In Industry, there are individual differences among workers in their performance. Turner and Lawerence (1965) and Hulin and Blood (1968) suggested that different types of workers respond differently to similar job characteristics. Any group of workers irrespective of occupation will vary considerably in terms of their relative work efficiency and performance (Blum and Naylor 1968). According to White (1978) challenging, interesting or pleasant task increases productivity while boring repetitive work tends to decrease productivity. Differences in productivity exist even when several people work on identical machines. Also, differences among workers in performance are typically consistent over time. Tiffin (1944) reported a correlation of .96 between two week's production of 99 hosiery loopers. However, Rothe (1951), and Rothe and Nye (1958, 1959, 1961) found that productivity of various groups of industrial employees showed a generally low relationship between one week's productivity and the next. Incentives to work may be ineffective when the range of intra-individual differences were greater than the range of inter-individual differences.

Viewing efficiency from the psychological approach, Laird and Laird (1967) say "efficiency means using abilities in ways that bring optimum results with least human waste or strain."
Work efficiency depends on a number of variables. It is an outcome of a group of variables residing within the individual, and environmental conditions. An adequate comprehension of the dynamics of work efficiency requires an understanding of the nature and effect of these variables. The individual and environmental variables will be enumerated and discussed at some length in the ensuing review.

(A) **Individual variables and work efficiency**

Some of the investigators like Chatterjee (1969), Tiffin and McCormick (1979), Vatsyayan (1980) have brought to light the relevance of psychological factors which effect efficiency in industrial settings. Some of the salient psychological variables influencing work efficiency in industrial set-up will be reviewed. These may be enumerated as follows:

1. Ability
2. Motivation
3. Goal setting
4. Job satisfaction
5. Attitudes
6. Morale
7. Interest
8. Personality

(1) **Ability**

"Each human being possesses a pattern of abilities which is unique to him as an individual" (Gagne and Fleishman 1959). According to Korman (1978) different abilities have traditionally been the explanation for differences in work effectiveness that do not seem to be attributable to motivation. Smith (1971) found that many high ability non-achievers might achieve if they were given early guidance and were allowed..."
opportunity to change their academic programs. Spearman's (1904) theory of intelligence with its general factor (g) and specific abilities called S factors, emphasized that though more importance may be given to general intelligence, specific factors may also be considered. According to Dunnette (1973) abilities are primary determinants of job performance. English (1977) found ability to be significantly related to performance.

Ability will be discussed under (a) Intelligence (b) Aptitude.

(a) Intelligence: An adequate level of general ability enables an individual to profit more effectively. It is basic to learning in school, vocational efficiency and interpersonal relationships. Various studies have attempted to establish the relationship of intelligence to performance. Bingham and Davis (1924) reported "superiority in intelligence above a certain minimum, contributes less to business success than does superiority in several non-intellectual traits of personality." Proctor (1937) found that intelligence quotient (I.Q) in different types of work varied as shown below:

<table>
<thead>
<tr>
<th>Occupational</th>
<th>Mean Intelligence</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>115</td>
<td>130</td>
</tr>
<tr>
<td>Managerial</td>
<td>108</td>
<td>565</td>
</tr>
<tr>
<td>Clinical</td>
<td>104</td>
<td>228</td>
</tr>
<tr>
<td>Skilled</td>
<td>99</td>
<td>12</td>
</tr>
<tr>
<td>Semi-skilled</td>
<td>97</td>
<td>10</td>
</tr>
</tbody>
</table>
Thompson (1947) found a small group of top-rated executives superior to others on the Wonderlic personnel Test. Super (1949) has stated that to some degree intelligence is related to success on the job. Dosajh's (1958) results indicate that a high score on Progressive Matrices can safely be taken as a criteria for selection of students for the groups where a knowledge of science and mathematics play an important part and in such groups as Technical and Science. On the other hand Super and Crites (1971) say "Given intelligence above the minimum required for learning the occupation, additional increments of intelligence appear to have no special effect on an individual's success in that occupation.

Mathur (1966) found the mean I.Q. on A.C.E. to be 117 for Engineering Degree Courses, 111 for Medical, 107 for Diploma in Engineering, 102 for Law and 101 for Teachers Training students. DeCecco (1970) found a correlation of .42 to .87 between intelligence tests and scores on academic achievements. Vohra (1977) found intelligence related to achievements of the polytechnic students. He found a correlation of .07 and .21 for internal and external achievements respectively and intelligence. Kleiman (1978) says "relationship between performance in training and that on non-linear job tasks is moderated by intelligence." McClelland (1973) has shown that there is little evidence that measures of intellectual ability of the type used in school settings are related to career and work success.
(b) **Aptitudes** - Both general ability (intelligence) and special abilities are important in determining the success of an individual in occupational courses. Workers differ in abilities, some people may be better equipped aptitude wise for certain jobs, while others may be poorly suited, for these jobs. Aptitude is a present condition but with a forward reference. It is a condition or set of characteristics regarded as symptomatic, indicative of potentialities (Bingham, 1937). It connotes more than potential ability in performance, it implies fitness, suitability for the activities in question.

