3.1. Social pressure for continuous provision of certain services (e.g., medical care, transport and communication, and security etc.) is a strongly compelling factor in shift work. In fact it has been pointed out by Rutenfranz, Colquhoun, Knauth and Ghata (1977) that shift work disturbs the life of the individual workers who provide the services.

Three dimensions have usually been studied about psycho-sociological aspects of shift workers: life at work, family life, social life.

Shift-workers are quite different from any other worker within their work content; mental activities are predominant, levels of skills are quite high - and the salary is one fifth to one third higher than for a similar day job (Carpentier and Cazamian, 1977). The relationships with workmates are very closed, as demonstrated by many authors (Brown, 1975; Maurice and Monteil, 1965). According to a number of research reports about the consequences of shift work, general psychic disturbances of shift workers have been reported frequently (e.g., Koller, 1977, 1973; Carpentier and Cazamian, 1977; Kryspin-Sxner and Zapotoczky, 1968). The probability of developing these health disorders depends on exogenous factors like the shift system, the work load, the environmental conditions as well as the social state, the housing conditions, the attitudes of the family towards shift work and on endogenous parameters like personality dimensions, the ability to cope with different stressors and the general health state. Psychic disturbances appear as a
loss of well-being and psychic balance. As a consequence this may lead to an onset of complaints like nervousness, fatigue, premature tiredness, depressive symptoms, aggressive behaviour and even thoughts about suicide. Additionally, the developments of psychosomatic disorders may be initiated or promoted by specific work-related personal problems.

3.2. Stress: The conceptual premise of 'psychosocial stress' lies in the basic concept of 'psychosocial reality' — built up by a person, gradually, through his own individuated experiences. For studying organisational behaviour of an individual, he/she can not be thought of exclusively in terms of his/her physiological constitution or in terms of native psychological attributes. Because, in expressing himself/herself in relation to organisational environment, as a person, he or she behaves as the product of socialisation — with acquired skills for continuous adjustments and coping in relation to his or her immediate and consequent 'psychosocial reality'. All kinds of discomforts, uncongenialities, maladjustments, and problems of shift workers in relation to their respective shift work schedules with doubtful etiological issues may be critically re-examined with reference to 'individual psychosocial reality', as the mainspring.

Shift worker, as a human being remains immersed in his strivings, purposes, and goals of life so the assessment of his behaviour by another man must be a basic part of causal analysis — remaining free of any fixed notion of causality. The dynamic complexity of the psychosocial reality can not be explored by the traditional concepts and methods, because it functions in respect to man's subjective awareness of his own and other's actions. So it would be
more comprehensive "to understand what is in terms of what could be" (Quinney, 1973).

The term psychosocial stress refers to changes in life events which have an impact on physical and mental health. The said stress can cause physiological dysfunction or emotional disturbance, disrupts the balance of internal environment, and, if prolonged, generate symptoms of psychosomatic disorder. It was not until the late 1960s that psychosocial stress was studied seriously. It has been observed that any veridical reality can cause psychosocial stress if that is not acceptable to psychosocial reality of a person. So anything real if seems to a person's psychosocial reality uncongenial then it seems to him/her as stressful and in order to remove that or overcome that he/she may develop a defensive behaviour by developing a symptom of uneasiness or deemed-disease with the fond hope of enjoying others' due sympathy and drawing due attention.

Extremes of temperature and humidity, physical pain, hunger and thirst, and similar physical conditions are stressful at any age. Disturbances of normal rhythm of sleep can cause stressful effect on man. Sometimes a condition of the physical environment can be stressful without one's being aware of what is happening.

3.3. Stress is closely related to shift work as it has been pointed out by Andersen (1953), Guerin and Durrrmeyer (1973). But the abnormal schedules are not alone concerned, psychological causes can explain over-stress (Chazalette, 1973; Leonard, 1979). Fatigue is related to shift work, but
varies a lot according to the type of work performed. Leonard (1979) and Besseyre des Horts (1982) show that level of automation in shift work has a considerable impact on fatigue dimension. Work accidents are not really more frequent in case of shift work but they may be heavier during nights (de Terssae et al., 1978). It appears that workers in developing countries (e.g., Tasto et al., 1973, Shri Ram Centre, 1970; Kogi, 1977; Khalaque and Rahman, 1982, 1984; Mahatthevan, 1982; Dumont, 1982) evaluate on the whole negatively the effects of shift work on their health, family life and social activity (including political, trade union, educational, cultural, sporting and recreational activity). They tend to view these drawbacks in much more relative terms than workers in industrialised countries because of the advantages shift work offers in relation to job opportunities and financial benefits.

3.4. Family life: Family life is the psycho-sociological dimension which is most affected by shift work. Maurice and Monteil (1965) found that most shift workers were disturbed in their family life about the organization of everyday life, as also shown by Brown (1959, 1975), Mott et al. (1965), Chazalette (1973).

Lee et al. (1982) presumed that the shift work system in today’s industrialized society serves as a threatening factor to the functions of the nuclear family—supply of family pleasures, provision of emotional shelters for adults and socialization of children.

It is remarkable that each research study and review dealing with social and psychological problems of shift workers addresses the (potential) negative impact of night and shift work upon family life, leisure activity and societal participation.
The continuous shift work rhythm has disruptive effects on family and social life: evenings are regularly broken, nights and weekends are time and again spent on the job, spells of spare time alternate, and so forth (Banning et al., 1961; Mott et al., 1965; Maurice and Monteil, 1965; de la Mare and Walker, 1968; Sergeant, 1971; Guerin and Durrmeyer, 1973; Thierry et al., 1975; Maurice, 1976; Carpentier and Cazamian, 1977; Walker, 1978; Thierry et al., 1981, 1982; Thierry and Jansen, 1983).

Concerning family life, the following four specific categories are differentiated by a number of investigators (Wyatt and Marriott, 1953; Ulich, 1957; Brown, 1959; Banning et al., 1961; Mott et al., 1965; Maurice and Monteil, 1965; de la Mare and Walker, 1968; Sergeant, 1971; Guerin and Durrmeyer, 1973; Thierry et al., 1975; Maurice, 1976; Carpentier and Cazamian, 1977; Walker, 1978; Thierry et al., 1981, 1982; Thierry and Jansen, 1983):

1. management of household;
2. relationships between shift worker and spouse;
3. relationships between the members of the family;
4. societal participation of family members.

The next aspects are examples of those which are often considered as disadvantageous:

- not much time for joint family activities;
- common meals at irregular times;
- feelings of loneliness of the spouse during the night shift;
- irregular sex life;
- less contact with children going to school;
- the necessity to keep small kids quiet during day-time sleep;
- "a man around the house" during several non-weekend days;
- the necessity to cook more frequently;
- multiple work load for the spouse;

On the contrary, the following aspects are frequently viewed as positive:

+ more opportunity for contact with and care for pre-school children;
+ joint shopping on weekdays;
+ opportunity for discussion between shift worker and spouse;
+ a less unequal distribution of household duties.

Social life is more affected by shift work when it is strictly organized such as movie, theatre, collective sport, or union activities (Maurice, 1971; Frost and Jamal, 1979). The informal relationships with friends or relatives are less affected, although the number of contacts is more restricted than for day workers (Mott et al., 1965; Guerin and Durrmeyer, 1973).

