INDIVIDUAL DIFFERENCES IN WORK BEHAVIOUR OF BLUE-COLLAR WORKERS: A STUDY OF RUBBER TAPPERS IN MALAYSIA

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SUMMARY

This thesis examines individual differences in work behaviour of rubber tappers. The study examined sex, age, experience and race differences and their interactions with terrain on job performance, absenteeism, and job satisfaction of 1053 rubber tappers.

Rubber tappers are unskilled blue-collar workers who essentially do the same type of work and are paid the same rates of pay. There are very few studies that have compared male and female blue-collar workers doing similar jobs in organisational settings. This study is one of the few investigations that examines sex differences in job performance of blue-collar workers doing same job using production data. Studies on age differences in work behaviour encounter numerous methodological difficulties such as high turnover, internal transfers and problems associated with age differences in educational levels. The participation of rubber tappers in this study is envisaged to overcome these difficulties because attrition rates of rubber tappers are low, and internal transfers are non existent. Further, the educational levels of rubber tappers are relatively similar across different age cohorts, as most rubber tappers have little or no education.

Two measures of both job performance and absenteeism were derived from payroll records. The two job performance measures were total crop production and attendance. The two absenteeism measures were avoidable and unavoidable absence rates. Overall job satisfaction was determined using a 4-item scale. Significant sex, age, experience and race differences were obtained for job performance, absenteeism and job satisfaction. Significant interactive effects were also obtained for sex, age, experience, race and terrain for job performance and absenteeism. The results are discussed in relation to the abilities and motivation of rubber tappers. The implication of these findings for employee selection and human resource management in rubber estates is discussed.

KEY WORDS: Sex, Age, Job Performance, Absenteeism, Job Satisfaction

Dedicated to

my wife

Zaleha Othman

and

my children

Asif Qayyum

Anis Fairuuz

Juwayriyyah

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CHAPERT 1: SEX AND AGE DIFFERENCES IN TASK PERFORMANCE IN LABORATORY SETTINGS

1.1 INTRODUCTION

This study investigates individual differences in the work behaviour of rubber tappers, examining sex, age, experience and race differences in job performance, absenteeism and job satisfaction. The influence of terrain and rain saturation on job performance and absenteeism is also considered. Rubber tappers are unskilled blue-collar workers. Irrespective of sex, age, experience or race, they are all paid the same rate of pay and do essentially the same type of work. There is a dearth of studies comparing the work behaviour of blue-collar male and female workers doing essentially the same job in organisational settings using objective data (Loscocco, 1990; Mannheim, 1983). This study, is one of the few investigations examining sex differences in the job performance of blue-collar workers using production records.

Chapter 1 reviews the literature on sex and age differences in cognitive and motor abilities. Fleishman (1975) noted that cognitive and motor abilities are essential for successful job performance. The review of cognitive abilities examines spatial, verbal and mathematical abilities, as these abilities have been shown to affect task performance. Motor abilities are examined with particular emphasis on manual dexterity, as this ability is associated with the job performance of rubber tappers. Chapter 2 examines sex and age differences in work behaviour. Empirical evidence on sex and age differences in job performance, absenteeism and job satisfaction is reviewed in this chapter.

Chapter 3 discusses the context of the investigation, namely the rubber industry. This chapter explores the history of the natural rubber industry from the discovery of rubber in the Amazon jungles in the late fifteenth century to the first rubber seedling planted in Malaysia during the late nineteenth century. An outline of the structure of the rubber industry in Malaysia is also provided. The industry consist of estates which are dominated by the major plantation companies and smallholdings. This thesis focuses on rubber tappers employed in estates. Next, there is a discussion of the production of rubber and the management of rubber estates. Finally, the characteristics of the rubber tapper's job are outlined, to give an insight into the nature of the job.

Chapter 4 discusses the research methodology used in this study. First a rationale for the research is provided. It is noted that there are very few investigations of sex differences in job performance of blue-collar workers doing similar jobs. It is also observed that studies of age differences in work behaviour in organisational settings encounter numerous methodological difficulties, such as high turnover and internal transfer rates. There is also the problem of cohort effects associated with age differences in educational level. It is argued that the participation of rubber tappers in the study was appropriate because the attrition rates of rubber tappers are low and internal transfers are very low. Further, the educational level of rubber tappers is much the same across cohorts as most rubber tappers have received little or no education.

The research design used in this study is a nonexperimental design (Keppel & Zedeck, 1989; Pedhazur & Schmelkin, 1991). A pilot study was conducted to determine sex, age, and experience differences in job performance and absenteeism. Based on the results of this study, the scope of the main study was extended to include a larger sample of rubber tappers and also to include race as an independent variable. Also two environmental factors were identified as mediating variables: terrain and rain saturation. The data for the main study were collected from nine rubber estates belonging to one plantation company. Production and absenteeism data were obtained from the company payroll, in the form of a checkroll report. Two measures of job performance were derived from the production data: total crop and out-turn. Total crop is the amount of latex and scrap rubber produced over a twelve-month period. Out-turn is the ratio of normal days worked over the possible days of work in a calendar year. Two types of absenteeism were defined in the study: avoidable and unavoidable absence. Avoidable absence is the total unsanctioned absence in a year. Unavoidable absence is the total sick leave (both hospitalised and non-hospitalised) taken in a year. Data for job satisfaction were collected through a questionnaire administered to a sub-sample of rubber tappers. Data on sex, age, experience and race were obtained from personnel records. Rubber tappers were categorised into three age groups (young, middle-aged and older) and two experience groups (less and more experience). The experience of rubber tappers in the main sample was truncated. Information on previous experience was obtained from the sub-sample of rubber tappers, and was used to determine total experience. The rubber tappers in the study were primarily of two races, Malay and Indian. Two environmental factors were considered in the study: terrain and rain saturation. The topography of the nine estates was categorised into hilly and undulating terrain, based on the gradient of the terrain. Rain saturation is the amount of rainfall received per hectare by the estates in a year. Based on the rainfall per hectare, the estates were classified into dry and wet estates. This chapter also outlines the process of data collection, the statistical analyses conducted on the data and the limitations of the research.

Chapter 5, 6, and 7 provides the results of the study. Chapter 5 reports the results of the analysis of job performance. Chapter 6 provides the results for absenteeism and Chapter 7 details the results for job satisfaction. In each of the three chapters, the results are reported separately for the independent variables of sex, age, experience, and race. The ANOVA results provide the main and interaction effects of sex, age, experience, race and terrain for job performance and absenteeism. Only the results for terrain as a mediating variable are reported since rain saturation was dropped from the analysis, because a Chi-square analysis conducted on the distribution of rubber tappers by, age, experience and race in dry and wet conditions indicated a bias in the distribution.

The final chapter, Chapter 8, discusses the findings of this study in the context of the ability and motivation of rubber tappers. The implications of the findings for estate management are considered in the context of worker selection.

1.2 SEX AND AGE DIFFERENCES IN TASK PERFORMANCE

According to Waldman and Spangler (1989), one of the key determinants of job peformance is ability. Ability is the general capacity of an individual related to performance (Fleishman, 1975). According to Fleishman (1975), identification of abilities required in successful task performance is crucial for understanding human performance. In this context, numerous cognitive and motor ability tests have been developed to predict performance (Ghiselli, 1966; Hunter & Hunter, 1984). Generally, cognitive ability tests have been shown to be good predictors of job performance (Hunter & Hunter, 1984). This chapter will review selective literature on sex and age differences in cognitive and motor abilities. The cognitive abilities considered are spatial, verbal and mathematical abilities.

1.2.1 Spatial Ability

1.2.1.1 Sex Differences

Sex differences in spatial ability have been extensively reviewed. Generally males perform better than females on spatial tasks (Halpern, 1986; Linn & Petersen, 1985; Maccoby and Jacklin, 1974; Moffat, Hampson & Hafzipantelis, 1998; Sandstrom, Kaufman & Huettel, 1998; Voyer, Voyer & Bryden, 1995). Male superiority in spatial ability has been observed among children (Liben & Down, 1993; Livesey & Intili, 1996; Vederhus & Krekling, 1996) and in culturally diverse groups (Amponsah & Krekling, 1997; Silverman, Philips & Silverman, 1996).

Spatial ability is not a unitary construct but includes several spatial components. McGee (1979) identified spatial visualisation and spatial orientation as two non-overlapping components of spatial ability. Linn and Petersen (1985) distinguished three categories of spatial abilities: 1) mental rotation (the ability to rotate rapidly and accurately two-or three-dimensional figures); 2) spatial perception (the ability to determine spatial relations despite distracting information); and 3) spatial visualisation (the ability to manipulate complex spatial information to produce a correct solution).

Spatial ability can be measured by various psychometric tests. In a meta-analysis carried out to examine sex differences in spatial abilities, Voyer, Voyer and Bryden (1995) grouped the various tests identified in their meta-analysis according to the three categories defined by Linn and Petersen (1985), based on a test-by-test approach. The mental rotation category comprised the Spatial Relations subtest of the Primary Mental Abilities Test, the Cards Rotation Test, and the Mental Rotation Test. The spatial perception category comprised the Rod-and-Frame Test and the Water Level Test. The spatial visualisation category comprised the following tests: the Paper Form Board Test, the DAT spatial Relations Subtest, the Identical Block Test, the Block Design subtests of the Wechsler Adult Intelligence Scale, the Wechsler Adult Scale-Revised and the Wechsler Intelligence Scale for Children, the Paper Folding Test, Embedded Figures Test and the Hidden Figures Test.

Studies examining sex differences in mental rotation ability have consistently found that males perform better than females (Amponsah & Krekling, 1997; Silverman, Philips & Silverman, 1996; Vederhus & Krekling, 1996; Voyer, Voyer & Bryden, 1995; Voyer, 1997). Voyer (1997) and O'Laughlin and Brubaker (1998) used the Vandenberg and

Kuse Mental Rotation Test (MRT) to assess sex differences in spatial ability. The study found that males performed better than females on the MRT. Birenbaum, Kelly and Levi-Keren (1994) examined sex differences in spatial abilities using the Spatial Test (S) of the Comprehensive Ability Battery to measure mental rotation ability. The study examined the speed and accuracy of subjects in indicating whether a test shape was rotated only or flipped and rotated. The study found that females were slower and less accurate than males on mental rotation. Prinzel and Freeman (1995) examined the effect of increasing task difficulty on sex differences in mental rotation. The difficulty of the mental rotation task was reflected by the degree of rotation of test stimuli. The study measured reaction times to targets rotated either through 90° or through 180°. Targets rotated through 180° were significantly more difficult to detect compared to targets rotated through 90°. Females had significantly longer reaction times when making a correct response compared to males, and males made significantly more correct responses than did females. In experimental studies on spatial vigilance, where subjects are required to monitor repetitive presentations of lines for occasional changes in height (spatial task) or duration (temporal task), men have been found to have a greater perceptual sensitivity on the spatial task than women, though men and women do not differ on the temporal task (Dittmar, Warm, Dember & Ricks, 1993; Prinzel & Freeman, 1997). Robert and Ohlmann (1994) examined sex differences in spatial perception using the Water-level task. This task requires subjects to indicate the orientation of a liquid in a tilted container, and participants were required to produce water-line drawings on response sheets that were set in either the horizontal or the vertical plane. Participants were either seated or stood in the normal upright position. The study found that regardless of the position of the stimulus or of posture, the performance of men was significantly better than that of women.

The magnitude of sex differences in spatial abilities has been well established by meta-analysis. The magnitude of sex differences is typically measured by effect size, which is the standardised mean difference between the scores of males and females (Cohen, 1977). Linn and Petersen (1985) conducted a meta-analysis of 172 studies. For spatial perception the meta-analysis yielded a mean effect size of 0.44 ($p<0.05$) favouring males. The mean effect size obtained for mental rotation was 0.73 ($p<0.05$), also favouring males. For spatial visualisation the analysis yielded a mean effect size of 0.13 ($p>0.05$) indicating no significant differences between males and females. Voyer, Voyer and Bryden (1995) also conducted a meta-analysis of 286 studies to determine the magnitude of sex differences in spatial ability. Their findings indicate that the effect size for mental rotation was 0.56 ($p<0.05$) favouring males. The effect size for spatial perception was 0.44 ($p<0.05$) also favouring males. The effect size obtained for spatial visualisation was 0.19 ($p>0.05$), indicating no significant differences between males and females. The effect sizes yielded for mental rotation and spatial perception in both studies can be considered medium to large (Cohen, 1977 considers an effect size of 0.50 as medium and 0.80 as large). The findings of both meta-analyses suggest sex differences in spatial ability are consistent and stable. Both studies found males to be superior in mental rotation and spatial perception. However there is no conclusive evidence for sex differences in spatial visualisation.