Aptitudes have a prognostic value in industry. Leffel (1939) found that boys who planned to enter technical profession or semi-professions made significantly high scores on the O'Rourke Mechanical Aptitude Test than did those who planned to enter other fields. In a non-degree programme 62 men were tested for their technical aptitude on the DAT and the percentile equivalents of average scores were 37 on Verbal Reasoning, 26 on Space Relations and 49 on Mechanical Reasoning (Bennett, Seashore and Wesman, 1955).

According to the DOT code in Roe's (1956) book the skilled profession would require the highest rank in Mechanical reasoning and sixth in Abstract Reasoning. Seashore and Odgers (1959) conducted a study on students of machine shop and automation, the ratings of the teacher correlated well with the performance of students on Abstract Reasoning and Numerical
Ability. Super and Crites (1962) speak about space relations as an aptitude which has long been considered important in such clearly similar activities as machine shop work, carpentry and mechanical drawing in which the worker must judge shape and size and translate two dimensional objects. According to Bennett, Seashore and Wesman (1966) students who are superior in Mechanical Reasoning, Space Relations and Numerical Ability will do better in Engineering courses.

Sharma (1971) used the aptitude tests for predicting the technical potential at delta level. Vohra (1977) found the relationship between Space Relations and academic achievement to be $0.24$ (external assessment) and $0.16$ (internal assessment). For Mechanical Reasoning and academic achievement the correlation was $0.11$ (internal) and $0.22$ (external). Between Numerical Ability and achievement the correlation was $0.21$ (external) and $0.24$ (internal). The relationship between Abstract Reasoning and achievement was found positive $0.10$ (internal) and $0.19$ (external).

Brown and Ghiselli (1952) point out "it is not safe to assume that tests which best predict trainability will predict job proficiency equally well." However, he found a slight tendency for a test that proves useful in predicting trainability also useful in predicting job proficiency and vice-versa.
Task performance is a function of special ability factors in combination with (not necessarily in interaction with motivational variables as reported by Johnson (1971). Though motivation times ability predicted training effectiveness better for technical groups, motivation, singly was found to be the most consistent, significant and valuable predictor of training effectiveness (Maitra 1977).

(2) Motivation

According to Maier (1976) motivation is a way of bringing to expression an ability a person already possesses. Industry has generally overlooked the complexity of human motivation and has erroneously oversimplified a highly complex phenomenon (Elum and Naylor, 1968). Motivation cannot be measured directly; examination of past research, however, shows a reliance on performance outcomes as surrogate measures of motivation (Terborg and Miller, 1978). Occupational motives have been classified on the basis of extrinsic-intrinsic dichotomy, and influence work efficiency. The former, e.g., money, advancement, financial security, pension etc. can be manipulated by management to influence performance. Intrinsic motivation constitutes the idiosyncratic intrinsic differences in motivational variables. Creamer (1978) found the measure of intrinsic specific motivation to successfully predict performance.

Herzberg's (1966) "two factor" or "motivation hygiene" theory has significant implications in work settings. It
incorporates two kinds of factors, intrinsic or motivators and extrinsic or hygiene factors. The former are related to job satisfaction and the latter to job dissatisfaction - these factors are also called maintenance factors because their presence maintains satisfaction. Primarily, they operate to dissatisfy individuals when they are not adequately provided but their appropriate presence does not motivate them significantly. On the other hand, increases in the intrinsic factors are associated with satisfaction and are called motivational factors. Their absence will not necessarily cause job dissatisfaction. They operate primarily to build strong motivation and high job satisfaction. The difference between motivational and maintenance factors help in answering why fringe benefits and personnel policies provided by managers did not increase employee motivation in work settings. Lahiri and Srivastava's (1967) study on 93 middle managers goes against the generality of Herzberg's theory. Rao's (1970) study on 60 bank managers did not support the theory either. Indian studies using different methods cast serious doubts in favour of Herzberg's theory. However, according to Dwivedi (1979); it should be recognized that the theory is of significance in indicating the various types of needs which motivate individuals and their varied impact on satisfaction in organizational settings.