Unsocial working hours cause considerable social difficulties for many people. Opportunities of being together with the family, meeting friends and relatives and the ability to use leisure time is considerably diminished by the hours of working. In the long term this can mean that problems and difficulties in family relations easily occur, one’s circle of friends becomes restricted and to a greater extent leisure time activities which require programming of co-ordination with other people who experience medical psychological troubles. It is clear that many people who work abnormal hours experience both social and medical problems.
Several authors use the concept of time to illustrate the ways in which shift work may affect the spending of spare time, but they do so in very different ways. Bunnage (1979) cites Sorokin's differentiation between mechanical time (that is, time as measured by the clock) and socio-cultural time. Walker (1973) stresses the significance of social time; the pattern of leisure and social activities, both diurnally and weekly.

Parker and Smith (1976) differentiate between 5 different meanings of time:

- working time;
- work related time (e.g. travelling towards and from work);
- existence-time (eating, sleeping, and so forth);
- semi-leisure (activities that have some obligatory character, like caring for the dog);
- leisure (time spent according to one's own discretion).

It is important to consider at least two different "causal" chains: the impact of shift work upon the spending of spare time and the ways in which current leisure activities may affect the actual implications of shift work for the shift work and his family (Thierry and Jansen, 1983). Results from several studies indicate that to the extent that workers in continuous shifts participate in clubs, councils and parties, the percentage of officials or broad members among them is pretty low. Shift workers may experience some "apartheid", both within their organization and regarding their living community.

Feelings of apartheid may cause shift workers, in the terms of Wilensky (1960), to "individualize" their spare time and to withdraw within their family,
which they value consequently the, more, and within a small circle of friends (Bunnage, 1979). These phenomena led Walker (1978) to characterize shift workers as "marginal men". Also, the opportunities to get more education are found to be restricted for shift workers (Brown, 1959; Mann and Hoffman, 1960; Banning et al., 1961; Mott et al., 1965; Maurice and Monteil, 1965; Wedderburn, 1967; Andersen and Bunnage, 1979; Bratt, 1973; Chazalette, 1973; Maurice, 1976; Carpentier and Cazamian, 1977; Nachreiner, 1977; Rutenfranz et al., 1981).

Wedderburn (1981) observes: "sometimes it seems to be that the modal day worker with whom the poor shift worker is contrasted can have no time to relax at all because of his active social life."

The impact of continuous shift work upon family life, leisure, and societal participation appears to be moderated by an array of variables, of a pluriform character. The stronger and the longer shift work tradition in a given region; the less shift workers appear to have problems regarding societal participation. The same effect occurs as the size of the living community is larger.

Also, shift work is less resisted against as technology and the provision of societal services (like health care) are recognized as the major reasons for the application of shift work (Brown, 1959; Chazalette, 1973; Carpentier and Cazamian, 1977; Bunnage, 1979). Many studies have been reported regarding the physiological and psychological effects of a long duration of the day-rest night-work reversed life pattern (Lee et al., 1979; Matsumoto et al., 1982): Shift workers show various physical and psychological complaints,
including degradation of physical strength, lack of sleep, inferiority complex and irritability and anxiety, due to the abnormal life pattern of night-work and day-rest (Uehata et al., 1982; Kogi et al., 1976).

From the above discussion, it is evident that a large number of studies about psycho-social problems of industrial shift workers has been conducted in the western countries (Rutenfranz & Colquhoun, 1978; Reinberg et al., 1981; Wedderburn, 1981). But due to dissimilar socio-economic condition the studies conducted in the Western World cannot be generalized in our country. Hence the evaluation of the psycho-social problems of industrial shift workers should be done in the socio-economic context of developing countries.

3.5. Review of Related Literature: A number of research findings and reviews by several investigators from different countries have identified and reported that shift workers consistently experience more physical, psychological, and social problems than normal day workers (Agervold, 1976; Carpentier and Cazamian, 1977; Dunham, 1977; Froberg, 1981; Gordon et al., 1981; Jamal, 1981; Koller et al., 1978; Kumashiro et al., 1982; Maurice, 1975; Mott et al., 1965; Nilsson, 1981; Smith et al., 1982; Taste, 1978).

There are many factors which interact in a complex manner in shift work. They are presented under separate sections below.

Physical and Physiological Aspects of Shift work: Shift work can directly disrupt time-oriented physiological diurnal rhythm of the body, and thus bringing about a variety of physical and physiological consequences.
Sleep: Disturbed sleep/wakefulness is a major problem accompanying shift work (Akerstedt & Froberg, 1976; Rutenfranz et al., 1977; Agervold, 1976; Rutenfranz 1981).

First, unusual work hours of the workers prevent them from sleeping at normal time. Second, when they have an opportunity to sleep, they have to do so in an environment which is geared towards the awakened state. Third, night work and day sleep affect one of the most apparent circadian rhythms.

Kleitman (1963) described that the sleep-wakefulness cycle is a 24-hour cycle which has been socially established to conform to social functions and community activities. He demonstrated that the shift worker's sleep problems are due to deviation from his established rhythmic cycle.

Spencer (1970) found that 27% of shift workers reported that shift schedule adversely affected their health mainly due to not getting adequate sleep.

A survey of 9000 shift workers (Thiis-Bvensen, 1969) showed that 20% of them had difficulty in adapting to shift work because of lack of sleep. In another inquiry, Thiis-Bvensen (1953) found that 60% of shift workers, as compared with 11% of day workers, suffered from sleep disturbances.

Tepas (1982) showed that shift workers have problems in sleeping because they attempt to sleep at chronobiologically bad times of day; this initially reflects in difficulty in going to sleep and in staying asleep.

Wyatt and Marriatt (1953) demonstrated that even the sleep that the rotating workers get is not so "refreshing" as sleeping at the normal time.
It has also been reported that the rotating shift workers’ ability to sleep is made more difficult by noises in the home and the community (Maier, 1955; Knauth Rutenfranz, 1972; Mott et al., 1965; Thiis-Svensen, 1955; Wyatt and Marriott, 1953). Thiis-Svensen (1955) showed that housing conditions are clearly responsible for this state of affairs.

Smith et al., (1982) reported a greater percentage of rotating and night shift workers rated their sleep quality as "fair to poor" than afternoon or day shift workers. The poorer sleep of the rotators was explained in terms of environmental noise, disturbances in circadian rhythm, or general fatigue effect.

Khaleque and Rahman (1982) conducted a survey in Bangladesh concerning the sleep difficulties and health complaints of 116 permanent shift (morning, afternoon, and night) workers and 44 weekly rotating 3-shift workers. The results show that the amount of daily sleep of the rotating shift workers was smaller than that of the fixed shift workers. But sleep loss due to interruption was greater for the fixed shift workers than the rotating shift workers. For the workers of both fixed and rotating shifts, difficulties in falling asleep were more common. There was no age effect detected on the quantity and quality of sleep of the subjects. The comparison between fixed and rotating shifts further shows that on the whole, the latter group had more incidences of consulting doctors, serious illness and hospitalization.

To determine the effects of ageing and experience on sleep have shown that sleep is a major concern for elderly shift workers (Andlauer and Fourre, 1965; Bannel and Dervillee, 1971; Chazalette, 1973 Faret, 1975; Faret and
Similarly, Akerstedt (1980) found that the negative effects of shift work on quality and quantity of sleep begin to pile up after 45 years of age. The conclusion to which these findings point is that there is no habituation to night work but rather growing intolerance to it. However, Meulenbergs and Verhaegen (1982) found that the elderly (50-56 years of age) shift workers in their study were reasonably well adapted to their shift system. They had no more sleep interruptions than did the day workers.

