus of control and Aesthetic value alone can predict an high innovator by 80.8 percent from that of a low innovator.