Chris Argyris' (1957) approach to motivation assumes that the workers are already motivated and the problem facing
the management is how to channelize their motivation in the proper direction. All human beings possess psychological energy and their attempts to utilize this energy in a manner which satisfies their higher level needs provides them with motivation. Accordingly, if the management provides the workers with opportunity to gratify their needs the psychological energy is directed towards attainment of organizational goals. With the idea of using human motivation, Argyris has advocated the 'mixed model' comparing (1) the factor which direct the workers' psychological energy towards organizational goals include open communication and democratic distribution of power, and (2) factors which divert the energy from the accomplishment of organizational goals include excessive central control and operation within the limited circle of a simple work-unit without indicating any significance in the entire organizational setting. Argyris has blamed the management for not demanding the maximum potentials of its people who frequently reveal short-sighted behavioral patterns in their work situations. Further, he feels the interpersonal problems stem from divergence between the what individuals preach and what they practice. However, Argyris has been criticized because he stresses individual personalities in work situation instead of a comprehensive standpoint of organizational culture and that his strong inclination towards frankness gives rise to an aggressive response.
McGregor's (1960) theory 'X' presumes that lower level employees are "lazy, dislike work, have little ambition, avoid responsibility, lack creativity and are motivated only by security and economic gain." Theory 'Y' assumes that for human beings work is as natural as play, or rest; employees are motivated besides 'survival' by other needs because they are capable of creativity, have initiative and self-direction. McGregor believes that organizations will be more successful if they accept 'Y' assumption about human nature.

According to Ganguli (1961) different people will be motivated by different things and different amount of different things. Gellerman (1970) pointed out that there is no single motive that determines the reaction of all workers to all jobs and hence no single strategy will keep productivity high for everyone everywhere.

Atkinson and McClelland (1961) have shown that needs can be an integral part of personality. That workers select their jobs because they see potentialities for the satisfaction of their needs. After reviewing recent studies, Stacey (1969) reported a significant relationship between achievement motivation and occupational choice. Different but related to the needs approach stands the role of values in determining career choice.

Recently over two decades, a great deal of research has been done in the study of three needs - achievement, affiliation
and power, and their correlates in human behaviour. Of the three, achievement motive has a more significant influence on the success and failure of industrial enterprises than any other motive (McClelland, 1961). The need for achievement has been defined as the "desire to exceed some standard of behaviour" (McClelland et al, 1953). McClelland feels that the entrepreneurial class is the best measure of how the need for achievement level is related to economic growth. If this need level is high in society there will be more people, who try to produce more goods than they can consume. McClelland (1961) has stressed the psychological aspects of an entrepreneur. He says that in a mobile society where an occupational position is somewhat dependent on performance instead of family or political connections, managers, executives or entrepreneurs should have higher achievement than men in other comparable occupations.

Wainer and Ruben (1969) using three motives, achievement, power and affiliation found predictive efficiency of nAch above was superior. The growth rate of these companies led by entrepreneurs with high nAch was almost 250% higher (.73 versus .21) than those companies led by entrepreneurs with a moderate nAch. This was supported by Morris and Fargher (1974), Hundal and S. Singh (1975) and S. Singh and Jaiswal (1977). Hayashi, Rim and Lynn (1970) conducted a test on McClelland's theory of achievement motivation in Britain, Japan, Ireland and Israel. Results were significantly supportive of the hypothesis that in high growth countries young people show
a greater degree of commitment to career success than is found in low growth countries. Hundal (1971) and Sinha and Chaubey (1972) found need for achievement (henceforth referred to as nAch) and economic growth to be positively related. Argyle (1972) supports the view that achievement motivation leads to industrial growth via the activities of entrepreneurs. Singh, S (1979) reports that at macro and micro levels achievement motivation promotes entrepreneurship which in turn is a key to a nation's economic growth.

Technology is an important factor in full time entrepreneurial activities because individuals with higher nAch might adopt better techniques more quickly and extensively as a more efficient way of achieving their goals. McClelland and Winter (1969) present evidence in support of the view that people with high nAch not only get into entrepreneurial occupations, but also tend to behave in more expansive and more successful ways.

Durand (1975) confirmed the positive relation of nAch to performance. The performance measure was a composite measure of business activities.

Singh (1970) conducted studies on business entrepreneurs and agricultural entrepreneurs of Delhi. He found nAch greater in successful businessmen and progressive agricultural entrepreneurs compared to unsuccessful and traditional ones. Hundal's (1971) study compared the fast and slow progressing
small scale entrepreneurs of Punjab, in which the former group scored higher on nAch than the latter. Singh and Singh (1972) reported that business entrepreneurs possess more risk taking capacity as contrast to agricultural entrepreneurs.

According to Luthans (1973) about 10% of the people in the United States are highly achievement motivated. Achievement oriented people take a strictly business attitude toward whatever their business happens to be. With a high degree of achievement motivation the individuals are found to be more persistent, realistic and action minded as compared to individuals with other kinds of motivational patterns.

These research endeavours, as represented of a large body of literature, have documented a high significant link between high achievement needs and "motivated" behaviour among businessmen.

Another motive that has gained considerable importance in the Industrial sector is the power motive (nPow). Wainer and Ruben (1969) reported that nPow also has relevance to performance among entrepreneurs. They found that high performing firms (as measured by changes in sales) were headed by entrepreneurs having a combination of both high achievement and lowered power needs.