Koller et al., (1978) reported that a group of 270 day workers and shift workers (majority of the shift workers working on a rapidly rotating continuous three-shift system) in our oil refinery with the intention to see whether and in what way, men giving up shift work (drop-outs) differ from those who stay in shift work, and from those on permanent day work. It was found, with respect to sleeping conditions and causes of sleep disturbances, that the subjective evaluation of the environmental noise level differed significantly between day and shift workers. However there were also marked differences between the day workers and the 'drop outs'. The 'drop outs' regarded the environment as noisier, and complained of sleep disturbances more often. In this study, the 'drop-outs' reported the higher rate of sleep disturbances than did the shift workers.

Froberg (1981), in the course of a review of Swedish Research over the last eight years, observed that three-shift workers report sleep disturbances more often than day workers. In an intervention study where the night shift was discontinued, total sleep was increased and sleep disturbances diminished (Akerstedt & Tarsvall, 1977a).
Akerstedt & Tarsvall (1973) conducted a study on 400 steel workers in Sweden where they had an opportunity to investigate into the effects of shift work on workers' well-being both before and after the company. Due to the economic situation, some 3-shift and 4-shift workers were transferred to day shift or 2-shift while others remained in their original shifts. Results show that the group that changed to 2-shift work exhibited a clear improvement in sleep/mood, gastrointestinal complaints, and social participation. The group that changed to day work showed the same trend but the improvement reached significance only for social complaints. The group that changed from 4-shift to 3-shift work exhibited a non-significant increase in sleep/mood and gastrointestinal complaints, but a decrease in social complaints.

Rutenfranz et al., (1981) conclude that shift work which excludes night shift and straight day work do not lead to sleep disturbances to any significant degree; but that shift work which includes night shift and continuous night work bring about special sleep problems for the shift worker.

**Appetite and Digestive Disorders**

Appetite and digestive disorders are related to problems associated with the eating pattern of shift workers. Shift work, especially the night shift, affects the normal eating and drinking habits.

A number of investigators (Hogg, 1961; Deruelle and Lazarini, 1958; Aanonsen, 1959; Leonard, 1979) reported that digestion is quite affected by shift work.
Shift workers frequently complain about the effects of job hours on their appetite and digestion. The study by Mott et al., (1965) revealed that 75% of all shift workers had disorders of this type than day workers, with the greatest severity among the night and the rotating shift workers. This study further showed that 52% of the rotating shift workers reported that their appetite was best in the day shift, while only 2% said that it was good in the night shift. Conversely, 58% reported that their appetite was poor when on the night shift, while only 3% reported that their appetite was as poor during the day shift as it was during the night.

Rutenfranz, Knauth, and Angersbach (1981) showed that disturbances of appetite occurred:

- In less than 5% of the day workers;
- 5% of shift workers not doing night work;
- In approximately 35-70% of shift workers doing night shift;
- 50% of workers doing continuous night shift.

The above figures show that shift workers doing night work or doing continuous night shift clearly suffer more from disturbances of eating habits than day workers or shift workers not doing night work.

The frequency of digestive disorders suggests that eating habit may be an important factor. Takagi (1972) presented evidence from employees of several Japanese industries that significant eating habit changes occur with shift schedules, implying that the nutrition of shift workers probably suffered as a result.
According to Carpentier and Cazamian (1977) and Dervillee and Lazarini (1959), unrhythmic nutrition is at the root of the pronounced digestive disorders observed among the rotating shift workers. Debry and Bleyer (1972) showed that although shift work does not affect total calorie intake, it alters its distribution over the 24-hour period.

Thiis-Svensen (1958) and Bast (1960) suggested that shift work causes an increase in nervousness which in turn results in a higher frequency of digestive difficulties. On the other hand, Mann and Hoffman (1960) and Mather, Kit, Black, and Herman (1970) argued that the rotating shift workers' appetite and digestive difficulties were due to their departures from established 24-hour rhythmic cycles for eating.

The consumption of alcohol, caffeine, and tobacco may, however, have a pathogenic influence on gastrointestinal dysfunctions. It has been shown that night workers tend to increase their intake of caffeine and indulge in heavy tobacco smoking in order to increase their wakefulness during the shift (Metz, 1960).

Elimination problems: The physiological rhythms, that must adapt themselves to the conditions of constant change or alternation of work schedules, are of different kinds but none seem to be more resistant to change than those involved in the elimination of major wastes from the body.

Teleky (1943) identified severe elimination problems in adjusting the schedule of bodily functions as required by industrial night work, suggesting that elimination rhythms are the most difficult to adapt to a new work schedule.
Mott et al., (1965) also reported that rotating shift workers had more problems of adjusting their bowel habits when they were on the night segment of their shift.

Shift work and general health: Golligan (1981) observes:

"The literature describing the impact of shift work on employee safety and health can best be described as equivocal. Although there is some evidence to suggest that shift work may adversely affect individual well-being (e.g., Wyatt & Marriott, 1953; Thilsg-Svensen, 1958; Dirken, 1966), equally compelling evidence suggests that it does not (Harrington, 1978; Taylor & Pocock, 1972)."

Rutenfranz, et al., (1977) observed that shift work, by disturbing circadian temporal structure, introduces the possibility of a risk to health. On the other hand, Rutenfranz, Knauth, and Angersbach (1981) expressed the view that no noticeable influence on health may be expected from forms of shift work which exclude night shift.

The lack of consistency in past research as to the relationship between shift work and general health has mainly been attributed to the 'selection process' involved in the recruitment or retaining of shift workers (Akerstedt & Torsvall, 1978, Koller, Kundi, & Cervinka, 1978).

Koller, Kundi, and Cervinka (op. cit.) took this selection bias into consideration by including 'drop-outs' as an extra group in their study and
found some differences in health in this group. This study demonstrated that in contrast to only 15% of day workers, more than half of the shift workers related their health complaints to the work they were doing; the proportion of 'drop-outs' (35.7%) asserting a connection lay in between. Thus there is evidence that the 'drop-outs' were not as well adapted to work as their day worker colleagues. The study further showed that in response to a question 'whether a change of work was desirable for the sake of the workers' health', significantly greater proportion of the shift workers affirmed the need for change, than comes in order: 'drop-outs' and day workers.

However, some studies with separated groups of 'drop-outs' did not find differences between shift- and day workers with respect to mortality and absenteeism rates (Taylor & Pocock, 1972; This-Svensen, 1958). And, according to Haider, Kundi, and Koller (1981), the inconsistency in these results may, apart from selection factors, arise from the use of different kinds of "health" or "sickness" scores.

Nevertheless, it has been shown that general medical health problems are not universally related to shift work but occur only for a minority of persons who cannot adapt their rhythmic functioning to new schedule demands. Mott et al., (1965) concluded that physical health is poorer for those who experience more difficulty in adjusting the time-oriented body functions to their shift.

Tasto (1978) investigated the effect of working afternoon, night, and rotating shifts on psychological and physiological well-being taking data from about 1200 nurses and 1200 food processors. Findings of the study
demonstrated significantly greater adaptation difficulty experienced by all other categories of shift workers than by day shift workers. Rotating shift workers encountered the most difficulty having more sickness, more accidents, and making greater use of work-site clinics than were other workers. They also reported significantly more indigestion, leg and foot cramps, colds, chest pain, menstrual problems, nervousness/shakiness, alcohol consumption, and fatigue; and less satisfactory sleep patterns, domestic and social life, psychological health, and work performance.