1.2.1.2 Age Differences

Age differences in spatial ability have been observed in psychometric and experimental studies. Studies of psychometric test performance have generally indicated that performance on spatial aptitude tests generally declines with age (Arenberg, 1973; Bromley, 1966; Fozard & Nuttall, 1971; Dobson, Kirasic & Allen, 1995; Salthouse, 1982; Salthouse, 1994; Schaie & Strother, 1968; Wechsler, 1958). Ekstrom, French and Harman (1976) identified four different spatial abilities: flexibility of closure, speed of closure, visualisation, and spatial orientation. Flexibility of closure is the ability to differentiate a specific figure from its perceptual background. Studies have shown that flexibility of closure ability declines with age (Botwinick & Storandt, 1974; Lee & Pollack, 1978). Speed of closure is the ability to integrate unrelated spatial elements into single perceptual patterns or concepts and an age-related decline has also been observed for this ability (Danziger & Salthouse, 1978). Visualisation is the ability to manipulate or transform the image of a spatial pattern. Spatial orientation is the ability to perceive spatial patterns or to maintain orientation with respect to objects in space. Horn and Cattell (1966) found age related declines in flexibility of closure, speed of closure, visualisation and spatial perception abilities. The greatest decline with age was noted for spatial orientation, followed by speed of closure, visualisation and, finally, flexibility of closure.

Experimental studies on ageing and spatial performance have examined mental rotation, spatial perception, and spatial memory. There is no clear evidence of an age-related decrement in mental rotation ability. Several studies have indicated a decrease in the rate of mental rotation with age (Berg, Hertzog & Hunt, 1982; Cerella, Poon and Fozard, 1981). However, Jacewicz and Hartley (1979) found no differences in the mental rotation rates of young and elderly individuals. Generally, it was found that there was an age-related decline in spatial perception. Studies on visuospatial illusions such as the Mueller-Lyer illusion (Comalli, 1970) and the Poggendorff illusion (Leibowitz & Gwozdecki, 1967) have shown that susceptibility to illusory effects is low among children but high among the elderly. Studies on memory for spatial location have also shown age-related declines. Compared to younger people, older people were found to be less able to locate features on a map (Light & Zelinski, 1983) or to remember objects arranged randomly (Waddell & Rogoff, 1981).

Verhaeghen and Salthouse (1997) conducted a meta-analysis on 91 studies to examine the interrelations among age and five measures of cognitive functioning: speed, primary-working memory, episodic memory, reasoning and spatial abilities. In their study, spatial ability measures were derived from psychometric tests and experimental tasks of closure, cube assembly, surface development, paper folding, block design and integration-synthesis. The study found a negative though non-significant trend for age and spatial ability. This finding suggests a possible decline in spatial ability over the adult life span. Babcock and Laguna (1996) examined whether the influence of speed, working memory, spatial ability and rule application on the Raven's Advanced Progressive Matrices (APM) was similar for young and old adults. The APM is a test designed to measure an individual's capacity for perception and abstraction of relationships among stimuli. Problems on the APM are presented as geometric matrix-style series completion task. Participants in the study were required to perform several tasks including spatial tasks. The spatial tasks consisted of geometric comparison and pattern comparison. These tasks were designed to measure the participants' ability to perform tasks involving spatial stimuli, while attempting to minimise the amount of mental transformation required. The study found the influence of spatial ability on the performance of the APM were similar for young and old adults.

Not all laboratory studies of task performance have concluded that performance deteriorates with age. Davies and Parasuraman (1982) concluded that older people performed at the same level as younger people on tasks that required sustained attention. Giambra and Quilter (1988) also found that sustained attention accuracy was resistant to age effects.

1.2.2 Verbal Ability

1.2.2.1 Sex Differences

The literature on gender differences in verbal ability has generally concluded that females are superior in overall verbal ability (Denno, 1982; Halpern, 1986; Maccoby & Jacklin, 1974; Smedler & Torestad, 1996; Stumpf, 1995). However, much of the evidence in the literature suggests contradictory findings. Early studies indicated that females were superior to males in verbal and linguistic abilities (Anastasi, 1958; Maccoby, 1966). Tyler (1965), on the other hand, found that females were superior in verbal fluency but not in vocabulary. Halpern (1986), in a review of sex differences in verbal ability, concluded that females outperform males in fluent speech production, anagrams and on general tests of verbal ability while males outperform females in resolving analogies. Halpern and Wright (1996) reported that females performed better than males on a letter and synonym generation task.

Hyde and Linn (1988) do not share the view that females are superior in overall verbal ability. They conducted a meta-analysis of 165 studies. Their analysis of sex differences in verbal ability produced a weighted mean effect size of 0.11 indicating a slight female superiority in verbal performance. However they argued that an effect size of 0.11 is so small that to all intents and purposes gender differences in verbal ability do not exist. They concluded that "such a small differences does not translate into any meaningful psychological or educational implications"(p 62).

Many of the studies investigating gender differences in verbal ability do not look at verbal ability in isolation but examine it as part of an investigation of cognition which includes spatial and mathematical abilities (Cahan & Ganor, 1995; Kraft & Nickel, 1995; McDermott, 1995; Rosen, 1995; Skaalvik & Rankin, 1994; Smedler & Torestad, 1996). In these studies verbal abilities were usually measured as part of a comprehensive test battery measuring other cognitive skills. In a large-scale study investigating gender differences among elementary school children in Israel, Cahan and Ganor (1995) sampled 11000 nine- to 12-year-old children from the 4th, 5th and 6th grades of 61 different schools. The tests of verbal ability included measures of classification, analogies, vocabulary, verbal oddities and sentence completion. The study found girls from all three grades performed better than boys on verbal classification, analogies and sentence completion. On the other hand boys performed better than girls on verbal oddities and vocabulary.

Kraft and Nickel (1995) conducted a longitudinal study measuring verbal abilities in early childhood on two- to five-year-old children. The study was conducted at six-month intervals. Measures of verbal ability were taken at the beginning and end of the six-month period. There were four measures of verbal ability: fluency, vocabulary, information and similarities. Verbal fluency was measured by a subtest of the Illinois Test of Psycholinguistic Ability (ITPA). This tests the number of concepts that can be identified concerning an object. Vocabulary, information and similarities were measured by the respective subtests of the Wechsler Primary and Pre-school Scale of Intelligence (WPPSI). The WPPSI Vocabulary subtest assessed the quality of definitions given for a variety of words. The WPPSI Information subtest measured the extent of factual knowledge about objects or concepts, while the WPPSI Similarities subtest measured the ability to determine appropriate relations between objects or concepts. Overall ability was determined by combining the standardised scores of the four verbal subtests of fluency, vocabulary, information and similarities. The scores from the verbal subtests which required verbal comprehension (vocabulary, information and similarities) were combined into a single principal factor called Verbal Comprehension Ability. The study found that for Overall Verbal Ability there were no significant sex differences. However there were significant sex differences in Verbal Comprehension Ability, which favoured males. In the specific verbal ability of fluency, girls scored higher than boys both at the first testing and after six months. The magnitude of the sex difference in verbal fluency was $d = 0.55$ on the first test and $d = 0.85$ after six months. On the verbal ability of vocabulary, boys outperformed girls at the end of six months but not during the first test. The magnitude of the sex difference for vocabulary was $d = 0.43$ on the first test and $d = 0.60$ after six months. The study found no sex differences for the verbal abilities of information and similarities. The findings of this study suggest that there are sex differences in certain verbal abilities in early childhood and with maturation the magnitude of these differences becomes greater.

Gender differences in verbal achievement have been sex-stereotyped as favouring women (Stein & Smithhells, 1969). Skaalvik and Rankin (1994) investigated whether such stereotyping influences self-concept, self-perception and motivation in verbal abilities among 6th and 9th grade Norwegian students. Verbal self-concept was defined as self-perceived aptitudes or ability to learn. Verbal self-perception, or self-perceived verbal skills, was defined as the expectation of success on a verbal task. Verbal motivation was assessed by two measures. One was termed 'verbal intention', defined as the intention to include reading and writing in future education or career plans. The other was termed 'intrinsic motivation' which included preference measures for reading and writing. The study found girls obtained significantly higher verbal achievement scores than did boys. Girls also had a higher verbal self-concept and higher verbal self-perceived skills compared to boys. However both these differences were not significant, though girls were found to have a significantly higher verbal motivation than boys. Skaalvik and Rankin (1994) suggest these findings confirm the sex-stereotyping of verbal achievement as a female characteristic.

1.2.2.2 Age Differences

There are no consistent findings relating to age differences in verbal ability. Age-related declines has been observed in several subskills of verbal ability though not in others. Van der Linden, Philippot and Heinen (1997) compared the performance of three age groups (20-30 years, 60-69 years, and 70-80 years) on the California Verbal Learning Test. The study found ageing affected the following cognitive components involved in the test: rate of forgetting, learning strategies, ability to discriminate relevant from irrelevant responses and retrieval processes. Onesimo (1996) investigated two groups of older people (50-59 and 70-91 years) capacity to tell stories (narrative speech) in the presence of pictorial representation in different languages (Catalan, English, French, Galician and Spanish). The ability to understand and tell stories was found to decline with increasing age, regardless of language. Onesimo suggested that older individuals' capacity to integrate all story elements and to create a mental representation of events and relations between events may be reduced.

Schum and Sivan (1997) investigated the verbal abilities of healthy 70-90 year old adults, using a battery of nine tests of the Multilingual Aphasia Examination. The performance of the elderly people were compared to the norms for younger participants. A significant age-related decline was found for only one (sentence repetition) test out of the nine tests. According to Schum and Sivan, this test was the only test that made specific demands on short-term memory and serial auditory information processing. Therefore the relative stability of verbal performance of elderly adults suggests that any occurrence of deficient performance in older individuals was more likely a reflection of the presence of age-associated disease rather than normal aging. Moore, Zabrucky and Commander (1997) examined general verbal ability and performance on comprehension tasks among young and older adults. They noted that younger adults reported greater use of strategies to resolve comprehension failures and placed a higher value on good comprehension skills than older adults.

In a study of children, Porath (1996) compared verbally gifted six-year-old children to chronological and mental-age controls on narrative ability. Gifted children were found to organise story plots in ways typical of eight-year-old children. Elaboration of basic plot structures was also more advanced among gifted children, compared to their chronological and mental-age peers. Gifted children also showed considerable advancement in language skills. Evans (1996) in a study of talkative and reticent primary grade school children found that talkative children had superior language skills compared to reticent children.

Phonological sensitivity (Lonigan, Burgess, Anthony & Barker, 1998) and phonological accuracy (Goffman, Schwartz & Marton, 1996) have also been observed to increase with age in children. Phonological processing involves the use of phonological information in processing written and oral language. Adams(1990) indicated that the development of phonological processing is an important percusor to acquisition of early reading skills. Chafouleas, Lewandowski, Smith and Blachman (1997) examined performance of children in kindergarten through 2nd grade on 11 phonological awareness tasks, encompassing the areas of rhyme, alliteration, blending, segmentation, and manipulation. The study observed that the performance on all the phonological tasks showed rapid growth in six-year-old children (1st grade), and most tasks were mastered by the age of seven. Age, verbal ability, letter-sound knowledge and reading skill were also found to be significantly related to performance on the phonological awareness tasks. Naslund and Schneider (1996) in a study of German children, also observed that phonological awareness together with letter knowledge at kindergarten level may predict later literacy skills.

1.2.3 Mathematical Ability

1.2.3.1 Sex Differences

Reviews of gender differences in mathematical performance have generally established that males perform better than females (Anastasi, 1958; Halpern, 1986; Maccoby and Jacklin, 1974). Generally it appears that gender differences in mathematical achievement do not appear until the elementary school years (around the age of five or six) where girls perform better than boys (Mills, Ablard, Stumpf, 1993; Park, Bauer & Sullivan, 1998; Robinson, Abbott, Berninger & Busse, 1996). However by the end of high school, boys around the age of 18 were found to perform better than girls (Anastasi, 1958; Fennema, 1974; Halpern, 1986; Maccoby & Jacklin, 1974; Skaalvik, 1990).