McClelland has defined the nPow as a person's desire to control or influence another person who is subordinate. This need is related to the political means used to achieve economic aims.
but the results of McClelland's study (1950, 1955) showed that nPow was not related to economic development. According to McClelland and Lecky (1975) high power motivation interferes with small business success - probably because it results in too high risk taking. They also found that people with high nPow do not seem to take into account the probability of success. Power motivated persons tend to be somewhat higher risk takers than others (Davis, 1977). Durand (1975) conducted a study on black businessmen and found entrepreneurs who exhibited high levels of business activity were those who had high achievement and low power motives.

Affiliation motivation is a drive to relate to people. The affiliation motive has been generally assumed as being either a means to an end or an end in itself. Or they may socialize simply because they enjoyed it regardless of whether anything but company was apparently gained thereby (Schacter, 1959). People with achievement motivation work harder when they have precise feedback about their successes and failures; but individuals with affiliation motives work better when complimented for their favourable attitude and cooperation. Also achievement motivated individuals select assistants who are competent regardless about personal feelings about them; affiliation motivated people select friends to surround them (Davis, 1977).

Bowen (1973) investigated the correlation between nAch, nAff and nPow on Indian businessmen and managerial personnel and
reported that the three motives are generally uncorrelated.

Maier (1976) points out that needs by themselves may produce restless behaviour but such general behaviour is in contrast to motivated behaviour that is pointed towards an incentive that is goal-oriented.

(3) Goal Setting

Locke (1975), and Latham and Yukl (1975) suggest "we have just begun to understand why goal setting affects employee motivation and performance." Locke's goal setting theory (Locke, 1968) states that if a person accepts a particular performance goal, his or her performance is likely to be higher if the goal is difficult than it is easy. Evidence from both laboratory and field studies (Locke 1968; Steers and Porter, 1974; and Yukl, 1975) provides impressive support for this aspect of goal setting. The implementation of difficult and specific goals leads to performance increments (Steers and Porter, 1974; Locke, 1975; Latham and Yukl, 1975). Very recently, Dunnette (1978) reported that goals with high difficulty (.2 probability of success) and low goal acceptance result in lower performance than goals with somewhat lower difficulty (.5 probability of success) and higher acceptance. Yukl and Latham (1978) too found that difficult goals led to higher performance; individuals with high need for achievement and an internal control orientation set higher goals.
Latham (1975) found the correlation between goals set and subsequent productivity extremely high. According to White (1978) goals are extremely potent factors in determining productivity.

Goal setting does give proper direction to one's performance increments. But if the worker is not satisfied with his work, then both the quantity and quality of his work will suffer. Therefore along with goal setting job satisfaction also plays an important role in industry and is conducive to productivity.

(4) Job Satisfaction

It is generally taken for granted that a satisfied worker is also efficient. Numerous studies are supportive of this view. Neel (1952) found a significant tendency for workers in heavy industry to produce if they were satisfied. Stagher (1956) points out that in extreme cases it can be asserted that the satisfied workers are more productive than those who are low in satisfaction. Herzberg, Mausner, Peterson and Capwell (1957) reported that high job satisfaction and high productivity went together. Ganguli (1961) has also confirmed a significant relationship between job satisfaction and productivity. Chatterjee (1961) investigated the relationship between satisfaction and industrial productivity in light engineering plant in public sector and found satisfaction with management and with group closely associated with high production.
Investigators at SITRA (1963) found the level of job satisfaction to be significantly higher in high productivity units than in low productive units. Also, employees in high productivity units viewed more favourably the various aspects of their job and such as salary, management working conditions and so on.

Locke (1965) reported the results of several experiments—a clear relationship between success on the task and the degree of satisfaction was demonstrated. Sinha and Nair (1965) studied the relationship between job satisfaction and productivity. They found the skilled worker to be significantly more satisfied and satisfaction was also closely related to productivity.

According to Greenhaus and Badin and Korman (1978) job satisfaction and job performance are positively correlated for high rather than low self esteem workers. However, White (1978) pointed out that performance is not always tied to satisfaction level. Organization is extremely important in determining performance; individuals perceive the organization as the predominance cause of both high and low productivity.

Locke (1976) has defined job satisfaction as "pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences." Ganguli (1964) provided a norm for answering the question "What percentage of Indian employees can be considered as satisfied with their jobs?" The analysis indicated that in engineering industries in India, nearly 5% of employees were highly dissatisfied with their total job.
situation, 29% dissatisfied, 19% satisfied and 3% highly satisfied. A total of 44% employees were neither satisfied nor dissatisfied.

Weararaghavan (1960) studied the satisfaction and discontent of workers in three units of the transport industry belonging to public and private sectors. In general, private sector workers had greater satisfaction and were favourably inclined towards the management.

Lawler and Porter (1967); Wanous (1974b) suggested that performance affects intrinsic satisfaction more than extrinsic satisfaction rather than causing performance, is caused by it (Lawler and Porter, 1967). Further, the researchers distinguished between extrinsic and intrinsic rewards; the latter being more directly related to performance.