A review by Kleitman (1963) demonstrated that shift workers require four days to two weeks for adjustment of bodily functions to new routine. Other studies (Dahlgren, 1978; Shri Ram Centre, 1970) have shown that as compared to permanent shift workers, rotating shift workers have more difficulty in adjusting their bodily functions such as eating, sleeping etc. to the new schedule. Akerstedt, Patkai, and Dahlgren (1977) observed that compared to permanent night workers, two-shift workers exhibit a considerable lack of long-term adjustment to night work.

Several studies have shown that certain individuals can invert their circadian rhythm after two or three days, while others need nearly a week and in certain cases inversion is impossible (Maurice, 1975).

In an attempt to measure the workers' rate of adjustment to the time-oriented body functions, Mott, Mann, McLoughlin, and Warwick (1965) used questionnaires dealing with eating, sleeping, and elimination. The results indicated that the worker's difficulty of adjustment to shift increases as the frequency of complaints about body functions increases, and that the
frequency of complaints about body functions was greatest among the rotating shift workers.

Mann and Hoffman (1960), in their study of operators in two different power plants in the United States, found that only 31% of the men working under an extended seven day week rotation reported that they adjusted to their hardest shift change (moving from day shift to night shift) within a day or less. Under a monthly rotating schedule, however, 70% reported that their adjustment to the new schedule took four days or more.

The study by Zedeck, Jackson, and Summers (1983) with rotating workers on a three-shift system revealed that 52% of the respondents took a day or less to adjust to new meal times, but 16% reported that they never adjust. Further, 42% needed 2 to 4 days to adjust to new sleep times. The results also indicated that the older, experienced workers adjusted more readily, however, these workers perceived themselves in poorer health. On the other hand, those who adjusted (to meal times and sleeping times) more slowly, expressed a higher probability of leaving the organization.

Wyatt and Marriott (1953), who studied workers alternating between day and night shifts either on a weekly, fortnightly, or monthly basis, observed that after changing to night work 27% of them took from one to three days to settle down to the new meal times, 12% took from four to six days and 23% needed longer. The same study also showed that a large majority (83.3%) adapted themselves immediately to the normal time for sleep after changing to the day shift. The corresponding figure for the night shift was 50%. In their conclusion, Wyatt and Marriott said that changes in meal
times were more disturbing than changes in sleeping times. These investigators further added that "whether shifts should be changed every week, fortnight, or month, will depend, amongst other things, on the effects of these changes on digestions and the time taken to get adapted to the change".

Tasto, Colligan, Skjei, and Polly (1978) reported that there is a significant association between the degree of shift satisfaction and the ability to adapt to a particular shift. Maurice (1975), citing his own work with Monteil (Maurice & Monteil, 1965), showed that adjustment to rotating shift work varies according to the type of shift schedule. Whereas 49% of the two-shift workers can adjust within 2 days or less, the corresponding figures for the semi-continuous and the continuous three-shift systems are 37% and 27% respectively. On the other hand, whereas only 12% of the two-shift workers need 4 days or more to adjust to the changing shift schedule, the percentages of semi-continuous and continuous three-shift workers requiring similar time for adjustment are 26 and 27 respectively.

However, Maurice (op. cit.) maintained that other factors, such as age and workload, may also affect the workers' adjustment. Difficulties of adjustment are most commonly reported by the youngest workers, whereas a certain degree of habituation to changes of shift may develop with age or length of service.

Psychological Aspects of Shift work

Shift work, as it is having some physical and physiological consequences, is also very likely to affect the psychological states of the workers. These
are reflected in their feelings of fatigue, irritation, tiredness, etc. and their attitudes towards shift work and other aspects of work life.

A review of past literature does not reveal much empirical investigations into the psychological effects of shift work. Mott, Mann, McLoughlin, and Warwick (1965) examined the factors of self-esteem, anxiety, and conflict-pressure and found no relationship to the type of shift schedule.

Similarly, Shri Ram Centre (1970) attempted to study the relationship between shift work and personal adjustment (defined in terms of anxiety, conflict-pressure, and job satisfaction) for a sample of 89 permanent day shift workers and 104 rotating shift workers. The results did not reveal any differences between permanent day and rotating shift workers in their anxiety and conflict-pressure reactions.

Wyatt and Marriott (1953) reported widespread and severe feelings of fatigue among night workers than among day workers, both during and after work. They showed that overall 33.3% of the workers felt that they were more tired when they were on the night shift. Wyatt and Marriott's findings regarding fatigue were confirmed by Carpentier and Gazamian (1977) and Smith, Colligan, and Tasto (1982). And Carpentier and Gazamian (op. cit.) explained the reasons for the same as follows:

The over-fatigue and the specific pathology of the night workers result from two causes: exertion during nocturnal de-activation, and insufficiently restorative sleep during diurnal activation. Ageing aggravates both
factors: Psychological and physiological decline further increase occupational strain, and the disturbances of sleep due to ageing reduce still further its restorative properties.

A recent study by Zedeck, Jackson, and Summers (1983) with 732 three-shift workers on a 28-day cycle of rotation, attempted to measure psychological well-being (in terms of enthusiasm, tension, tiredness).

Results indicated poorer psychological well-being for 'Swing' (3 p.m. to 11 p.m.) and 'Graveyard' (11 p.m. to 7 a.m.) shifts.

Jamal (1981) investigated the relationship between shift schedules and mental health, job satisfaction, social participation, organizational commitment, etc., among nurses and industrial workers, both comprising fixed and rotating shift schedules. The results demonstrated that workers on fixed shift schedules were better off than workers on rotating shift schedules in terms of mental health, job satisfaction, organizational commitment, and social participation.

It has been shown in several studies that the complaint of inadequate sleep is accompanied by the feeling of fatigue (Akerstedt & Torsvall, 1977a, 1977b; Froberg, 1981; Kogi, 1971) and that the three-shift workers report fatigue, irritation, and aggression more often than day workers (Froberg, 1981). In one study (Akerstedt & Torsvall, 1977a), when the night shift was abolished, this had a clear positive effect.
The study by Kumashiro, Mikami, and Saito (1982) investigated the mental stress of machine operators working in a small-medium sized company. The results showed that compared with non-shift workers, shift workers were less favourably disposed towards their work and towards management and they felt an increase in boredom, loneliness, irritation, anxiety, and depression.

Shift worker's attitude towards shift work and other aspects of work life: Most of the studies that were conducted so far find that the majority of the shift workers are, on the whole, dissatisfied with it (Bast, 1960; Grossin, 1969; Mann & Hoffman, 1960; Mott et al., 1965; Neville & Co-workers, 1961; Organisation for European Economic Cooperation, 1959; the Philips Factories Group, 1958; Shri Ram Centre, 1970; Ulich, 1957; Wyatt & Marriott, 1953).

An Indian study conducted by Shri Ram Centre (1970) showed that 70% of the workers disliked being in the rotating shift as opposed to 30% who liked it. The findings of this study further revealed that those who like rotating shifts are relatively older, more experienced in the job and in rotating shifts, have more dependents, more income, and more favourable attitude towards the existing shift system.

As to the causes for dislike, Wyatt and Marriott (1953) reported that 34% of the workers said that they disliked the night shift because they did not obtain sufficient sleep, 23% because of the changes in social habits, and 23% because of nutritional and digestive disorders.