Hyde, Fennema and Lamon (1990) suggest that the differences between males and females in mathematical performance is essentially very small, and also that this difference has declined over the last 30 years. Hyde Fennema and Lamon (1990) conducted a meta-analysis of 100 studies to assess the magnitude of gender differences in mathematical performance. The study yielded 254 effect sizes and the weighted mean effect size for the whole sample was 0.15, indicating slightly better performance by males on average. When the average overall effect size was based on samples of the general population (excluding high ability and precocious individuals), the effect size was -0.05, indicating a very small female superiority in performance. However such a small effect size was deemed negligible in magnitude. The authors argued that effect sizes of 0.15 and -0.05 were so small that they provide little support for the contention that boys are superior in mathematical ability. However, the study did find that in the selective sample of high ability and precocious individuals, males excelled in mathematical performance. The effect size for high ability individuals was 0.54 and for precocious individuals 0.41.

Gender differences in mathematical achievement can be sex-stereotyped as a male domain (Fennema and Sherman, 1978). Such stereotyping suggests that boys have better mathematical abilities than do girls. Also, boys were found to have more positive attitudes, motivation, expectations and self-perceptions in mathematics compared to girls (Marsh, 1989). In a study examining gender differences in mathematics and verbal self-perceptions and motivation among Norwegian sixth and ninth grade students, Skaalvik and Rankin (1994) found no significant gender differences in mathematics achievement for students in both grades. But the study found that boys had a higher mathematical self-concept and higher mathematical self-perceived skills than did girls. Skaalvik and Rankin (1994) suggested that this finding confirms the sex-stereotyping of mathematical abilities as a male domain. In a study examining the relationship between self-efficacy and test anxiety, Bandalos, Yates and Thorndike-Christ (1995) found self-efficacy and test anxiety were stronger for female than male students, though these gender differences were not significant. Lussier (1996) reported significant sex differences in mathematical self-efficacy but not test anxiety, with males having higher self-efficacy scores than females. Bradley and Wygant (1998) on the other hand, reported that women taking two statistics courses had significantly higher anxiety, though they performed as well than males on the two courses.

Gender differences in mathematical achievement are viewed as mediated separately by spatial skills (Benbow & Lubinsky, 1993; Casey, Nuttall, Pezaris & Benbow, 1995) and internalised attitudes and feelings (Crawford, Chaffin & Fitton, 1995). Casey, Nuttall and Pezaris (1997) examined how both these factors combined to mediate gender differences in mathematical achievement. The study investigated whether spatial skill, mathematical anxiety and mathematical self-confidence functioned as mediators of significant gender differences in scores on the Mathematics Scholastic Aptitude Test (SAT-M) among high ability college-bound students. High ability students were identified as students who scored at or above 480 on the Verbal Scholastic Aptitude Test (SAT-V). Path analysis techniques were used to determine the relationship of gender, spatial skill (mental rotation ability), internalisation variables (mathematical self-confidence and mathematical anxiety) and mathematics achievement (SAT-M). The study found males scored higher than females on the SAT-M. Males also had better mental rotation ability than females and their mathematical anxiety was lower than that of females. Path analysis findings indicated no direct relationship between gender and math performance. The study suggested that males perform better on the SAT-M because they have greater knowledge and skill at answering mathematical questions, better mental rotation ability, and a higher self-confidence in solving mathematical problems on the SAT-M. However the study found mathetical anxiety did not serve as a mediator in the relationship between gender and mathematical performance.

Success or failure in mathematics performance is generally attributed to internal or external factors. Males frequently attribute success to internal factors such as ability while female attribute success to external factors such as effort (Wolleat, Pedro, Becker & Fennema, 1980). Bandalos, Yates and Thorndike-Christ (1995) examined the effect of the attribution of success and failure on test anxiety. They found success and failure attribution influenced test anxiety for both male and female students. Male students attributing failure to external causes had higher levels of test anxiety relative to female students. Attributions of success or failure also vary in different cultures. Clarkson (1983) found no significant gender differences for attributing success or failure in mathematics to internal or external factors among Papua New Guinea school children. However in a study among Kenyan school children, Kivilu and Rogers (1998) found significant gender differences in attributing success or failure in mathematics to internal or external factors. Compared to female students, male students were found to be more likely to attribute success to external factors and to attribute failure to internal factors.

Males and females differ in their abilities in mathematical subskills. Mills, Ablard and Stumpf (1993) found boys performed better than girls in mathematical reasoning tasks, and in the comprehension of algebraic operations and the understanding of mathematical concepts. Hyde, Fennema and Lamon (1990) observed females were superior in computing skills while males were better in problem-solving skills. Low and Over (1993) found that boys were more likely than girls to identify missing or irrelevant information in mathematical problems. Gallagher and De Lisi (1994) investigated gender differences in mathematical problem-solving strategy among high ability students. The study identified two categories of mathematical problems, conventional problems and unconventional problems. The conventional problems were routine textbook problems that could be solved primarily through algorithmic methods, where the method of solution was clearly defined. The unconventional problems were those that either required the use of an atypical solution strategy, such as an unusual algorithmic method, or could be solved more quickly using some type of estimation or insight. The study found female students performed better on conventional rather than on unconventional problems. Female students were also more likely to use conventional strategies to solve mathematical problems while male students were more likely to use unconventional strategies. Gallagher and De Lisi suggested that the implication of these findings is that female students are generally better at tasks requiring rapid retrieval of information from memory while male students are better at tasks that require the manipulation of information already present in memory.

1.2.3.2 Age Differences

A consistent finding in cognitive ageing research is that older adults process information more slowly that younger adults (Cerella, 1990; Myerson, Hale, Wagstaff, Poon, & Smith, 1990; Salthouse, 1991, 1992, 1996). However, in the domain of arithmetic, studies of mental arithmetic performance have shown that there are no age differences in the speed of executing arithmetic fact retrieval and borrowing in complex subtractions (Allen, Ashcraft, & Weber, 1992; Geary, Frensch, & Wiley, 1993; Geary & Wiley, 1991). Older adults retrieve arithmetic information from long-term memory as efficiently as do younger adults. The above observations gave rise to the modified view that slowing occurs within a given cognitive domain, for instance lexical and nonlexical (Hale, Myerson, Faust, & Fristoe, 1995; Lima, Hale, & Myerson, 1991) and is not generalised.

Sliwinski (1997) examined the performance of adults ranging in age from 20 to 86 years on two nonlexical tasks that required different types of counting operations. The first task is the alphabet-arithmetic task (AA task). Participants performed this task by counting up the number of letters in the alphabet corresponding to the numeric addend and comparing their results to answers presented in the equation. The second task is a numerosity task in which participants were presented with an array of items and asked to count the number of occurrences of items presented. Response times were measured for the AA task and numerosity. Both response time procedures were administered using a computer. There was no age-related slowing for the arithmetic counting task (AA task). No age-related slowing was also observed for numerosity task. According to Sliwinski, in two different experimental tasks that measured counting speed, no age differences was observed, suggesting that counting speed was invariant across the adult life span.

Allen, Smith, Jerge and Vires-Collins (1997) carried out two mental multiplication experiments designed to measure age differences in central processing (retrieval and decision processes) and peripheral processing (encoding and response execution). The experiment on central processing determined whether age differences varied across processing stages when retrieval difficulty was varied by manipulating the retrieval task (production vs verification). For the production task, participants were required to answer a presented problem orally (eg., 1 x 1 = ?). For the verification task, participants were required to decide if a presented problem (eg., 1 x 1 = 1) was "true" or "false". Problem size was varied in both these tasks. The experiment on peripheral processes determined whether age differences in mental arithmetic were due to age differences in encoding and not in central processing. Encoding difficulty was manipulated by varying exposure duration (600ms and 300ms) in a multiplication production task. It was assumed that decreasing exposure would degrade stimulus quality and thereby make encoding more difficult. The experiments were carried out using a computer. Neither experiment showed evidence of age differences in central processes but a peripheral processing decrement was observed for older adults. No age by problem size interaction was found in both the experiments. The peripheral processing experiment also indicated a decreasing age difference as problem difficulty was increased. According to the researchers, these findings suggest that the magnitude of age differences in central processing speed was significantly less than the magnitude of age differences in peripheral processing speed. Also, older adults in general, may have a higher skill level for basic fact retrieval in mental arithmetic than do young adults.

Geary and Lin (1998) also examine the speed of executing numerical and arithmetic processes in young and older adults. Four numerical cognition tasks were examined:

enumeration, magnitude comparison, simple and complex subtraction. The enumeration task consisted of quantifying number of objects in sets of three or four items. The stimuli consisted of 21 sets of 1 to 7 Xs. The magnitude task consisted of determining which two numbers is smaller or larger. The stimuli consisted of 84 pairs of single-digit integers ranging in value from 1 to 9. The subtraction stimuli consisted of simple problems (eg., 9 - 3) and complex problems (eg., 93 - 5). Response time was measured to determine speed and accuracy of executing arithmetic fact retrieval, borrowing, subitizing, magnitude comparison, counting, and basic processes such as encoding and speaking numbers. The tasks were presented on a video screen controlled by a computer. For each of the four tasks, spoken answers were recorded on a voice operated relay interfaced with a computer. For the simple and complex subtraction tasks and enumeration task, participants were also asked how they arrived at the answer. The study found a varied pattern of age-related differences in the speed of executing numerical and arithmetical processes. Younger adults were consistently faster than older adults for executing peripheral processes, specifically speed of encoding digits and speaking numbers. No clear age differences in the speed of executing central processes were observed. Younger adults were found to process numerical information within subitizing range more quickly than older adults. Older adults on the other hand were faster at borrowing in complex subtraction. No age-related differences was observed for speed of subtracting fact retrieval or for accessing magnitude representation beyond subitizing range.

1.2.4 Motor Abilities

1.2.4.1 Sex Differences

Women are generally considered to perform better than men in fine motor tasks. Early laboratory studies on task performance found that females excelled in manual dexterity (Maccoby and Jacklin, 1974). Riley and Cochran (1984) examined the dexterity performance of men and women on various dexterity tasks in a laboratory setting. These tasks included the standard Purdue Pegboard test, a pencil tapping test, a fine manipulative task which consisted of filling a long tube with balls, and a simulated assembly task which involved the assembly of two duplex electrical receptacles. The Purdue Pegboard task and the pencil tapping task are tasks requiring motor precision. Both these tests are recognised as standard measures for the assessment of manual dexterity. The electrical box assembly task requires a gross motor activity of the hand with emphasis on rotational components and the fine manipulative task requires a fine motor activity of the hand. The study found females showed better performance on the Purdue Pegboard task compared to males. Females also had a higher level of accuracy on the pencil tapping activity compared to males, while males scored better on the assembly task compared to females. Riley and Cochran (1984) suggest that these findings indicate that females were better at simple dexterity measures whereas males performed better at more complex assembly tasks. Peters and Campagnaro (1996) also examine sex differences in fine motor movements on a peg-moving task. The aim of the study was to determine how men and women would differ on peg-moving tasks in which the difficulty of the peg-moving task was systematically varied, either in terms of peg size or in terms of having participants manipulate pegs with tweezers, so that peg size would not be a factor in determining performance. Apart from the peg-moving task, the study also included finger-tapping task and sequencing tasks. The study observed that on a peg-moving task with thick pegs, that could easily be picked by large hands and that required a large movement trajectory, men performed better than women. However, on a peg-moving task with very thin pegs, women performed better than men. When the same thin pegs were picked up and placed with tweezers, eliminating finger size as a factor, sex differences disappeared. The study also found that men performed better than women on tapping and sequencing tasks. Peters and Campagnaro suggest that these findings do not support the view that women excel in fine motor task performance. According to them, other factors than dexterity determine the magnitude and direction of sex differences in fine motor task performance.

1.2.4.2 Age Differences

Early laboratory studies demonstrated age-related declines in several psychological functions, involving sensory and motor mechanisms, memory and information processing (Welford, 1985). In task that are complex and demanding, older people have been found to be disadvantaged (McDowd & Craik, 1988; Welford, 1977). There are two possible explanations for the sensitivity of complex task-to age- related changes. Birren, Woods and Williams (1980) suggested that older people have a lower 'mental speed' and execute elementary information processes more slowly than younger people. Therefore young people have a speed advantage over older people in complex task performance because of the greater number of elementary processes required to complete the task. Second, specific components of complex task performance may be selectively impaired with increasing age. Cerella (1985) noted that central computational processing was slower among older people than younger people, while Charness (1985) noted greater memory deficits among older than among younger individuals. Dobson, Kirasic and Allen (1995) observed greater age-related performance decrements as the complexity of spatial task performance (figure comparison task) was increased.