(5) **Attitudes**

Maier (1976) has very aptly pointed out that if the subject of attitude is to be a major concern of industry, it must be shown to have a direct bearing on efficiency. The effect of employee attitude on production has been clearly demonstrated by the intensive research programme carried on by the Western Electric Company, Hawthorne Works, Chicago (Roethlisberger and Dickson, 1939). The experiment was conducted on a group of six girls employed in assembling telephone relays. The experiment
started by introducing numerous changes each of which continued for a test period ranging from four to twelve weeks. The results of the experiment imply that basically productivity increased because of a change in the girls' attitudes towards their work and their work groups. Blum and Naylor (1968) point out that in recognizing employee attitudes the Hawthorne studies are of utmost significance.

Herzberg, Mausner and Synderman (1959) feel that the problems of people's relationships with their work continues to be a basic one. Herman (1973) found that when an employee is free of situational constraints in choosing among behavioural alternatives, his attitudes predict his performance.

Chowdhry (1953) studied the effect of attitudes on the work efficiency in Textile Mills. She classified two mills as high-tension and low-tension on the basis of employee attitude. Results showed the low tension mill was higher in efficiency (77.5%) as compared to high-tension mill (73.4%).

An individual's attitude or an urge to continue in a job will reflect his interest in that particular job. According to Summers (1977) job oriented individuals tended to perceive job facets positively while off job oriented individuals perceived off job facets positively.

For any industrial plant, no matter whether its capacity is being used 50% or 100% the attitude of its employees towards their work may very well determine success or failure.
Herzberg (1957) has reported that the relationship between attitudes and productivity is not absolute but enough data justifies to attitudes being a factor in enhancing the workers output. However, low correlations indicate that besides job attitudes many other factors also affect productivity - morale being one such factor that affects productivity considerably.

(6) Morale

The definition of morale that has been proposed by Watson (1942), Stagner (1958), Katzell (1958), Guion (1958), and Blum and Naylor (1968) place varying degrees of emphasis on three elements that are apparently implicated in the morale construct: satisfaction, motivation, and group cohesiveness. Scott and Mitchell (1972) define morale as one's overall feelings towards his job. They use satisfaction (job attitudes) and morale interchangeably.

It is usually assumed that high morale and high productivity go hand in hand. However, this is not unanimously supported by empirical studies. Mayo (1946) reported an increase in production in a Philadelphia spinning plant from approximately 70% to 80% after the introduction of rest pauses. This increase was attributed to an improvement in morale since a bonus plan for production of 75% and above was in effect before and during the study. Katz and Hyman (1947) on the basis of a study in five shipyards concluded that morale and productivity were
correlated and that higher morale led to better productivity and vice versa.

Likert (1955) states that morale and productivity seemed related up to a point but it was also possible to raise production while lowering morale—poor morale is related to low production but high production depends upon a variety of motivating conditions.

Herzberg (1957), after summarizing the results of some two dozen published studies of the effects of morale on productivity, has pointed out that in 54% of the reported surveys high morale was associated with high productivity; in 35% morale-productivity were unrelated and in 11% high morale was associated with low productivity.

And Gellerman (1970) has aptly suggested that morale enhances productivity under certain conditions especially when the product is affected by craftsmanship or creativity.

Morale aids productivity to a point. If there is no interest in the job, one cannot hope for increments in efficiency. Interest too plays a role in influencing efficiency.

(7) Interests

The possibility of success in a profession is increased if there is interest in the job. Interest can help in increasing productivity. Osipow (1972) reports that success influences task preference which seems highly tenable in view of the
observed change of task preference associated with task success. He says that choice is not exactly the same as preference. Harrell (1976) points out that people differ in interests in such a way as to make for extremely important variations in work performance and industrial success. Successful persons in the same occupation have, to a large extent, the same interests.

Besides interest, an individual's personality plays a significant role in work efficiency in industry.

(8) **Personality**

Personality is a very vast term which sometimes is used to include the entire cognitive, affective and conative aspects of human behaviour.

According to Kolasa (1970) personality embraces all the unique traits and patterns of adjustment of the individual in his relationship with others and his environment.

Eric Berne (1961) has developed transactional analysis (TA) which refers to a method of analysing and understanding human behaviour. TA assumes that individuals have varying amounts of three ego states - child, parent and adult. In a healthy personality, a balance is maintained between the three ego states. In organizational settings, individuals who are dominated by one or two of these states cause problems. According to Hersey and Blanchard (1977) in industry, complementary and crossed type transactions are analysed to
determine the strengths of these ego states indicating life positions the individuals choose. This forms the basis for predicting individual behaviour in organizations.