Maurice and Monteil (1965) (Cited by Maurice, 1975) have shown that the shift worker's general attitude towards shift work varies according to the
type of shift system with which the worker is familiar. Thus, in response to the question "would you like to continue shift work in the future, or not?", 68% of the permanent shift workers said "yes, without hesitation," the corresponding figures for the rotating two-shift, semi-continuous rotating three-shift, and continuous rotating three-shift workers were 65%, 33%, and 32% respectively. Percentages of "yes, with hesitation" were 12, 16, 25, and 35 in order for the permanent shift, rotating two-shift, semi-continuous three-shift, and continuous three-shift workers. Percentages of "NO" responses were 19, 17, 41, and 33 for the permanent shift, rotating two-shift, semi-continuous three-shift, and continuous three-shift respectively. These figures show that the subjects' answers "Yes, with hesitation" increase progressively from permanent shift to rotating three-shift systems.

Wedderburn (1981), citing his own two surveys (Wedderburn, 1967, 1975) in the steel industry claimed, against the background of almost negative attitudes on the part of the shift workers as has been shown earlier, that he found relatively positive attitudes towards shift work by men on rapidly rotating systems. Along a five-point scale of attitude to shift work, 18% liked it very much, 29% more than they disliked it, 22% were neutral, 23% disliked it, and 8% disliked it very much. But when asked specifically about a list of common problems found in shift work, these shift workers endorsed their dislike of these problems in large number. Thus, in response to the question "what things do you dislike about shift work?" 61% endorsed the complaint about the effects on social life. Complaints about irregular sleeping times came next, with 47% mentioning it. Working at night, irregular
meal times, and early rising attracted complaints from over a third of the sample. Only 17% complained about effects on their health, and 9% had no complaints at all. Similar positive attitude towards shift work have also been reported by a few other investigators (Blakelock, 1960, 1967; Spencer, 1970).

It was pointed out in Maurice and Montell's (op. cit.) study that when the reasons for and against shift work are expressed, a favourable attitude or a positive intention to continue shift work in the future ("yes, without hesitation") will be based on factors in the following order: free time, habit, and wages. On the other hand, hesitation to continue shift work and especially a wish to abandon it will be based on factors in the following order: age, health, regular way of living, and family and social life. In the course of reporting his own works with Montell, Maurice (1975) added that those who replied "yes, with hesitation", did so mainly because of the financial advantages of shift work. This was particularly true of workers on three-shift system.

The study by Akerstedt and Torsvall (1978) in which they had an opportunity to investigate into the effects of shift work on workers' well-being both before and after the company transferred some 3-shift and 4-shift workers to day shift or 2-shift (or to 3-shift in the case of some of the 4-shift workers), while others remained in their original shifts, showed that the change to day work was associated with a very pronounced improvement in attitude. An improvement was also found for the change to 2-shift work, although it was less pronounced in this case. On the other hand, there was
a pronounced deterioration in attitude in 4-shift workers who changed to 3-shift work.

The study by Maurice and Monteil (1965), which was primarily concerned with the attitudes of the workers with regard to the way in which shift work is organised, compared groups of workers employed under different shift systems (normal day work, 2-shift, semi-continuous 3-shift and continuous 3-shift). With regard to preference for shifts, it was found that on the whole, the morning shift was the one preferred (52%). Among the reasons put forward for the preference for the morning shift, 38% concerned free time, 20% family life, 15% fatigue, and 9% social life. In contrast, when the afternoon shift is preferred, the reasons given mainly concern fatigue, or health (76%). The night shift was found to be preferred by a minority of individuals (5%), and the reasons for it varied.

In addition to the financial advantages (bonus for night work), both objective and subjective reasons were put forward: better working conditions, absence of supervisory personnel, more team spirit, and the feeling that "time passes more quickly".

Maurice and Monteil's study also showed that in response to the query about the arrangement of the daily hours of work, majority of the workers preferred the existing schedule. With respect to frequency of shift rotation, whereas the majority did not like to change the frequency of rotation with which they were familiar, a minority of the workers preferred frequencies of rotation longer than those being used, in this case longer than a week. The study further indicated that compared to 2-shift workers, the workers
on a continuous 3-shift system opted for a much more radical reorganization of shift work.

Gordon, McGill, and Maltese (1981) studied a group of day, night and rotating (both 2-and 3-shift) shift workers in order to obtain psycho-social data on the lives of workers and their families as a function of shift. Results on levels of satisfaction showed that only with the exception of job, rotators were the least satisfied on shift hours, sleep, family life, and social and leisure activities. With regard to preference for shift change, 91% of the day workers stated a preference for the day shift, while none of the rotators stated that they would choose a rotating shift if they had a choice.

Maurice and Monteill's (op. cit.) findings with regard to the preference for the morning shift had similarity with other studies (Brown, 1959; Khaleque & Rahman, 1982) and their findings with regard to the preference for the existing schedule got support from the study by Zedeck, Jackson, and Summers (1983). In contrast, there are other studies which show that majority of the shift workers do not like the existing schedule (Gordon, McGill, & Maltese, 1981; Koller, Kundi, & Cervinka, 1978; Wyatt & Marriott, 1953).

Wyatt and Marriott (1953) reported that almost all men (under a day-night rotating system) preferred day work to night work, no matter whether shifts were changed weekly, fortnightly, or monthly.

Koller, Kundi, and Cervinka (1978) reported that most day workers and 'drop-outs' (96.5% and 93.7%, respectively) were satisfied with their work schedule, while 51.5% of the shift workers stated that they would prefer to
change to day work. Day workers and 'drop-outs' also differed significantly from shift workers in their reasons for choice of work schedule. A high proportion of day workers stated that they simply preferred day work (31.6%), but family and health were other major considerations. These reasons were also given by the dropouts'. In the shift worker group, however, the distribution of the reasons given for choice of work schedule were completely different, the vast majority (80.1%) giving higher income.

Nachreiner (1980) conducted a study with 708 male shift workers from a weekly rotating three 8-hour shifts and a rapidly rotating (shorter than a week) two 12-hour shifts. The study also included 234 permanent day workers who served as control group. Answers to the question 'how satisfied they felt with the shift system they were working' showed that workers under the two-shift system were far more satisfied with their shift system than the three-shift workers. A similar tendency to that observed for satisfaction with the specific shift system was found for attitude toward shift work in general. This study also showed that the desire to change from shift work to day work was stronger under the three-shift system than under the two-shift system.

It has been reported that there is a statistically significant relationship between shift satisfaction and satisfaction with wages and promotional opportunities (Bart, 1960), though the measures of the worker's satisfaction with his supervision, working conditions, fellow workers, work operations, and general satisfaction have not been found to be related to his shift satisfaction.

Several studies (De La Mare and Shinmin, 1964; Northrup, 1951; Walker, 1966), however, demonstrated increased satisfaction when workers were permitted
to select the shift system to be utilised. Thils-Svensen (1958) suggested that the shift composition of the neighbourhood and the shift experience of other families influence shift work satisfaction. Mott et al., (1965) demonstrated that shift satisfaction is strongly related to problems of physiological rhythmic and social adjustment.