Teeken, Adam, Paas, van Boxtel, Houx and Jolles (1996) investigated the effects of age on discrete and reciprocal aiming movements among patients attending general practices in the region of Maastricht, in The Netherlands. The task required participants to make one discrete aiming movement, while the reciprocal task required participants to make a series of back-and-forth movements. The study found significant age effects for both discrete and reciprocal aiming movements. Increasing age was strongly associated with slower movements. The study also obtained a significant age by task interaction, there being a greater ageing effect for the discrete task than for the reciprocal task.

Salthouse, Hambrick, Lukas and Dell (1996) used a synthetic work approach to evaluate adult age differences in job performance. The synthetic work approach simulated complex work activities by requiring participants to perform several concurrent tasks in a laboratory setting. The study used Elsmore's (1994) SYNWORK1 computer programme which was designed to incorporate the dynamic aspects of complex work activities. It consists of four tasks: memory, arithmetic, visual monitoring, and auditory monitoring. In addition to these tasks, the synthetic work situation also required time management skills, to deal with multiple concurrent demands. This study involved two separate experiments in which adults of different ages performed the four tasks during 25 sessions in a synthetic work situation for five-minute periods over three days. In both the experiments it was found that there were large age differences in time management skills. As age increased, individuals were less able to deal successfully with several concurrent tasks and were often observed to neglect the more difficult tasks in order to deal with easier ones.

1.3 SUMMARY

Sex differences in spatial ability generally favour males. Males perform better than females in mental rotation ability and spatial perception. There is no conclusive evidence for sex differences in spatial visualisation. Sex differences in verbal ability generally favour females. Females have been found to be superior in several aspects of verbal ability, such as fluency and speech production, anagrams, letter and synonym generation tasks. Males on the other hand have been found to perform better on solving analogies and verbal oddities. Sex differences in mathematical performance generally favour males. Males' superior performance in mathematics is partly mediated by better mental rotation ability and higher self-confidence in solving mathematical problems. Women are generally considered to perform better in fine motor tasks. Laboratory studies have shown that females perform better than males in manual dexterity tasks.

Studies on age differences in spatial ability have shown an age-related decline on psychometric tests. Spatial abilities such as flexibility of closure, speed of closure, visualisation and spatial perception all appear to decline with age. No clear evidence of age-related declines have been observed for mental rotation ability. However, age-related declines have been observed for spatial perception and spatial memory abilities. There is no consistent evidence for age differences in verbal ability. Age-related declines have been observed on some subskills of verbal ability, such as narrative speech in the elderly. Among children, phonological awareness has been found to increase with age. Studies on age differences in mental arithmetic performance have shown no age differences in speed of executing arithmetic fact retrieval and borrowing in complex subtractions. However, age-related declines in mental multiplication has been observed in peripheral processes, but not in central processes. There is also evidence of age-related declines involving sensory and motor mechanisms, memory and information processing. Increasing age has also been associated with slower body movements.

CHAPTER 2: SEX AND AGE DIFFERENCES IN WORK BEHAVIOUR

This chapter reviews the literature on sex and age difference in work behaviour with particular reference to job performance, absenteeism and job satisfaction.

2.1 JOB PERFORMANCE

2.1.1 Sex Differences

The literature on sex differences in job performance in organisational setting is relatively sparce. Studies examining sex differences in job performance have used various types of job performance measures. By far the most widely used performance measure is performance evaluation, which includes ratings and rankings usually made by supervisors or managers. Few studies have used objective measures of job performance, such as production records. Studies using subjective evaluation measures have been shown to be susceptible to bias (Nieva and Gutek, 1980). Research on sex differences in job performance includes a wide variety of occupations, for example shopfloor employees, managers, academics, and college students. These studies have also been conducted in several different types of organisational settings.

2.1.1.1 Objective Measure of Job Performance

In a meta-analytic review of 52 laboratory research studies, Wood (1987) examined the impact of sex composition of groups on productivity. She found men, working individually or in same sex groups, had superior performance compared to women. Wood suggest that this differences was due to task contents or settings that favour men's interest and abilities over women's. However, she argued that in real-life work groups, men were also expected to perform better than women when tasks and settings favour men.

There are no consistent findings on sex differences in job performance using objective measures in organisational settings. Findings indicate both significant- and non-significant differences in performance. Inwald and Shusman (1984) investigated sex differences in the job performance of law enforcement officers who were hired and stayed on their job for at least one year. Job performance was based on attendance and discipline at work. Supervising officers provided recorded information for these measures . Job performance was compared by sex as follows: those with fewer than three absences versus those with three or more; those with fewer than three latenesses versus those with three or more; and those with and without disciplinary interviews. The study found that female officers were twice as likely as male officers to have three or more absences. Female officers had a higher percentage of latenesses compared to male officers and disciplinary interviews were administered to male officers more frequently than to female officers. Wood (1980) conducted a study among hourly non-union male and female manufacturing employees working within the same location doing comparable work in a packaging plant. The study examined possible test validity differences on four employment tests of job performance measures. The employment tests used in the study were the Purdue Non-Language (PNL) Test designed to measure mental ability, the Closure Flexibility (CF) Test which measures the ability to hold a configuration in mind despite distractions, the Perceptual Speed (PS) Test which measures the ability to rapidly discriminate visual configuration, and the SRA Shop Arithmetic (SA) Test designed to measure proficiency in mathematical reasoning. The performance criteria used in the study were frequency of absence, both excused and unexcused, for 18 months preceding the study and performance ratings provided by supervisors. The study found significant positive correlations for females on the CF Test with frequency of absences and performance ratings. There were no significant results for male employees on any test measure with frequence of absence and performance ratings.

Weisman and Teitelbaum (1987) investigated gender differences in productivity among married physicians. The study measured productivity as the total number of hours the physicians reported spending in all professional activities during a typical work week. The physicians involved in the study were 1420 active obstetrician-gynaecologists, half of whom were women. The study found that married female physicians worked 7.5 fewer hours per week than married male physicians. However these differences were attributed to different family circumstances. Married female physicians work fewer professional hours because they were more involved in household and childcare activities. Shye (1991) also reported significant differences in performance between male and female physicians. Male physicians reported working 50 hours per week while female physicians reported working 40 hours per week. However on average female physicians reported higher work loads than did male physicians. The proportion of total work time in a typical week devoted to direct patient care was 54.8% for male physicians compared to 62.2% for female physicians. The number of patients seen per hour for female physicians was 6.5 compared to 4.8 for male physicians. The length of a typical patient visit was longer for male physicians (19.9 min) than for female physicians (13.2 min). The patient care productivity index (based on average for number of patients seen per hour, number of hours worked per week, and proportion of work time spent in direct patient care) was less for male physicians (132.3) and higher for female physicians (161.5). According to Shye (1991) this findings suggest that although female physicians work fewer hours per week than male physicians, their overall productivity in terms of direct patient care was as high as that of men.

Vasil (1993) investigated research productivity and self-efficacy belief among academics. Self-efficacy beliefs are the perception of confidence in one's ability to perform a task. This influences whether a task is attempted, the effort expended to fulfil the task and the persistence in overcoming obstacles. Again this study measured research productivity using a productivity index, developed by weighting the number of presentations at national/international conference, reports, refereed articles, book chapters, books published, number of research grants received in dollar amounts, and number of master/doctoral advisees graduating over a three-year period. Significant sex differences were found in the research productivity index. Male academic staff reported significantly greater overall research productivity, with a greater number of reports and articles being published. Male academic staff also indicated a greater confidence in the ability to perform research activities. In an earlier study, Vasil (1992) investigated the relationship between research self-efficacy and research productivity of male and female academic staff. A self-report questionnaire was used to measure self-efficacy expectations, frequency of performance of research tasks and research productivity. Research self-efficacy was found to be positively correlated with research productivity, suggesting that research productivity increases with self-efficacy perception. Male academic staff reported significantly stronger research self-efficacy beliefs than did female academic staff. Male academic staff reported significantly higher frequency of research task completion than did female academic staff, and a higher overall level of research productivity.

2.1.1.2 Subjective Evaluation

The evidence on sex differences in ratings or ranking of job performance is mixed, with some studies suggesting that there are no sex differences in performance evaluations while others indicate that there are. Thompson and Thompson (1985) investigated sex differences in appraisal scores on task-based performance appraisal instruments used in two different companies, a small foam plastics plant and a large petroleum refinery. Immediate supervisors of the blue-collar workers from a wide range of departments in both organisations provided performance ratings and performance rankings on several performance criteria such as general reasoning, written communication, equipment repair, monitoring of process operations, quality control, communication with others, use of machines, and material handling and safety. The study found no sex differences in performance ratings and rankings in either of the companies. Latack, Josephs, Roach and Levine (1987) examined the performance of men and women on a carpentry apprentice programme. The programme instructors provided ratings on classroom performance. No sex differences in performance on the program were obtained. Shore and Thornton (1986) investigated the effects of supervisors' and subordinates' gender on self- and supervisory performance ratings of assembly line workers in a large electronics manufacturing company. The study used performance appraisal forms similar to that used by the company. Performance appraisal was based on six dimensions, including work quality, work quantity, judgement, initiative, teamwork and dependability. It was found that subordinates' self-ratings were higher than their supervisors' ratings of them and that gender did not affect the relationship between self- and supervisory ratings.

Arvey, Landon, Nutting and Maxwell (1992) found sex differences on some but not all ratings of the job performance of aspiring male and female entry-level police officer candidates. The study employed eight scales of physical job performance: running, wrestling, lifting and carrying, climbing, crawling and balancing, pushing and pulling, endurance, and general physical fitness. Immediate supervisors provided ratings on all eight scales. Men were rated significantly higher than women on wrestling, lifting and carrying, pushing and pulling, and endurance. There were no significant sex differences in general physical fitness, running, climbing, crawling and balancing. Schul and Wren (1992) investigated gender differences in the performance of sales people in a drug and skin care products company, using self-and supervisory ratings of sales performance. Questionnaires evaluating sale performance were sent to salespeople and sales managers. Sales performance was assessed through a 24-item instrument measuring four dimensions of performance: technical competence, sales planning, salesmanship skills and social relations. The study found that female salespeople's self evaluations were higher than those of males on technical competence, social relations and planning skills. However they rated themselves lower than men on selling skills. However, Supervisors rated females higher than males on selling skills, social relations and planning skills. No significant gender difference was found for technical competence. Pulakos, Opler, White and Borman (1989) investigated sex differences in performance ratings of first-term army enlisted personnel. Peer and supervisor ratings were obtained for three composite performance measures: technical skill and job effort; personnel discipline; and military bearing. Significant main effects were found for rater source (peer or supervisor), rater sex and ratee sex on two measures of performance, technical skill and job effort and military bearing. For rater source, the study found that peers gave higher ratings than supervisors on technical skill and job effort while supervisors provided higher ratings than peers on military bearing. For rater sex, female raters gave higher ratings than male on both performance measures. For ratee sex, male ratees gave higher ratings than female on both performance measures.

2.1.1.2.1 Evaluation Bias

One of the major pitfalls of the subjective evaluation of job performance is sex bias in evaluation. Generally, there are sex stereotyping and subtle gender bias effects in performance evaluation (Dobbins, Cardy, & Truxillo, 1988; Maurer & Taylor, 1994; Shore, 1992; Snipes, Oswald & Caudill, 1998). Nieva and Gutek (1980) in a review of sex evaluation bias, found evidence of pro-male bias, of women receiving more favourable evaluation than men, and of no differences in the evaluation of men and women. The study identified prejudicial evaluation of women's qualifications and performance as a major external barrier to women achieving equality with men. Greenhaus and Parasuraman (1993) observed that among the most highly successful managers, the performance of women was less likely to be attributed to ability than was the performance of men.