The Holistic theorists as grouped by Kolasa (1970) include holistic, organismic and field theorists. In spite of the common aspects of emphasis on the individual as a whole, they differ in many ways. Maslow has focused a hierarchy of needs which has been greatly relied upon in industrial settings; his concept of self-actualisation need is of great significance. Rogers has explained personality in terms of the organism functioning in a phenomenal field Herzberg's 'Adam' and 'Abraham' aspects refer to his approach to personality. The Adam aspect of man has the hygiene needs satisfied through wages, fringe benefits and working conditions. The Abraham aspect possesses needs which are motivators including those related to psychological growth of the individual in work settings, job enlargement and enrichment etc. Lewin and Festinger have interpreted personality in terms of perceptual field in physical units and cognitive dissonance as a motivating condition respectively.

Hunt and Brewer's (1953) investigation on thousands of employees in various industries indicate that personality factor rather than lack of ability on the job are responsible for a large number of lay offs and failure in getting promotion revealing that lay offs are due to personality factors rather
than mere failure to produce. Eysenck (1971) states - "what has been said of the educational field is equally true of industrial and vocational guidance fields - stress has been placed on ability and achievement and a promising source of explanation and prediction has been cast aside. Even the few researchers which are available at the moment to explore the possibilities of adding considerations of this kind to the cognitive picture are sufficient to suggest that such an addition could go a long way to make predictions more accurate - performance at any job seems to be governed more by personal qualities such as extraversion-introversion than by mere cognitive qualities."

Tiffin and McCormick (1965) report that as a result of many investigations personality and adjustment factors are responsible for the ineffectiveness of job performance of many people, rather than lack of relevant aptitudes or technical competence. Friedlander (1966) found no personality difference between high and low performance. Meltzer and Ludwig (1968) found that good adjustment and the ability to get along with others would certainly increase the worker's productivity.

Dwivedi (1970) administered a questionnaire covering 13 personality traits to 52 managers from public and private sectors in and around Delhi. The highest ranking traits were cooperative, intelligent and energetic, while the lowest ones were aggressive, dominant and conforming.
Dank (1971) concluded that consistency and homogeneity dimensions do not effectively discriminate either when employed individually or in combination between relatively efficient and rationally inefficient personalities in a normal population. Blum and Naylor (1968) point out that personality contributes to a significant degree in determining the job success of many industries, particularly, in higher level jobs.

Dwivedi (1978) administered the MMPI to a sample of 54 supervisors of Escorts Ltd., Faridabad. It was found that the relationship between the scores of psychopathic deviate, depression, hypochondriasis, masculinity-femininity and schizophrenia, and performance were positive and significant.

Dwivedi (1978) summarises the results of thirty-two studies on relationships between personality and performance conducted in India and abroad. He found that personality or character traits were eight times more important than lack of skills in the reasons given for discharge; measures of dependence sociophilia, self-confidence and happiness were positively related with successful sales performance; personality variables were associated with occupational adjustment; neuroticism extraversion were associated negatively and positively respectively with job satisfaction.

Super and Crites (1962) have laid emphasis on the trait dimension of personality. Cattell has extensively worked on traits in various work settings employing a number of psychological
measures.

Greatly disregarded by the industrial psychologist is the work related personality variable as put forth by Eysenck (1957). His interpretation of extraversion is based essentially on two hypothesis -

(i) The inhibition hypothesis which implies that extraverts in comparison to introverts are less able to tolerate tasks of a routine nature because inhibition accumulates to a greater extent in their CNS and inhibits sustained task performance. This leads to behaviour characterized by withdrawal from such inducing situation; withdrawal facilitates dissipation of the accumulated inhibition and thus enables the individual to return to the task. Venables (1955) and Broadbent (1958) support this hypothesis.

(ii) The conditionability hypothesis implies that since extraverts condition slower than introverts they become socialized less rapidly and develop weaker self-control. Extraverts are less likely to be influenced by social and institutional codes of behaviour.

Cowell and Entwistle (1971) reported a negative correlation between extraversion and academic achievement in Engineering and Technical college. Mohan (1976) found that introverts do better on academic achievement than extraverts. Vohra (1977) supports this with results on polytechnic students.
Eysenck's (1967) results of the EPI indicate that successful businessmen are on the whole stable introverts; they are stable regardless of what type of work they do within business, but their degree of extraversion may be related to type of work. A review of the studies by Cooper and Payne (1967) and Eysenck (1967) reveal the stability with the job and performance of successful businessman are negatively related to extraversion.

Eysenck (1971) has found that extraversion is linked with various aspects of industrial performance. The ability of the introvert to resist boredom and persist with a task for a long period of time is valuable in certain industrial contexts. Extraverts display greater 'social intelligence', to take a personal interest in them and their problems and to anticipate their reactions so they tend to gravitate toward and excel in jobs that involve dealing with other people. Luthra (1976) found no significant \( r = .06 \) relationship between extraversion and performance.