The findings of Shri Ram Centre (1970) indicated that job dissatisfaction could probably be predicted from the shift assignment. It was found that the rotating shift workers who like rotating shift system show relatively lower degree of job dissatisfaction. In general, the more workers experience role-performance difficulty, the more dissatisfied they are with their job in general, and no vice-versa. In this connection, Zedeck et al., (1983) observed that workers most satisfied with the current shift schedule were most satisfied with their jobs and had a more positive view of the organization. On the other hand, those who preferred change of shift schedule were less satisfied with their job and personal life, and had slightly more negative perceptions of the work environment. This latter study also suggested that the older, more experienced worker was more satisfied and had less preference for change of shifts.

Some studies have identified age, skill, marital status (Maurice & Monteil, 1965; Mott et al., 1965), number of children, age of children, educational background, and supervision (Mott et al., 1965) as the background factors related to workers' attitudes towards shift work.

Maurice (1975), citing his own work with Monteil, also reported that the higher the skill level, the greater the desire to give up shift work.
The latter investigator further showed that whereas the married workers on a three-shift system most often wish to continue with this method of working, hesitation is most marked among the youngest and the oldest workers.

However, a closer scrutiny has revealed that educational background, supervision, and occupational skill level of the shift worker are also apparently related to satisfaction with shift work. In general, the higher the education or the skill level of the respondent, the less his/her satisfaction with shift work (Mott et al., op. cit.).

The age of the worker appears to be one of the key factors in understanding his/her attitude toward shift work. Mott et al. (op. cit.) observed that older shift workers have higher satisfaction with their shifts than the younger workers.

Kundi, Koller, Cervinka, and Haider (1981) studied a group of shift workers in order to see the relationship between job satisfaction and family situation and health. Their findings indicated that family situation, sleeping habits, and working situation are closely linked together in shift workers and either directly or through an increase of risk factors may have an influence on health state. These investigators observed, further, that shift workers uniformly have lower job satisfaction scores.

Mott et al., (1965) found that as the worker's level of reported difficulty in performing the role behaviors increases, the self-esteem of the worker declines and anxiety and conflict pressure increase. However, the personality traits (emotional sensitivity, superego strength, introversion-extraversion, self-sentiment control, and neuroticism) were not found to affect the relationship between level of interference and psychological health.
The inquiry of Burger and his co-workers (1958) stressed the psychological characteristics that determine the attitude of workers to shift work. In one study (Nachreiner, 1980), attempts were made to relate the attitudes towards shift work to the personality variables like neuroticism and extroversion-introversion. The most positive attitude towards shift work was found in the extraverted, emotionally stable shift workers in the two-shift system, the least favourable attitude was held by the emotionally unstable, introverted workers in the three-shift system. No such clear-cut trend was, however, found for the day workers.

The preparation of an adaptation index by Tasto (1973) showed that workers adapt best if (1) they are not too neurotic, (2) they are satisfied with their shift schedule and (3) they are satisfied with the type of work they are doing.

Effects on family and social life: In the following sections, the effect of shift work on family life, social life, and participation in organizational activities are given below.

Family Life: One of the most common spontaneous complaints about shift work is that it interferes with family life (Maurice and Monteil, 1965; Spencer, 1970, Ulich, 1957). And according to the findings of Maurice and Monteil (1965), the degree of interference felt increased in going from workers on a two-shift system (56%) to workers on a semi-continuous three-shift system (62%), and finally to those on continuous three-shift work (75%).
The findings of the Shift work Committee of the Japan Association of Industrial Health (1979), on the effects of shift working on the workers' family and social life, showed that complaints concentrated on the irregularity of life and disturbances of rest and free time, the rates of such complaints being very high among shift worker.

It is especially at meal times that the members of family form a unit; but depending on its timing, shift work can reduce the number of meals which the worker can take with his/her family. The coming together of the family of the shift workers at meal times has been shown to occur much less regularly than the normal day workers (Maurice and Monteil, 1965). Shift workers also often complain of reduced opportunities for contact with their children (Carpentier and Casamian, 1977; Ulich, 1957).

Several studies (Banks, 1960, Brown, 1959, Knauth, Romahn, Kuhlmann, Klimmer, & Rutenfranz, 1975, Mott et al., 1965), which included wives of the shift workers as respondents, have shown that the wives of the shift workers have to change the organization of domestic life every week and that they find it more difficult to prepare meals.

The effects of shift work seem to bear on two aspects of family life: i) the practical organization of day-to-day domestic life, and ii) the life of the family as a unit, including the relations between members of the family (Fourre, 1962).

In studying the effects of shift work on family life, Mott et al., (1965) analysed the different roles and obligations of the worker as a husband and a father. It appeared from the results of the inquiry that
workers on the rotating shift found it harder on their part to carry out a
given set of role activities than those on steady days and that the expressed
difficulties were greater among workers who wished to change to another shift
system. Similarly, Shri Ram Centre (1970) reported that the rotating shift
workers had more difficulty in performing the various role activities than
the permanent day workers and that the experience of role-performance inter-
ference can lead to job dissatisfaction.

Against the background of almost negative effects of shift work on
family life, there are also indications that shift work does not disturb
normal family life. It has been pointed out by one investigator (Wedderburn,
1981) that whereas 33% of the respondents claimed to be worse off for "time
with the family", 42% claimed that they were not affected and 19% claimed
that they were better off in this respect. This investigator, however, main-
tained that demographic variables obviously moderate effects on the family.
Thus, married shift workers with no children liked shift work most, and those
with children under 5 least, with many exceptions.

On the other hand, an inquiry by Chazalette (1973) showed that shift
work had both its advantages and inconveniences for family life. He reported
that 33% and 43% of the shift workers, respectively, considered its advantages
and inconveniences, but 24% said that shift work had both its advantages and
inconveniences.

Social life: The effects of shift work on social life seem to be more
inevitable than its effects on family life. In the words of Maurice (1975):
"In the case of the latter, in fact, possible methods of adaption or adjustment can be envisaged (improvement of housing conditions, improved organisation of family life), whereas in the case of social life, particularly organised activities, such adjustment seems unlikely". This viewpoint finds its support in the study by Nachreiner and Rutenfranz (1975) in which it was shown that shift workers voice complaints relatively more often about disturbances in the wider social sphere than in the immediate family circle.

Wedderburn (1981), citing the findings of his own two surveys (Wedderburn, 1967; 1975) in the steel industry, have shown that shift workers consider the disturbances of their social life even more serious than the physical effects of shift work. In response to the question "What things do you dislike about shift work?", 61% endorsed the complaint about the effects on social life as against only 17% who complained about effects on their health.

It appears from the findings of several investigations (Blakelock, 1960; Mann & Hoffman, 1960; Maurice & Monteil, 1965; Mott et al., 1965) that shift work makes it more difficult to have contacts with friends, co-workers, or neighbours than contacts with relatives. The inquiry conducted by Maurice and Monteil (op. cit.) further showed that the interference with contacts with friends was related to type of shift systems. Thus, the interference was "very great" or "fairly great" for 10% of workers on a two-shift system; the corresponding figures for workers on a semi-continuous three-shift system and continuous three-shift system were 29% and 48% respectively.
Working in shifts, people generally feel deprived of the opportunities to participate in socio-cultural activities such as visits to theatre, watching sports or television, attending evening classes, etc. And higher educational background or higher socio-professional levels of workers only add to this feeling of deprivation (Rutenfranz, Golquhoun, Knauth, & Ghatra, 1977).