Sackett, DuBois and Noe (1991) examined performance ratings given to men and women in 486 work groups from a wide variety of jobs and organisations. The study found that women received lower ratings when the proportion of women was less than 20% of the work group. However when women made up 50% or more of the work group, they were rated more highly than men. Sackett et al. (1991) suggested that the fact that women received lower ratings while working in small groups could be a reflection of the gender stereotyping of the job. Martell (1991) examined the impact of attentional and memory demands (observation and retrieval) of work performance ratings given to men and women in traditional male jobs. The study was conducted as a laboratory experiment in which undergraduates read a vignette depicting the work behaviour of a male or female police officer and then evaluated the officer's work performance. The study manipulated the attentional demands imposed on the participants while reading the vignette and the amount of time elapsing before issuing performance ratings. In the high attentional demand condition, participants attended to another task while reading the vignette and a time limit was imposed. In the low attentional demand condition, participants read only the vignette and there was no perceived time limit. In the high memory demand condition, participants gave work performance ratings one week after reading the vignette. In the low memory demand condition, participants gave performance ratings immediately after reading the vignette. The study found that when attentional demands were increased and time pressure was made salient, men's work performance was rated more highly than women's under conditions of both immediate and delayed rating. When participants were able to allocate all their attentional resources (as in the conditions of low attentional demand and no perceived time pressure) the differences between performance evaluation given immediately and after a week's delay, were minimal. Martell (1991) suggested that men were rated more highly in the high attentional demand condition because raters relied more heavily on positive male stereotypes. Thus when raters could allocate fewer attentional resources to forming an impression of work performance, they gave men more favourable work ratings based on perceived gender stereotypes.

Studies examining evaluation bias at management level show mixed results. Tsui and Gutek (1984) examined gender differences in the perceived performance effectiveness of male and female middle managers. Their study also examined discrepancies in the superior-subordinate-peer-and self-ratings for female and male managers. The study found that perceived performance effectiveness of male and female middle managers were much the same. No significant differences between male and female middle managers for superior, subordinate and self-ratings were obtained, even though the mean ratings for female managers were slightly higher than those for male managers. However significant differences between male and female managers were found for peer ratings, with female managers receiving higher ratings from peers than did male managers. Tsui and Gutek (1984) suggest the lack of bias in the performance ratings of superiors, subordinates and peers indicated pro-male bias may be inconsequential at middle management level. However when performance evaluations were used for promotion to a higher management level, women managers faced considerable bias in obtaining promotion. In a study examining the relationship of gender to managers' ratings of the promotional potential of a sample of managerial and professional employees, Landau (1995) found gender was significantly related to promotional potential, with women managers being rated lower in promotional potential than were men. Pregnant women also face bias in performance appraisal in organisations. Halpert, Wilson and Hickman (1993) investigated the effect of an employee's pregnancy on performance evaluation. Participants were asked to view videotapes of either a pregnant or non-pregnant women doing assessment centre-type tasks and were asked to evaluate the performance of both groups of women. Pregnant women were consistently assigned lower ratings, compared to non-pregnant women. The author suggest pregnant women face additional evaluation bias beyond the already existing bias of sex stereotyping discrimination.

Nieva and Gutek (1980) suggested several reasons as to why women face considerable bias in performance evaluation. The first was the required level of inference from the evaluation. In evaluating past performance, low levels of inference were required from evaluators, as assessment was confined to observable behaviour. However, evaluations of job qualifications for possible promotion require a higher level of inference to be made about the potential of an individual, together with an assessment of the prospects for future performance. Evaluation bias was most likely to occur where a high level of inference was required. The second reason identified by Nieva and Gutek (1980) was sex role incongruence. Employees in sex-incongruent and sex-atypical jobs were often discriminated against and received poor evaluations. Women who worked in predominantly male jobs were more likely to be evaluated poorly, despite their performance being equivalent to that of their male colleagues. Women also suffer sex-role incongruence when norms regarding desirable work-related behaviour become incompatible with behavioural norms regarded as appropriate to the female sex role. The third factor identified was the level of qualifications or performance. Men were usually thought to be more competent than women. Therefore when men and women are equally competent pro-male bias usually operates. However when men and women were both equally incompetent, women were rated more highly than men, perhaps because women were seen in a more positive light when they performed poorly.

2.1.2 Age Differences

The research literature on age and job performance in occupational settings is relatively small, partly because the investigations of work behaviour in relation to age involves methodological difficulties (Davies, Taylor & Dorn, 1992; Griew, 1959; Smith, 1981; Welford, 1958). Production records, which appear to provide valuable and informative data on performance, may have serious limitations (Welford, 1958). For example employees who consistently show declining output may be transferred to other work or in extreme cases dismissed. As a result, as Davies, Matthews and Wong (1991) observed, if "productivity decreases with age, then those more productive older workers remaining on the job will be unrepresentative of their age cohort, and any comparison of the productivity of different age groups will tend to favour older workers" (p166). On the other hand older workers who perform well may be promoted to supervisory positions, leaving less productive workers behind. Therefore any age comparison carried out will tend to favour younger workers. Davies and Sparrow (1985) suggest that age comparisons of job performance are only meaningful when turnover and internal rates of transfer are low. Further, any age comparison requires large samples of workers within different age groups who are all engaged on exactly the same work. Welford (1958) argued that minor differences in job characteristics may conceal major differences in the demands made on an employee's skills and abilities.

2.1.2.1 Empirical Reviews

Most of the reviews on age and job performance have generally concluded that there are little or no relation between age and job performance (Davies & Sparrow, 1985; Davies, Matthews, & Wong, 1991; McEvoy & Cascio, 1989; Rhodes, 1983; Waldman & Avolio, 1986; Warr, 1994).

Rhodes (1983) conducted a comprehensive review of the age and job performance relationship. Her review reported mixed results on the relationship between age and job performance. Of the 34 studies that reported age and job performance relationships, eight reported positive relationships, nine a negative relationship, eight an inverted-U relationship, and nine obtained no significant relationship between age and job performance. Rhodes (1983) also considered the role of experience on the age-job performance relationship. Of the three studies reviewed, two reported an attenuating effect of experience on the relationship between age and job performance. Performance was essentially the same across age groups when experience was controlled. Avolio, Waldman and McDaniel (1990) examined the work performance of individuals in different occupations to determine whether experience contributes to the prediction of work performance beyond the contribution of age. The study found that, across occupations, experience was more highly correlated with job performance than was age. The age-performance correlation dropped substantially when experience was controlled. However the experience-performance relationship changed very little when age was controlled.

McEvoy and Cascio (1989) carried out a meta-analysis of research on the relationship between age and job performance conducted over 22 years and published in 46 behavioural science journals. The study found a total of 96 independent studies with a total sample size of 38,983 from a broad cross-section of jobs and age groups that reported age-performance correlations. It was concluded that age and job performance were essentially unrelated. There also was no evidence that the type of performance measure (ratings vs. productivity measures) or the type of job (professional vs. non-professional) significantly moderated the age-job performance relationship.

Waldman and Avolio (1986) also conducted a meta-analysis to examine the relationship between age and job performance. The study reviewed 40 samples which were classified into three categories according to the type of performance measure used. The three categories were supervisory ratings, peer ratings and individual productivity. The study also classified the type of job into professional and non-professional groups. For productivity measures job performance increased with age. However this positive relationship was small in magnitude and correlations were much the same for professional and non-professional groups. Waldman and Avolio (1986) also reported that for supervisory ratings, the correlations between age and job performance for both professional and non-professional groups were negative and significant. They suggested that the different results obtained for productivity measures and supervisory ratings may be due to rater bias when ratings were used, so that productivity measures may be a fairer and more appropriate representation of actual performance.

2.1.2.2 Output Measures

Production records or output data are the most satisfactory methods of assessing the relationship between age and job performance (Davies, Matthews, & Wong, 1991). In an early study, Clay (1956) examined age differences in productivity among machine operators, hand compositors and proof-readers at two British printing works. The turnover rates among employees was negligible. The study used production records obtained for three 13-week periods spread over three years. The study found that performance peaked among employees in their forties and thereafter declined. Schwab and Heneman (1977) investigated the relationship between work productivity, age and experience among production workers performing tasks which involved manual dexterity. The workers in the study were semi-skilled assemblers and moderately skilled sewing machine operators and machine tenders who were paid under a standard-time, piece-rate pay system. Output data were obtained from the firm's engineering department and an average hourly productivity value was computed. The study found the correlation between age and performance was positive and significant, indicating that older workers were more productive than younger workers. When experience was controlled for, the correlation between age and performance was near zero and nonsignificant. However when age was controlled for, the correlation between experience and performance was positive and significant. This findings suggest that experience predicts performance to a greater extent than does age.

Giniger, Dispenzieri and Eisenberg (1983) also investigated the relationship between age, experience and worker productivity. The study was carried out in the garment manufacturing industry. The workers were classified in terms of job tasks that required speed and job tasks that required skill. Employee turnover was minimal during the period of study. Production data were obtained from company records and productivity was measured in terms of average hourly piece-rate wages. It was found that for both speed and skill job tasks, the productivity of older workers surpassed that of younger ones. Partial correlations between experience and performance (controlling for age) indicated experience rather than age moderated performance, with older workers being more experienced than younger workers.

Sparrow and Davies (1988) investigated the effects of age, tenure, training level and job complexity (indexed by the size of machine serviced) on the job performance of service engineers servicing photocopiers for a multinational office equipment company. Turnover and internal transfer rates among employees were low. The educational levels were similar across age cohorts. Two output measures were obtained from company records. The first measure was the quality of service achieved, assessed as the number of copies made by a machine since the last service, as well as the time since the last service. The second measure was speed of performance, assessed by the time taken to service a machine. The study found job complexity significantly affected both quality and speed of performance. However it did not significantly interact with age, indicating older and younger workers performed equally well in servicing relatively complex and relatively simple machines. An inverted-U relationship between age and job performance was obtained with performance, peaking in the mid-thirties and early forties. It was also found that experience and training influenced the speed of performance more than did age.

2.1.2.3 Performance Ratings

Job performance may also be measured through performance ratings, which are usually made by supervisors. However ratings may be less satisfactory than objective measures (Landy & Farr, 1983). Cattell and Kline (1977) suggest ratings tends to be unreliable across raters and across time and are susceptible to rater bias. Ratings may also be influenced by stereotypes held by the rater and this may affect older workers, who are often discriminated against in performance evaluation, due to negative stereotyping of older workers (Davies, Matthews, & Wong, 1991).

Despite negative stereotyping, research has shown no significant differences in job performance ratings given to older and younger workers. Vecchio (1993) investigated the impact of differences in subordinate and supervisor age on job performance of high school teachers. Specifically, the study examined the differences in age that exist between the rater and ratee and how that influences the ratings of subordinate performance. The study found no evidence of a negative relationship between age and job performance. Interestingly, the study found supervisors were more likely to give subordinates who were older than they were more favourable evaluations, although the magnitude of this effect was not substantial.

However, some studies have obtained age differences in job performance ratings. Studies examining the job performance of American air-traffic controllers have reported age was negatively related to pre-training aptitude test scores, objective performance measures, and performance ratings given by supervisors, crew chiefs and peers (Cobb, Nelson, & Matthews, 1973; Trites & Cobb, 1962). Dalton and Thompson (1971) and Price, Thompson, and Dalton (1975) examined the job performance of engineers employed in large technological companies. Performance ratings were obtained from managers of the engineers. The study found rated performance increased initially, peaked in the mid-thirties and declined thereafter. Horner (1980) examined the performance ratings of middle-level managers working in a large American public utility company. The study found that managers who were over the age of 50 tended to be rated as less receptive to new ideas and as slower to acquire new skills. However, this group of managers were also more technically competent than younger managers. In a more recent study, Shore and Bleicken (1991) examined the relationship between age and performance ratings among assemblers in a large electronics manufacturing company. The study used performance evaluation forms similar to those used by the company. Performance ratings were made on six dimensions: work quality, work quantity, judgement, initiative, teamwork, and dependability. Ratings were obtained from the employees themselves as well as their supervisors. In general, a trend was observed for self-ratings to be higher than supervisory ratings. This effect was fairly consistent regardless of the age of the subordinates and the age of the supervisor. The study also noted that the most consistent rating congruence was observed among older workers. On the specific dimension of judgement, it was found that subordinates age did not affect self-ratings. On the other hand supervisory ratings on this dimension were consistently higher for older workers than for younger workers. Shore and Bleicken (1991) suggest that the reason for this was that judgement was a quality that was typically associated with increasing age and experience.

2.2 ABSENTEEISM

2.2.1 Sex Differences

A consistent finding from research on sex and absenteeism is that women tend to be absent from work more often than men (Johns, 1978; VandenHeuvel & Wooden, 1995). However this evidence is not conclusive. In a study among employees in a high-technology plant, Markham, Dansereau and Alutto (1982) found women had more absence than men. Fitzgibbons and Moch (1980) also found women had more excused absence than men among nonsupervisory workers. However, Thomas and Thomas (1994) found that among navy enlisted personnel, gender had no significant effect on absenteeism. Tsui, Egan and O'Reilly (1992) investigated the effects of workforce heterogeneity (individuals working with people who are demographically different from one another with respect to gender, age and race) on attendance behaviour in work units. The study found that gender differences (gender heterogeneity) in a work unit had a more negative effect on attendance behaviour for men than for women. Thus for men, increased differences in the gender composition of a group was associated with increased absence. For women in contrast, increased difference in the gender composition of a group was associated with lower absence.