Mohan and Mohan (1974) found neuroticism negatively related to psychomotor tasks. Morgenstern, Hodgson and Law (1974) reported that introverted subjects worked less efficiently in the presence of distractions while extraverts showed actual improvement in the presence of distractions. Malhotra (1975) found introverts performing better than extraverts in a vigilance task under conditions of auditory stress than noise.
In addition to the psychological determinants that effect a worker's efficiency, there are some environmental conditions that are intimately linked with efficiency in an organizational set-up.

(B) Environmental variables and work efficiency

Those factors extrinsic to the individual that effect work efficiency may be referred to as environmental factors. It is very difficult to study directly the efficiency and the impact of environmental conditions on efficiency of worker in a factory; generally by means of work curve the environmental variables can be studied indirectly. They may be discussed under (1) Physical conditions, (2) Social conditions, (3) Incentives.

(1) Physical conditions - Some of the salient physical conditions that influence productivity in industry are (a) Illumination, (b) Noise, (c) Heat, (d) Fatigue.

(a) Illumination : Adequate illumination is essential for the proper functioning of any industry. According to Maier (1976) careful tests of human performance must be made under different lighting conditions to determine optimal conditions.

Poor illumination causes fatigue and irritability, and is a source of errors and industrial accidents (Harrell 1976) which leads to low efficiency. Improvement in improper lighting would lead to higher output per worker, lower production costs, and a generally happier, healthier, and probably, safer
work force. Gellerman (1970) reports an increase in productivity by means of better illumination.

(b) Noise : Maier (1976) has aptly remarked that the worker is not disturbed by factory noises, as is the visitor, who without realizing overlooks the ability of the factory worker to make adjustments to such stimulation when he is constantly working in that environment. McKennell (1970) reported that surveys around airports found many people in the areas of highest noise exposure to be practically oblivious to the noise while even in the most distant zones polled there are individuals who found aircraft noise annoying.

Noise is more disturbing for mental than for manual work (Pollock and Bartlett, 1932). Baker and Madell (1965a,1965b) have reported that underachieving college students are more easily distracted from a written task by a humorous background recording than are high achievers. According to Ingram (1977) noise can have a negative effect on task performance, particularly tasks involving vigilance or monitoring.

(c) Heat : Worker productivity can be effected by temperature levels. Investigations conducted by the New York Ventilation Commission (1923) showed that worker productivity in physical work was impaired by high temperature and stagnant air. It was found that production was at its highest level when the temperature was 68°F and the air was fresh, the production under the least favourable (warm, stagnant air) conditions
was nearly 21\% below production under most favourable condition. Chatterjee (1969) observed that the efficiency of Indian workers does not decrease significantly with the rise in temperature whereas it decreases significantly with the fall of temperature from normal. Axelsson (1975) found reduction in work capacity due to heat stress.

(d) Fatigue: In industry, although machinery has alleviated the burden of human toil it has not reduced fatigue in the worker (Oliver, 1902). Kapoor, Mohan and Chander (1979) have defined industrial fatigue as a negative change in behaviour as a result of work for a long period of time.

Harrell (1976) has pointed out that noise, improper light and extreme heat, have all been shown to increase fatigue. Physical fatigue allowed the workers to do the scheduling themselves which resulted in improvement in productivity (Gellerman 1970).

Chambers (1951) differentiates between fatigue and monotony and says that if the machine speed exceeds the worker's capacity, it results in strain and fatigue and if the machine is working below the workers capacity monotony or boredom occur.

Working without rest can tire a worker and make him less efficient. Miles and Skilbeck (1944) found that two fifteen minute change of work periods resulted in a 14.2\% increase in performance. Bhatia and Murrell (1969) showed that introduction of rest pauses did not reduce productivity even
though the rest pauses reduced actual work by an hour. Further, six ten minute pauses resulted in a slight increase in efficiency over four fourteen minute pauses. An important aspect is time of rest should be predetermined as uncertainty causes tension (Vatsyayan, 1980). Griffith, Kerr, Mayo and Topal (1950) report greatest feelings of fatigue during the fourth and eighth hours of the eight hour shift.

(2) Social Conditions - Man cannot live as an island. For his own healthy and effective functioning in Industry, as in other fields too, he needs interaction with society. Production is also influenced by the friendly interactions of the members of the work group. Laird and Laird (1967) found that there was highest production when the members of the work group were attracted to each other and to their chief. Dwivedi (1979) reports that it has been empirically established that cohesive work groups are likely to be more productive than an equal number of isolated individuals. According to Morse, Weiss and Griggs (1954) work also relates to society. It gives people a feeling of "place" or role - it not only allows a person to exist but also tends to stabilize his place in society. Likert (1961) says "an organization will function best when its personnel function not as individuals but as members of highly affective work groups with high performance goals." Davar (1976) points out an interesting facet of Kirloskar Cummins Ltd - their belief that productivity or industrial efficiency programmes
can yield desired results only if there is unity of purpose between the workers and the management.