According to the findings of Mott et al., (1965), difficulty in performing social life activities seems to vary depending on a worker's desire to change shift, his age, and educational background. After an extensive review of literature on physical, social, and psychological effects of shift work, Dunham (1977) came out with the hypothesis that shiftwork-related problems are more likely to occur in communities with small concentration of shift workers and where social needs of the shift workers are not provided for.

Participation in organizational activities: It is especially the workers' participation in voluntary organizations (Sports, trade unions, political, cultural, etc., pursuits) that suffer from night and shift work.

The above observations of Mott et al., (1965) found support from many other studies (e.g., Best, 1960; Blakelock, 1960; Nilsson, 1978). Nilsson (op. cit.) further reported that rotating shift workers consider that their work hours prevent them from attending union meetings and other activities. And, according to Wedderburn (1967), a primary complain of shift workers results from their unwillingness to give up participation in social organizations.
The findings of the inquiry conducted in the United States by Mott, Mann, McLoughlin, and Warwick (1965) indicated that shift work tends to reduce both chances for membership and opportunities for members to participate in their organizations by serving as officers or on committees. Thus, this study showed a higher membership rate for the day workers than those of the rotating or permanent afternoon and night workers. Similarly, significantly more workers on the day shift than on the other three shifts had the opportunity to serve as officers or committee members.

Shift work and work performance: It has been shown in the previous sections that shift work affects the worker's whole range of life -- physical, social, and psychological. If the worker is disturbed physically, psychologically and socially, his/her performance in the undertaking such as output, accident, and absenteeism cannot remain unaffected. Past findings, dealing with production, accident and absenteeism of shift work, will be presented in the following sections.

Production: Whereas an earliest study by Farmer (1924) reported highest output for the afternoon shift and lowest for the morning shift, a recent study in an Indian Textile Mill by Malaviya and Ganesh (1976) reported the reverse. However, a majority of the studies (Bjerner & Swansen, 1953; Browne, 1965; National Industrial Conference Board, 1927; Ulich, 1957; Vernon, 1943; Wyatt & Marriott, 1953) agree that the level of performance on the night work is by far the lowest.
The findings of Shri Ram Centre (1970) showed that the attitudes of workers towards the shift have a bearing on productivity. Thus, the rotating shift workers who like rotating shift produce more during the night phase of their shift, whereas those who dislike rotating shift produce more during the day phase.

In a review of the productivity literature upto 1959, Mann and Hoffman (1960) concluded that the information is confusing and inconclusive but agreed with Wyatt and Marriott (1953) who suggested that night work has a cumulative effect which causes production levels to decrease.

Accident Studies of the accident rate have produced somewhat varied findings. Vernon (1943), investigating the frequency of accidents on the night shift, found a steady decrease in this frequency from the beginning to the end of the shift. Wyatt and Marriott (1953) observed slightly higher accident rate on the night shift than on the day shift but the difference was not statistically significant.

Nevertheless, Bostrand (1975) reported that although there were no differences in accident frequency between three-shift workers and day workers, the three-shift workers considered themselves to be more exposed to risk of accident than did day workers and two-shift workers.

Rutenfranz, Colquhoun, Knauth, and Ghata (1977) maintained that many factors may be involved in accident causation, some being specifically related to shift work, but knowledge in this field is conspicuously absent.
An exceptionally careful survey on industrial accident was conducted by Andlauer and Metz (1967) with 11,000 workers in the mining and steel industries operating on a three-shift system. It was observed that during the day (morning and afternoon shifts), accidents were more frequent but less serious, while at night they were less frequent but more serious.

Absenteeism: In some studies, absenteeism rates have been shown to be higher among shift workers than among workers on normal work schedules (Brugaard, 1949). Among the shift workers, the same has been shown to be higher among rotating shift workers than among permanent shift workers (Jamal, 1981; Maurice, 1975; Smith, Colligan, & Tasto, 1982).

Jamal (1981), on the basis of his study, showed that the workers on fixed shift schedules were lower on absenteeism than the workers on rotating shift schedules. This has been supported by the findings of Smith, Colligan, and Tasto (1982) who demonstrated higher frequency of injuries and sick absence for the rotating shift workers than those of the permanent shift or day work.

The results obtained from the survey conducted by Thiis-Svensen (1958) confirmed those obtained by Wyatt and Marriott (op. cit.): the rate of absenteeism was higher among day workers, but if the workers on the regular day time shift who had been moved to that shift from rotating shifts were excluded, absenteeism was about the same for the two categories of workers. Aanonsen (1959), who studied absenteeism from the pathological point of view, arrived at similar results.
The study by Wyatt and Marriott (1953) showed more absence on day work than on night work, but when shifts were changed every fortnight or every month, the amount of absence in successive weeks tended to increase on the night shift and to decrease on the day shift. They attempted to explain these opposed tendencies by saying that "night work impaired fitness or inclination for work, which resulted in a higher rate of absence in the later weeks of the night shift and in the earlier weeks of the following day shift". Similarly, for higher rates of absence on the day shift, they mentioned, in addition to the composition of their sample, counter attractions outside the factory (in case of day workers) and the higher rate of payment for night work.

Mott, Mann, McLoughlin, and Warwick (1965), after a review of past studies on absenteeism, thought that the findings on the relationship between work schedules and absences are highly inconsistent and often contradictory. Similarly, at the end of a review of literature on shift work and work performance, Maurice (1975) concluded that "the studies carried out so far have by no means produced final conclusions with regard to the effect of shift work whether on output, accidents, or absenteeism".

Against this background, there are other studies which are worth mentioning. The findings of the Shift work Committee of the Japan Association of Industrial Health (1979) showed that those who were absent from work due to sickness during the one year period constituted 43.2% of male day time workers, as against 51.9% of non-night 2-shift workers, 45.6% of 3-shift
workers, 53.0% of day-night two-shift workers, and 52.8% of other shift
workers. The mean frequency of sickness absence was 0.81, 1.20, 0.88, 1.09
and 1.22, respectively. As causes of absence due to sickness, the descending
order of frequency was: colds, gastro-enteric disorders, disorders excepting
ulcers, dental problems, low back pain, gastric-duodenal ulcers, and asthma
and bronchitis for both men and women. It appears from this inquiry that
the two-shift workers, with or without night work, were higher both in their
number and in their frequency of sickness absence than those of the day
workers and three-shift workers. This point found its support in a review of
Swedish research by Froberg (1981), who showed that two-shift workers have
higher sickness rates, not only than day workers but also than three-shift
workers or people with rotated duty schedules.

3.6. Frequency of Shift Rotation: It is almost established that permanent
or fixed shifts have more advantages than rotating shifts (Akerstedt, Patkai,
& Dahlгрen, 1977; Dehlгрен, 1978; Jamal, 1981; Mann, 1965; Maurice, 1975;
Mott, Mann, McLaughlin, & Warwick, 1965; Tasto, 1978; Tasto, Colligan, Skjei,

So the question is: if the system of shift rotation is to be retained,
not withstanding its disadvantages, what should be the preferred frequency
of shift rotation: should it rotate rapidly (e.g., after every two or three
days) or the rotation should be slower (e.g., a rotation after more than a
week)? And, according to Maurice (1975), the question is still highly con­
troversial and, at the moment, opinion is divided on this issue.
Rutenfranz et al., (1977), for example, reported a laboratory experiment in which attempts were made to examine the problem of the re-entrainment of physiological functions caused by shiftwork. The circadian rhythm of body temperature (used as an index of adaptation) was not found to be significantly altered in shift systems with single night shifts. However, in shift systems which involved consecutive nightwork for periods of one to three weeks, a phase shifting was observed for the minimum of body temperature; after seven or more days of night shift, the time of the minimum shifted to a point within the new sleeping period. Though it appeared from this study that an inversion of body temperature rhythm was possible after seven days, Rutenfranz et al., (1977) opted for single night shifts instead of consecutive night shifts.