Steers and Rhodes (1978) in their review of the literature on absenteeism suggested that employee attendance was affected by attendance motivation and the ability to get to work. They observed that absenteeism rates were generally higher among women than among men. The higher absenteeism among women may stem from their different levels of domestic responsibility; for example, the responsibility for child rearing traditionally rested with women rather than with men (Johns, 1997; Steers & Rhodes, 1978). VandenHeuvel (1997) conducted a comprehensive study of the determinants of absence from work caused by family responsibilities. The study considered two types of absence. The first was absence to care for an ill family member. The second was absence for other family reasons, such as taking family members to appointments, providing transportation for family members, taking time off to attend school activities, and so on. The study used self-reported absence data obtained through questionnaires from 2642 employed Australians. Of those who were surveyed, 41.7% of employees were absent because they had to care for family members who were taken ill. There were also significant sex differences in absence for those who cared for family members who became ill. More women employees (42.9%) than male employees (38.5%) were absent to care for family members who were ill. Specifically, the study found women that compared to men were more often absent from work to care for sick children and other relatives. No significant differences between men and women were obtained with respect to absence for family reasons other than illness. In a study among 21,232 Norwegian public sector employees, Mastekaasa and Olsen (1998) investigated absenteeism in men and women who had identical job titles and worked in the same workplace. Women had 1.3 to 1.7 times as many absences as men. Women were found to have longer absences requiring certification by a physician than short absences not requiring such certification. Mastekaasa and Olsen suggest that the gender difference is not due to women's greater problems in combining paid work with care for children, but is more likely to reflect general health or personality differences between men and women.

VandenHeuvel and Wooden (1995) examined whether the process of absence differs for men and women. This study examined how age, presence of dependants, job satisfaction, commuting time, stressful life events and work shifts influenced absence behaviour for men and women. The study found the effect of age and job satisfaction on absence varied significantly between men and women. A significant 'inverted U' relation between age and absence was found for men but not women. For women there was no obvious relationship between age and absence. Variations in expressed levels of job satisfaction were found to influence the attendance behaviour of men but not women. The average absence rate for men with low job satisfaction was about 46% higher than that for men with high job satisfaction. A significant relationship was also found between absence and commuting time for women but not for men. Women who commuted to work for a relatively long period of time each day had relatively higher absence rates. Shift work was also found to influence absence behaviour among women but not among men. Women who regularly worked shifts had absence rates that were 27% higher than those of women who did not. VandenHeuvel and Wooden (1995) suggested that the variation in absence behaviour among men and women could be due to internal and external factors. Women's absence behaviour was more sensitive to external pressures such as stressful life events, whereas men's absence behaviour was more sensitive to internal factors such as job satisfaction. Women's higher absence resulting from external factors could be attributed to the dual responsibility employed women assume (family responsibility and wage earner) which can create pressure on women to be absent from work.

2.2.2 Age Differences

Muchinsky (1977) identified absenteeism as one form of withdrawal behaviour. Absenteeism is both very costly to organisations and individual employees (Mowday, Porter & Steers, 1982; Steers & Rhodes, 1978; Taylor, 1979). Nicholson, Brown & Chadwick-Jones (1977) categorised absenteeism into avoidable and unavoidable absence. They distinguished sickness, involuntary, sanctioned and time-lost absence as unavoidable absence and casual, voluntary, unsanctioned and absence frequency as avoidable absence. There are various indices of absenteeism. These includes frequency measures (number of time absent); severity measures (duration or days absent); attitudinal absence (frequency of one-day absences); and medical absences defined as the frequency of absences lasting for three days or more (Huse & Taylor, 1962). Other absenteeism indices reported include lateness and worst day of week ('Blue Monday' or Friday) (Chadwick-Jones, Brown, Nicholson & Sheppard, 1971). Despite the numerous and varied indices of absenteeism used, the frequency index has been reported to be the most reliable and consistent measure of absence across different studies (Muchinsky, 1977).

Research on age and experience in relation to absenteeism has examined both avoidable and unavoidable absences. Hackett (1990) conducted a meta-analysis to examine the relationship between absenteeism, age and tenure. According to Hackett, the relationship of absenteeism to age and tenure was partially a function of absence type (avoidable or unavoidable) and sex. The study found age but not tenure was inversely associated with avoidable absenteeism, especially for males. Gender was found to moderate the negative relationship between age and avoidable absence. The relationship between age and avoidable absenteeism was fairly substantial for males in the all-male sample and negligible for females in the all-female sample. The study also found unavoidable absence was unrelated to either age or tenure. Martocchio (1989) conducted a meta-analysis to synthesise individual effect sizes of age-absence relationships based on absence frequency and time lost. The study found both frequency of absence (an indicator of voluntary absence) and time-lost (an indicator of involuntary absence) decreased with age.

Nicholson, Brown and Chadwick-Jones (1977) cross-tabulated the relationship between age and absenteeism published in 28 studies to examine differences between males and females and avoidable and unavoidable absences. The study reported differences in the relationship between age and absenteeism for men and women and avoidable and unavoidable absences. Avoidable absence was found to be inversely related to age and this tendency was more pronounced for men than for women. A positive relationship between age and avoidable absenteeism was found to be common for men. The study also noted other relationships (inverse, curvilinear, and zero) between age and absenteeism. However, no clear-cut relationship between age and unavoidable absence was observed for women. For men, there was a tendency for unavoidable absence to increase with age. In the same study, Nicholson, Brown and Chadwick-Jones (1977) investigated absenteeism among blue-collar workers across four contrasting technologies: clothing manufacture; foundries; continuous process plants producing oil, power, chemicals and plastics; and bus companies. The study found avoidable absence was inversely related to age and was especially prevalent amongst male workers. This relationship was reported to be more stable and reliable for age than for tenure. Garrison and Muchinsky (1977), in a similar study among clerical workers, found a negative relationship between age and avoidable absence and a positive relationship between age and unavoidable absence.

In more recent studies of absenteeism, Haccoun and Desgent (1993) conducted a telephone interview on a sample of French speaking workers in the city of Montreal to gather information about workers' perceptions of absence from work. The workers were required to report the reasons they were absent from work and the consequences they associated with absence. The study found that the workers were more likely to be absent from work for reasons associated with non-work constraints such as attending social or family events, than for work-related difficulties. The four most frequently mentioned reasons for absence were personal illness, personal needs such as meeting lawyers etc., insomnia or fatigue, and illness in the family. It was found that workers perceived that very few negative consequences attached to absence. Most workers believed that work not accomplished during absence was usually carried out either immediately through replacement workers or later when the workers themselves returned to work.

Rogers and Herting (1993) conducted a study on sick-leave usage patterns among workers at a US Naval Base in California. The study distinguished genuine sick leave from 'elective sick leave'. Genuine sick-leave cases were identified as resulting from employees being genuinely too ill to work. Elective sick leave cases on the other hand occured when employees who could go to work without any detrimental effect to their own health, to that of other employees, or to job productivity, but the employees chose not to do so. The study identified elective sick leave as leave due to slight headaches, minor menstrual discomfort, minor backaches, elective medical appointments, and attending sick children at home. The study obtained data on sick leave from employee payroll and personal records. An Attitude Survey Questionnaire was used to obtain data not available from the payroll and personal records. These include marital status, travel patterns, whether there were children at home, and the respondents' perception of health. The Attitude Survey Questionnaire also elicited responses as to the circumstances under which sick-leave would be used. The analyses of the sick leave data yielded a significant positive correlation between the use of sick leave and age. As age increased, sick leave usage also increased. The response towards how sick-leave would be used was consistent across different age groups. This suggested that age did not significantly affect the way employees felt about the use of sick leave.

Attitudinal factors such as job satisfaction have been found to moderate the relationship between age and absenteeism. Rhodes (1983) reported a negative relationship between job satisfaction and absenteeism. Nevertheless, studies have generally concluded that this relationship is typically weak (Chadwick-Jones, Nicholson & Brown, 1982; Hackett & Guion, 1985; Ilgen & Hollenback, 1977). Zaccaro, Craig and Quinn (1991) examined the relation between supervisory style and absenteeism and found that though supervisory style influenced job satisfaction, there was no association between supervisory style and absenteeism. Farrell and Stamm (1988) conducted a meta-analysis of the relationship between job satisfaction and absenteeism which included age. They found that age was a weaker predictor of absence than were attitudinal and organisational factors such as job involvement, task significance, task variety and pay

2.3 JOB SATISFACTION

2.3.1 Sex Differences

The literature on sex differences in job satisfaction is inconsistent. Some studies report women have higher levels of job satisfaction than do men (Murray & Atkinson, 1981) while other studies report men are more satisfied with work than women (Burke, 1996; Chiu, 1998; Dodd-McCue & Wright, 1996; Forgionne & Peeters, 1982; Shapiro & Stern, 1975; Smith, Kendall & Hulin, 1969). Yet other studies report that men and women do not differ significantly in overall job satisfaction (Mannheim, 1983; Mottaz, 1986; Quinn, Staines & McCullough, 1974; Smith, Smits & Hoy, 1998; Weeks and Nantel, 1995).

Research findings suggesting men and women do not differ in job satisfaction are interesting because compared to men, women are generally thought to have lower-status jobs, to receive lower rates of pay, to have less autonomy and authority on the job, and fewer opportunities for promotion (Mottaz, 1986). Therefore women are likely to have lower job satisfaction than men. Crosby (1982) refers to this situation as the paradox of the 'contented female worker'. It is a paradox because it is a central tenet of job satisfaction theories that unrewarding work conditions are likely to result in employees being dissatisfied (Mueller & Walace, 1996). Mottaz (1986) suggests one reason why men and women do not differ in job satisfaction is that men and women have different expectations with regard to work. Therefore although "women receive less from their jobs than men, they have lower expectations and hence perceive themselves as being just as satisfied as men" (Mottaz, 1986, p.360).

Men and women place different emphasis on work values related to job satisfaction. Men generally attach greater importance to extrinsic rewards such as pay, benefits autonomy and promotion whereas women attach greater importance to intrinsic rewards such as meaningful work and close relations with co-workers and supervisors. Nieva and Gutek (1981) found that relative to men, women valued interpersonal relationships more than pay and promotion. Mottaz (1986) reported that in his study, task autonomy was a significant predictor of overall work satisfaction for men but not for women. On the other hand friendly and supportive relationships with supervisors were a significant determinant of women's job satisfaction but not men's. McIlwee (1982), investigating work satisfaction among women in non-traditional (male dominated) occupations such as surveyors, production controllers, mechanics, welders, forklift operators, gardeners, and chefs, found intrinsic aspects of work such as variety and challenge, were cited as the most important. This study also observed that the primary source of women's job satisfaction was their greater orientation towards co-workers. McNeilly and Goldsmith (1991) noted that although women and men did not differ in overall job satisfaction, there were differences between men and women on several dimensions of job satisfaction. Men were reported to express greater satisfaction than women with pay and opportunities for promotion and advancement, and less satisfaction than women with their managers and supervisors. Chiu (1998), in a study of lawyers, found that women lawyers had lower job satisfaction than men lawyers, perhaps because women lawyers lack influence and opportunity in the profession. Apart from influence and opportunity, the study also found women lawyers had lower satisfaction than men lawyers on three aspects related to job satisfaction, namely financial rewards, non-competitive atmosphere, and time for self and family.

Witt and Nye (1992) examined gender differences in the perception of fairness of pay and promotion and in job satisfaction among 12,979 men and women employees in 30 different organisations. The sample included university staff, faculty and administrators, military development and research workers, employees in small hospitals, school teachers, factory workers and aviation administration employees. The study found that the relationship between job satisfaction and perceived fairness of pay and promotion between men and women was not significant. For each type of fairness (pay and promotion) and job satisfaction relationship (global and facet item), the observed mean correlations across work organisations were very similar for men and women. Mannheim (1983) examined the influence of personal factors (education, age and family status) and technological factors (level of mechanisation, production organisation, task autonomy and environmental stability) on the job satisfaction of male and female industrial workers. She reported that age, education and family status did not affect job satisfaction for either men or women A significant interaction between sex and age was obtained whereby older women were found to be more satisfied than men in the same age group. The study also found men and women working under different technological conditions did not differ in job satisfaction. Martin and Sehan (1989) examined the relationship between education and job satisfaction and how it may be affected by gender and wage earning status (primary and secondary-wage-earning responsibility). He observed a positive and significant relationship between job satisfaction and educational level for both men and women regardless of wage-earning status. Increased educational level was found to be associated with increased job satisfaction among men and women. The study also observed that economic responsibility (measured by wage-earning status), rather than gender was critical to the education-job satisfaction relationship.