Maier (1976) has stated that Hawthorne study clearly showed that opinions about the company were influenced by home conditions, by the employee's social position in the group in which he worked as well as by the visible conditions. The investigators began to realise that the factory was a social as well as a work environment and that these background conditions could not be ignored in the study of employee's satisfactions and productivity. As regards this study it was found that social groups operating in the workshop had an adequate effect on the behaviour of the individual members especially vis-a-vis the amount of work output.

Relationships have also been established between community variables and the behaviour and performance of workers (Katzell, Barrett and Parker, 1961). Blum and Naylor (1968) have very aptly pointed out that work cannot be considered apart from the social interrelations with his family, company and community and must always be considered.

Holt (1979) notes that social values will have an increasing impact on the work of the industrial engineer. This will create the need for new approaches to the organization of industrial work both in terms of individual and group performance.
(3) **Incentives**

The importance of incentives in industry cannot be minimized. It provides the extrinsic motivation to the worker. Incentives originate within the environment. Dwivedi (1979) has defined an incentive as the outward stimulus which activates a need or brings the motive to work. Different incentives are suitable and motivate people at different levels. Ganguli (1956) found that adequate income was found to be of utmost significance among assistant professors and lecturers whereas assistant lecturers gave top priority to the opportunity for advanced training. Generally, incentives are classified into (a) Financial incentives (b) Non-financial incentives.

(a) **Financial incentives** - For most workers monetary rewards form the major motivation. With rising prices and inflation in India the money motive gets top priority. Ganguli (1954) showed that adequate earning was one of the three most highly ranked incentives. Unlike the western counterpart, where pay was frequently ranked lower in the hierarchy of incentives, the Indian worker gives top priority to pay and job security. Georgopoulos, Mahoney and Jones (1957) found that better performers saw a stronger relationship between pay and performance than did the poorer performers. Vroom's (1964) motivational model stresses the importance of considering the workers' perception of the relationship between pay and...
performance. Lawler (1966) points out "many managers have assumed that by rising pay plans that are called incentive plans and that purport to tie pay to productivity, the law of effect will operate in such a way as to increase the productivity of workers.

Mukerjee and Sreekumar (1969) were attempting to determine the effectiveness of a financial incentive system in a plastics factory. Rothe (1970) has reported that where financial systems were in effect that week's intercorrelation of productivity were higher than where such incentives did not exist. Workers in industry have a largely instrumental orientation, i.e., they seek work as having little intrinsic value, but as being only a means to an end - high financial rewards (Irkson and Simpson 1975; and Irkson 1977).

As one ascends the scale in the management hierarchy, money may still be important but its importance diminishes and other non-financial incentives become more powerful.

(b) **Non-financial incentives** - There is no ready-made incentive plan that can be used universally and at all times. Incentive plans need to be changed from time to time because the employees get adapted and the incentives cease to implement the required efficiency. Rothe (1978) has suggested that if optimal incentives could be offered to each employee wherever he or she is working to satisfy his motives for working at that time, output or productivity would be fantastic.
However, a number of non-financial incentives are effective; some salient ones are (Chatterjee, 1969).

(i) **Praise and punishment** - A person who has achieved something wants others to know of his accomplishment, and therefore should be praised in public and given recognition in that manner. In Industry, at home or elsewhere people respond better to praise than to punishment. The latter should be given at the right time and the correct amount. Too much would lead to frustration.

(ii) **Knowledge of Results** - A worker likes to know the result of his job. Chowdhry and Trivedi (1952) employed a "group norm" technique and provided to their sample of Textile workers in Ahmedabad information regarding breaks and damages as well as quantity of work accomplished by the group within a period of time. The efficiency enhanced considerably and the rates of damages declined significantly.

(iii) **Worker's Participation** - Providing involvement and participation would lead to enthusiasm among employees which may evoke a two-way communication between the workers and management. Davar (1976) cites the example of the management at MUSCO (Mahindra Ugine Steel Company Ltd) where delegation of responsibility led to participation among younger and senior executives. Their sales sharply increased from 494 lakh in 1969 to 1,045 lakhs in 1971 - an increase of 111.5%.
(iv) **Opportunity for Growth** - The need for self actualization lies in everyone and should be stimulated by providing opportunities for growth and promotion in the industry; the worker's activities must be directed towards the achievement of appropriate organizational goals. Narain (1971) conducted a survey on 1213 managers with 47 public sector undertakings in India. It was found that conducive to job performance the feeling of worthwhile accomplishments was ranked the highest.

(v) **Suggestion System** is an incentive which satisfies many needs of worker. A useful suggestion can be awarded a cash prize. Chatterjee (1969) has cited an example; a steel plant received a valuable suggestion from a worker that led to financial gain to the company - he was rewarded with Rs. 10,000 and his photograph and the whole story were published in all important newspapers in India.