In the words of the investigators:

Single night shifts are better than consecutive night shifts
(a) because a single night shift does not significantly disturb circadian rhythms and (b) because more than seven consecutive night shifts are required for reentrainment of the rhythms ....

It could be argued that a sequence of consecutive night shifts longer than seven days would therefore be acceptable. However, for psycho-social reasons most workers need either to change their shift or to have some rest days after no more than one week, so reentrainment is not normally possible in practice.

However, it is mainly the physiologists or investigators focusing on the physiological aspects of shift work who discuss the choice between slow and rapid rotation. According to Carpentier and Gazamian (1977),
"those who think that it is possible or even desirable to bring about an inversion in the biological rhythms want it to be slow, while those who do not think that inversion is possible or wish to avoid it want the periodicity to be rapid."

Nevertheless, it would be worthwhile at this point to take into consideration the view points of those who are involved in the controversy. The principal advocates of rapid rotation are: Rutenfranz, Colquhoun, Knauth, and Ghate (1977), Rutenfranz, Knauth, and Argersbach (1981), and Rutenfranz, Knauth, and Colquhoun (1976). The main proponents of slow shift rotation are: Winget, Hughes, and LeDoux (1973). However, Shri Ram Centre (1970) and Wyatt and Marriott (1953) are also supporters of the second view.

The same views in favour of rapid shift rotation were also expressed by Rutenfranz, Knauth, and Angersbach (1981) and Rutenfranz, Knauth, and Colquhoun (1976). The Health of Munition Workers Committee, as cited by Wyatt and Marriott (1953), also emphasised the physiological advantages of infrequent shift changes but recognized that it might be difficult to reconcile these advantages with personal desires and social claims.

In contrast, the findings of the supporters of the slow rotation of shifts show that rapid rotation of shifts cannot be justified on psychosocial grounds. The inquiry conducted by Shri Ram Centre (1970) demonstrated that workers who like to have a change in the shift pattern prefer a less frequent rotation, i.e., rotation once a month or so. This was because
the rotating shift workers who dislike the rotating shift system require more time (two weeks or more) to adjust to the changed demands on their personal and family life. The author held the view that frequent shift changes incapacitate the individual to switchover from one system of activities to another. Moreover, this study also showed that shifts of longer duration created less conflict-pressure on the workers. Thus, on a policy implication, the study stated:

In view of the findings of the study that shifts of longer duration created less conflict-pressure on workers, it might be suggested that, subject to technological considerations or industrial relations constraints, industry should elect to rotate shifts once a month, if not longer. Any system of shift rotation which involves shorter period is likely to create more perceptual difficulty among workers.

Telaky (1943), after a survey of literature relating to the effects of night work on health and efficiency, also suggested a monthly rather than a weekly change of shifts. Wyatt and Marriott (1953), supporters of slow rotation, observed that workers' adaptation to the change in meal times takes longer time and that the workers cannot get adequate sleep during the first few days after changing shifts. In view of these, they preferred fortnightly change of shifts over weekly change and added that it would be the most effective compromise from the standpoint of health, efficiency, and personal satisfaction.
It seems that the findings of the above mentioned studies go in favour of a longer frequency of shift rotation. But Carpentier and Casamian (1977) maintained that recent studies recommend faster shift rotation of every two or three days. Although it has been shown that there are fewer cases of ill effects on health among the workers on fast shift rotation than among the workers on weekly shift rotation (Andlauer and Fourre, 1965; Murrell, 1965). Barhad and Painote (1970) failed to find such difference.

3.7. Quality of working life: In an attempt to study the relationship between job attitudes and QWL, Joseph (1978) collected data from 96 skilled and semi-skilled technicians in a Public Sector enterprise, following a questionnaire approach. Conceiving QWL as an evaluation process of one's life in the work context, he operationalised it along four dimensions.

Job attitudes were operationalised in terms of work, pay, promotion, co-workers, and supervision. The findings of the study indicated that a) attitude towards the nature of work is closely associated with QWL. The more one feels that his/her work is interesting, challenging, and that it gives him/her a sense of achievement, the higher would be his/her perceived quality of working life; b) associates or co-workers have the potential to make QWL high or low; and c) attitude towards supervision and pay appear to be least associated with QWL even though supervision seems to be a general factor influencing other job aspects.
In another study, Ghosh and Kalra (1982) collected the importance of ratings of 15 - QWL factors from 70 managers in public and private sector organizations in their attempt to see how the different factors associated with the concept of QWL are influenced by variables like age, income, qualifications, experience, etc. Results of this study revealed significant perceptual differences only in relation to four factors: employee welfare, advancement based on merit, absence of undue job stress, and union-management relations. The inquiry further showed that 'employee welfare' was influenced by age and income, 'advancement based on merit' was influenced by education and experience, 'absence of undue job stress' was influenced by professional/non-professional categories; and the perception of 'union-management relations' also differed according to the professional/non-professional categorization of respondents. However, the investigators concluded that "various QWL factors are likely to be perceived differently by different groups".

Singh and Maggu (1980), in an attempt to study the corporate quality of working life, operationalized QWL in terms of five dimensions and collected data from 251 managerial level employees representing 42 organizations. Results showed that QWL was considerably low across all the categories of respondents and across all the parameters of work system, perceived QWL being the poorest in the case of democratisation of work process. It was further observed that the variation in managerial hierarchy, income, and experience do not significantly influence the perceptions of the QWL.
In a more comprehensive study, Sayeed and Sinha (1981) examined the relationship between QWL and job satisfaction and performance taking data from 184 Class III employees working in two organizations. For measuring QWL, they used the inventory developed by Sinha and Sayeed (1980). For job satisfaction, they used the same dimensions as used by Joseph (op. cit.) for measuring job attitudes. And performance measures were obtained from workers' self-and supervisor ratings. Over-all, the results indicated that higher QWL leads to greater job satisfaction and better performance.

A review of past literature reveals that shift workers consistently experience more physical, psychological, and social problems than normal day workers. But a very little attempts have been made to reveal much empirical evidence concerning psychological effects of shift work. So the present study will claim a good deal of importance throwing light on the psychological aspect of shift workers.

3.8. After overviewing the research literature related to the problems of shift workers the present investigator has become able to identify certain issues which seem helpful in formulating research questions for the purpose of present investigation. These questions are as follows:

i) How far do the permanent day and night shift workers differ in terms of fatigue resulting from their work?

ii) Is there any difference between two groups in terms of health and well-being?
iii) How far do the work schedules of the permanent day and night shift workers affect their family life, restrict social life and curtail leisure activities?

iv) Is there any difference between the two groups in terms of job satisfaction?

v) How far do the permanent day and night shift workers differ in terms of job related problems (e.g., health complaints, sleep difficulties and perception of family life and social life)?

vi) How far do the permanent day and night shift workers differ in terms of mental health in occupation?

With reference to the above frame of research questions the outline plan for present investigation has been developed and submitted for approval to the appropriate authority of the Calcutta University. The said approved outline plan has been incorporated in Chapter Four.