Employees at different hierarchical levels in organisations have different levels of job satisfaction. Generally the higher an individual is in the organisational hierarchy, the higher the level of job satisfaction for both men and women. For example, Burke

(1996) reported that among employees of a professional firm, women and men at higher levels in the organisation were generally more satisfied in their work than were men and women at lower levels. Similar findings were also reported by Mottaz (1986) who examined workers from different occupations: professional, managerial, clerical, service and blue-collar. The occupational groups were divided into upper-level and lower-level occupational categories. The upper-level category consisted of professional and managerial workers, while the lower-level category consisted of clerical, service and blue-collar workers. It was found that men and women in higher level occupations had significantly higher levels of job satisfaction than workers in lower level occupations. However the study found no gender differences within occupational level, indicating that men and women at similar occupational levels had similar levels of job satisfaction. Smith, Smits and Hoy (1998) investigated job satisfaction among male and female employees in relation to the employer gender. There were four gender-related dyadic combinations examined in the study: female employee and female employer; male employee and female employer; female employee and male employer; and male employee and male employer. The study found women had significantly higher job satisfaction when employed by women than when employed by men. Similarly, men had higher job satisfaction when employed by men than employed by women.

2.3.2 Age Differences

Reviews of the literature on age and job satisfaction have generally concluded that job satisfaction is higher among older workers (Bourne, 1982; Davies & Sparrow, 1985; Rhodes, 1983). Rhodes (1983) reviewed 28 bivariate analyses which reported age related differences in overall job satisfaction. Her review found 22 studies reported evidence of a positive relationship between age and overall job satisfaction. A positive linear relationship was found among workers aged up to 60 years. Other studies have also reported high levels of job satisfaction among workers over the age of 60 (Saleh &

Otis, 1964; Staines & Quinn, 1979). Weaver (1980) in a US national survey of representative households found a positive relationship between age and job satisfaction.

There are other relationships between age and job satisfaction reported in the literature. Rhodes (1983) in her review reported a curvilinear relationship between age and job satisfaction. However, she noted studies reporting such relationships were few, there being only two studies among 28 bivariate analyses which reported a U-shaped relationship between age and job satisfaction. Another two of the 28 studies reported an inverted U-shaped relationship. But in an earlier review, Herzberg, Mausner, Peterson and Capwell (1957) found that in 17 studies out of 23 examined, a U-shaped relationship between age and job satisfaction was obtained. They reported that the level of job satisfaction was initially high, lowest in the middle years, and rose again towards retirement age. Singh and Singh (1980) also found a similar relationship among supervisors. Kacmar and Ferris (1989) reported a U-shaped relationship for nurses, though the curvilinear relationship between age and job satisfaction only emerged when tenure was controlled. In their study, Kacmar and Ferris (1989) found job satisfaction was lowest between the age of 30 and 40.

A few studies have also reported no relationship between age and job satisfaction. Rhodes (1983) in her review of age differences in job satisfaction found two studies that reported no significant relationship between age and overall job satisfaction. Further, Hollingworth, Matthews and Hartnett (1988), in a study of white-collar employees, found no age differences in job satisfaction. Meyer, Paunonen, Gellatly, Goffin and Jackson (1989) also found no correlation between age and job satisfaction among managers in a food service organisation.

Davies, Matthews and Wong (1991) suggested that besides a linear and curvilinear relationship between age and job satisfaction, there was one other possible relationship:

a monotonic and positive but non-linear relationship. Davies, et al. (1991) cited the study by Kalleberg and Loscocco (1983) to support this relationship. The study by Kalleberg and Loscocco (1983) used data from the 1972-73 Quality of Employment Survey to assess job satisfaction among 1390 subjects, analysed as 10 age bands with adequate numbers in the extreme bands of 16-20 years and 61+ years age groups. The study found a relatively strong third-order polynomial component in the regression of age on job satisfaction. Job satisfaction was found to increase until the late thirties, was fairly constant thereafter until the late fifties and then increased further with age. Workers who were in the 61+ age group were found to have the highest job satisfaction among all the participants in the study.

Research into the relationship between age and job satisfaction have also examined different aspects or facets of job satisfaction. Rhodes (1983) found that satisfaction with the work itself was linearly related to age. Satisfaction with pay was also found to be positively related to age (Spector, 1985; Kacmar & Ferris, 1989).

Davies, et al. (1991) identified two main reasons for age differences in job satisfaction. First age differences in job satisfaction may be a result of a genuine change with age in job attitudes and expectations. Wright and Hamilton (1978) have suggested that job satisfaction increases with age because older workers have jobs that are more rewarding and more congruent with their need and values. Kalleberg and Loscocco (1983) found that intrinsic rewards, such as a challenging job and fulfilling work, increased with age. Conversely, Campbell, Converse and Rodgers (1976) indicated that job satisfaction increases with age because workers' expectancies become 'ground down' by experience, such that older workers are more easily satisfied than younger workers. Second, age differences in job satisfaction could be an artefact of cohort differences, or of the confounding of age with job tenure. Glenn, Taylor, and Weaver (1977) indicated that older people may have higher job satisfaction compared to younger people because older cohorts tend to be have less formal education. As a result of this older people tend to have lower expectations of the satisfaction to be gained from work. Kalleberg and Loscocco (1983) using quasi-longitudinal data from the 1972-73 Quality of Employment Survey have confirmed that cohort effects partly explained the age differences in job satisfaction that were obtained in the survey. Tenure has been reported to confound the relationship between age and job satisfaction. O'Brien and Dowling (1981) found that age remained positively correlated with job satisfaction when tenure was controlled in male but not in female samples. Kacmar and Ferris (1989) suggested that tenure in the job and tenure working for current supervisor should be controlled as well as controlling for length of service. When examining age differences in job satisfaction, Kacmar and Ferris (1989) reported that when the three factors related to tenure were controlled, a linear, positive relationship between age and intrinsic job satisfaction and a U-shaped relationship between age and extrinsic source of job satisfaction was observed.

2.4 SUMMARY

Very few studies have been carried out on sex differences in job performance. Generally, these studies have mainly used two types of job performance measures: objective measures and performance evaluation. The findings of these studies are inconsistent. Some studies have reported sex differences in job performance while others have reported no sex differences. The evidence on sex differences in absenteeism is not conclusive, though women were found to be absent more often than men. The higher absence among women is partly attributed to the primary role they play in family responsibility. The findings on sex differences in job satisfaction are also inconsistent. Some studies report women have higher job satisfaction than men while other studies report men more satisfied with work than women. There are also studies that report men and women do not differ in job satisfaction.

Studies on age and job performance faces considerable methodological difficulties. Age comparison of job performance is only meaningful when turnover and internal transfer rates are low and a large sample of workers are engaged in exactly the same work. Most reviews on age and job performance have generally concluded that there are little or no relation between age and job performance. Correlational studies of age, experience and job performance have generally found experience predicts job performance to a greater extent than age does. The relationship between age and absenteeism suggest that avoidable absence is inversely related to age. Unavoidable absence on the other hand is positively related to age. A positive relationship between age and avoidable and unavoidable absence is commonly found among men. A positive relationship between age and unavoidable absence is generally observed for women. The relationship between age and job satisfaction has usually been found to be positive. Older workers have higher job satisfaction levels compared to young workers.

CHAPTER 3 : THE NATURAL RUBBER INDUSTRY

3.1 INTRODUCTION

Malaysia is a major producer of natural rubber which is one of the world's major industrial raw materials. Rubber is used as a key raw material in the production of many consumer and industrial products. Its main application has been in the manufacture of vehicle tyres. It is also widely used in the manufacture of other products including mattresses, carpet underlay, medical and industrial gloves, condoms, balloons, and bearings. The total value of rubber produced and consumed in the world in 1992 was about US$20 billion and on average, each global inhabitant in 1990 consumed 2.9 kg of rubber (Barlow, Jayasuriya & Tan, 1994). Appendix 1 gives an illustration of global consumption of rubber (natural and synthetic rubber) in 1990.

There are two kinds of rubber and they are both obtained from very different sources. The first kind of rubber is natural rubber. Natural rubber is obtained through the exploitation of a tree called *Hevea Brasiliensis*. This tree originally grew wild in the Amazon Basin and the adjacent area of Brazil. The bark of the tree is exploited for a white liquid called latex, which is collected in small cups, tied around the tree. The latex is then processed into intermediary rubber for industrial use. The second kind of rubber is synthetic rubber. It has its origin in petroleum. Monomers obtained from oil and gas are converted through an industrial process into latex. The latex is then further transformed into intermediary rubber for industrial use.

This following sections will discuss the development of the natural rubber industry in Malaysia. Among the topics discussed will be the history and the development of the natural rubber industry, the structure of the rubber industry and how rubber is produced. This discussion will be followed by a description of the management of rubber estates. Here the role of management and its duties in the production of rubber is examined. Finally, the chapter will consider the main concern of this thesis, the individual rubber tapper. Here it will explore in detail the job of a rubber tapper and the fringe benefits tappers receive.

3.2 HISTORY OF NATURAL RUBBER

The natural rubber industry in Malaysia has its roots in Brazil. During the late fifteenth century, European visitors to Central and South America found that Indians were extracting latex from rubber yielding trees and using it for waterproofing garments (Chaloner, 1963). The trees from which these natives of South America extract rubber is called *Hevea Brasiliensis*, a tree which belongs to the family *Euphorniaceae*. These trees were found to grow wild in the Amazon Basin. Samples of rubber from South America were sent to Europe by early European explorers.

Rubber became an important raw material only during the early nineteenth century when discoveries were made in the treatment and utilisation of rubber. Rubber in its untreated form is not suitable for use in manufacturing as it is unable to retain its natural property of elasticity under changes in temperature. In 1820, Thomas Hancock made an advance in the treatment of rubber when he devised a masticator machine in his London factory to process scrap rubber. With this advance, rubber was commercially used in manufacturing inserts for garters, mittens and waistbands in the clothing industry. In 1823, Charles Macintosh first used rubber as a water-proof material for garments. Between 1839 and 1844, Charles Goodyear made a decisive advance in the treatment of rubber in America. During this period he discovered and perfected the process of vulcanisation of rubber. This process prevented rubber from being affected by changes in temperature. This development led to the invention of the pneumatic tyre by R.W. Thomson in 1845 which was later improved and patented by J.B. Dunlop in 1888.

These inventions laid the foundation for the natural rubber industry. As the automobile industry began to develop in the early twentieth century, demand for rubber started to increase.

The main source of rubber during this period was from South America, particularly from Brazil. The supply of rubber form Brazil was erratic. This was because the rubber trees in Brazil were not cultivated in a systematic manner and they were tapped wherever they occurred in the jungle. Further, the traditional method used by the Indians to extract latex by making numerous incisions in the bark with an axe was wasteful and destroyed the tree quickly. As a result of this the supply of rubber to Europe and Britain was affected. To overcome this problem, Thomas Hancock, in 1857, suggested that the best rubber trees should be cultivated as profitable plantation ventures in the East and West Indies. The initiative to transfer strains of rubber from South America to the East was made by Sir Clements Markham from the India Office in London. In 1873, James Collins, the curator of the museum of the British Pharmaceutical Society obtained 2000 Hevea seeds from Brazil. The seeds were germinated at the Royal Botanical Gardens at Kew near London. Twelve plants were raised from this batch of seeds and six plants were sent to the Botanical Gardens in Calcutta. However, the experiments in Calcutta failed due to climatic conditions.

In 1876, Henry Wickham was asked to obtain further seeds from Brazil. Wickham gathered 70,000 seeds of the *Hevea Brasiliensis* variety and Kew Gardens were able to germinate 2700 plants from those seeds. In August of 1876, a total of 1919 plants were despatched to the Botanical Gardens at Heneratgoda in Ceylon and another 50 plants were sent to the Botanical Gardens in Singapore. A year after the plants were sent to Singapore, five of the plants had survived. In September, 1877 a second batch of 22 plants were sent to the Singapore Botanical Gardens. The Superintendent of the Singapore Botanical Gardens, H.J. Murton, took nine plants from this second consignment to the State of Perak in Malaya. Malaya during this period was a colony of the British Empire. The plants taken by Murton to Perak were planted at the Residency Gardens at Kuala Kangsar. These plants were supervised by the Resident of Perak, Hugh Low, and the plants thrived. The success of the rubber plant in Kuala Kangsar was the beginning of the rubber industry in Malaysia.

3.3 DEVELOPMENT OF THE NATURAL RUBBER INDUSTRY

3.3.1 The Early Period

Ten years after the introduction of the rubber seedlings in Perak, little progress had been made in establishing rubber as a commercial crop in Malaysia. Seedlings derived from the original trees planted at Kuala Kangsar were planted at several other locations in Perak. Heslop Hill, an early pioneer, planted several rubber trees along roadsides for observation on three coffee estates at Kamunting in Perak, Weld Hill in Selangor, and Linsum in Negeri Sembilan. However such plantings were only to serve as an indication that rubber trees could be grown satisfactorily under a range of soil and topographic conditions (Barlow, 1978).

Arope, Nor and Hua (1983) suggested that the initial lack of interest and the unsystematic nature of the earliest rubber plantings could be attributed to several factors. First, coffee was still a primary cash crop in Malaysia. In the 1880s, coffee planting was a highly profitable venture as coffee was commanding a very high price in the market. Second, there was a lack of awareness among local growers of the potential of rubber as a profitable crop. During this period, the supply of rubber to Europe and Britain was coming from Brazil and Africa and there was an adequate supply from these two sources. A third but crucial reason was the ignorance among local growers of the productivity of rubber trees and of the suitable methods for extracting latex from the trees.

Towards the later part of the 1890s and the early 1900s, rubber planting expanded quickly. In 1898 the area planted with rubber trees was 800 hectares. But in 1900 the hectarage had increased to 2400 hectares. Ten years later, the area planted with rubber has increased to 218, 900 hectares (Barlow, 1978). Appendix 2 shows the expansion of area planted with rubber trees in Peninsular Malaysia from 1898 to 1921. Barlow (1978) suggested that the increases in area planted with rubber in the early 1900s was phenomenal by the standards of the time. There are several reasons for this rapid expansion (Arope, Nor, & Hua, 1983; Barlow, 1978).

3.3.1.1 Demand for Rubber

During this period, world demand for natural rubber was increasing, created by the expansion of the automobile and electrical industries. As a result of the increasing demand for rubber, the price of rubber increased sharply. The average annual price of rubber in London increased from $2.36 per kg in 1900 to $5.55 per kg in 1906. In August of 1910 the price shot up to $12.00 per kg (Barlow, 1978; p.25). With such high prices and excellent returns on investment, growers started switching from coffee to rubber. New areas which were originally jungle were cleared for rubber cultivation. The colonial administration during this period encouraged rubber growing through the introduction of new land regulations that required very low rentals for land granted for rubber cultivation.

3.3.1.2 Suitable Climate

In order for rubber to be successfully cultivated, it need equatorial climatic conditions. These climatic conditions are relatively little variation in temperature and an evenly distributed annual rainfall of 1800-4000 mm. There also needs to be an absence of any destructive winds that could damage the trunk of a rubber tree. These conditions were available throughout most parts of the country.

3.3.1.3 Political Stability

During the nineteenth century, British colonial rule in the then Malaya was restricted to the Straits Settlement of Singapore, Penang and Malacca (see Appendix 3 for a map of Malaya *circa* 1922). There was relative peace and stability in these states. The other states outside the Straits Settlements were ruled by Malay sultans. In these states, especially Perak which was rich in tin, there was unrest and an absence of law and order as a result of clan warfare in the Chinese tin mining community. These disturbances were a threat to the Straits Settlements and interfered with its trade. As a result, the British Imperial government reversed its hitherto non-interference policy in the affairs of the states ruled by the Malay sultans and effectively took control of the secular administration of these states. By 1890 the states of Perak, Selangor, Negeri Sembilan and Pahang had all accepted a British Resident. The British Resident became the colonial administrator for these states. Through the colonial administration, the British were able to restore law and order in these states, as a result of which trade and development prospered and expanded.

3.3.1.4 Good Transportation Network

The expansion of a good transportation network was crucial to the development of the rubber industry. The exploitation of tin in Perak in the nineteenth century saw the establishment of the first railway line in Perak. By 1900, a network of light roads and railways was well established on the west coast of Peninsular Malaysia. By 1910, this roads were gravelled and the railway was extended and connected to ports in Selangor, Malacca and Johor in the south. As the roads and railway system expanded, rubber estates also expanded along these routes on either side of the roads and railway. Within the rubber estates, factories were established to process the latex into rubber sheets which were efficiently transported by road and rail to the ports for export to Europe, America and the Far East.

3.3.1.5 Cheap Labour

The rubber industry is a very labour intensive industry. During the early 1900s when machinery was not yet available, vast tracts of virgin jungle were cleared using manual labour. In the rubber estates, a very large work force was required to exploit the rubber trees as well as to maintain them. As the British who ruled Malaya at that time were also the colonial masters of India, they encouraged cheap Indian labour to migrate to Malaysia to work in the rubber estates in large numbers. This Indian labour, together with the local indigenous population, provided the labour force for the expanding rubber industry.

3.3.1.6 Research and Development

Research and development into rubber cultivation and exploitation helped spur the expansion of the industry. One man who was instrumental in the early stages of the industry in solving the practical problems of establishing rubber as a commercial crop was Henry Ridley. In 1888, Ridley was appointed the Director of the Botanical Gardens in Singapore. In 1889, he began his classic work on tapping rubber trees. He introduced the herring-bone method of tapping which was a significant improvement on the Brazilian method of incision using an axe. He also introduced a new tapping knife which is still commonly used today. This knife enabled a high quality of tapping to be achieved with minimal wounding to the bark of the rubber tree. It also boosted rubber production. In addition, Ridley's research made many improvements in other aspects of rubber production, such as the effects of planting density on yield, the use of cover crops to protect against land erosion, improvements in pest and disease control, and improvements in the methods of processing latex. The rubber estates were quick to adopt these new methods and productivity increased tremendously as a result.

3.3.2 The Post 1910 Period

The growth of the rubber industry after 1910 followed a cyclical pattern of expansion and decline. The expansion and decline of the industry was closely associated with world demand for rubber which was influenced by several events. Up till the outbreak of World War 1, the industry saw steady growth. Large number of companies were formed by British investors to acquire existing estates and to develop new ones. The outbreak of World War 1 caused the price of rubber to decline as a result of the curtailment of exports to Europe and Britain. This caused a severe slump in the industry in Malaysia. After the war, the industry picked up as demand for rubber started to increase. However this was not to last very long. The industry experienced another shock during the Great Depression from 1929-1932.

At the outbreak of World War 2, the Japanese occupied Malaysia. Many of the British owned estates were abandoned by their owners. During this period the rubber estates were neglected and the industry again suffered a decline. After the war, when the British returned to Malaysia, they revived the industry. In 1957 Malaysia gained its independence from Britain. The agriculture sector became the main contributor to the growth of the Malaysian economy. Rubber became the main export earner and Malaysia became the world's number one exporter of natural rubber.

Towards the end of the 1970s and throughout the 1980s the rubber industry saw a steady decline in the area planted with rubber. Increasingly plantation owners started to switch to the more lucrative oil palm cultivation. New areas opened for agricultural cultivation were planted with oil palm. Rubber estates with old rubber trees that were due for replanting were planted with oil palm instead of rubber trees . In 1975 the total area planted with rubber was approximately 2 million hectares. By 1994 this had declined to about 1.7 million hectares. During the same period the area planted with oil palm increased from 0.6 million hectares in 1975 to 2.4 million hectares in 1994. Table

3.1 shows the total area planted with rubber and oil palm from 1986-1995. Table 3.2 shows the average price of rubber and crude palm oil from 1986-1995. The prices are shown in Ringgit the currency of Malaysia, denoted as RM. The sterling equivalent in 1996 was £1 = RM4.00.

Table 3.1 Area Planted Under Rubber and Oil Palm from 1986-1995 ('000 ha)

Year	Rubber	Oil Palm
1986	1912.2	1560.5
1987	1881.3	1640.2
1988	1865.8	1814.7
1989	1849.0	1946.5
1990	1836.7	2029.5
1991	1818.7	2094.0
1992	1792.3	2197.7
1993	1792.5	2305.9
1994	1737.9	2412.0
1995	1678.9	2515.8

Source: Department of Statistics, Malaysia

Table 3.2 Average Price of Rubber and Crude Palm Oil from 1986-1995

Year	Rubber (RM/tonne)	Crude Palm Oil (RM/tonne)
1986	2084.20	579.00
1987	2486.70	774.00
1988	3099.90	1029.00
1989	2617.20	822.00
1990	2333.70	750.00
1991	2267.30	837.00
1992	2189.20	917.00
1993	2130.20	890.00
1994	2949.20	1284.00
1995	3936.10	1473.00

Source: Department of Statistics, Malaysia

One of the main reasons for the decline of the rubber industry is the declining price of natural rubber. The stiff competition from synthetic rubber, coupled with the high levels of production, caused prices to decline. During this period the price of crude palm oil in the world market was high. The high price of crude palm oil together with the quick return on investment made oil palm an attractive crop to estate owners. Oil palm fruits can be harvested within 3-4 years of planting, compared to rubber trees which can be exploited around 4-5 years after planting. Further, the cost of producing palm oil is much less than rubber. The average production cost of rubber is about RM1600-RM2000 per tonne while that of crude palm oil is RM400-RM500 per tonne.

3.4 STRUCTURE OF THE NATURAL RUBBER INDUSTRY

The natural rubber industry in Malaysia can be classified into two main sectors; estates and smallholdings. The classification between estates and smallholdings is determined by the size of the land planted with rubber trees. An area of 40 hectares or more planted with rubber trees is categorised as an estate. An area of 40 hectares or fewer planted with rubber trees is classified as a smallholding.

3.4.1 Estates

Rubber estates are the primary producers of rubber in Malaysia. They are highly organised and managed efficiently. Large companies may own up to 30-40 rubber estates dispersed all over the country. Each of these estates may average around 1000 hectares or more. Table 3.3 shows the number of rubber estates, size of planted area, production of rubber, and yield of rubber per hectare from 1986-1995.

Table 3.3 Number of estates, size of planted area, production and yield of rubber from 1986-1995.

Year	No. of estates	size (ha)*	production (tonne)	yiled per ha (kg/ha)
1986	1519	399,351	497,531	1492
1987	1481	381,482	490,587	1497
1988	1448	371,094	481,071	1481
1989	1414	361,007	432,775	1371
1990	1367	348,749	396,612	1329
1991	1293	333,410	366,249	1338
1992	1189	314,133	332,971	1332
1993	1133	292,516	296,298	1293
1994	1075	274,982	271,307	1417
1995	1022	254,341	242,612	1241

* includes immature area

Source: Department of Statistics, Malaysia

Rubber estates can be classified according to the characteristics of their ownership and management. There are three main classes of ownership and management: centrally managed estates; medium and large independent estates; and small independent estates (Barlow, 1978). The three types of estates are briefly discussed below.

3.4.1.1 Centrally Managed Estates

Centrally managed estates are mainly medium or large size estates. The medium size estates are usually 202-404 hectares in size, while the large estates are 405 hectares or more in size. These estates are owned by large public and private companies. Large plantation companies centrally manage their rubber estates through a plantation agency. The plantation agency is a managerial body that makes strategic and operational decisions for all the estates under its management. The agency appoints the estate managers and staff, allocates the estate budgets, and devises planting and human resource policies. As the estates under its management are dispersed across a wide geographical area, the agency controls and monitors the operation of all its estates through monthly progress reports. This reports are sent by estate managers to the headquarters. The agency also has a team of Visiting Agents who are senior managers at the agency and make periodic visits to the estates to review their operations.

Most private companies that own rubber estates in Malaysia manage their estates through an agency. Among them are Sime Darby, Guthrie, Kuala Lumpur Kepong Berhad, to name but a few. Public companies owned by government agencies also have centrally managed estates. One of these government agencies is RISDA (Rubber Industry Smallholders Development Authority). The rubber estates belonging to RISDA are centrally managed by its management agency called, Estate Pekebun Kecil Sendirian Berhad or in short form, ESPEK. Nine rubber estates managed by ESPEK comprise the sample for the research reported in this thesis. The following chapter on research methodology discusses ESPEK and the rubber estates it manages in more detail.

3.4.1.2 Medium and Large Independent Estates

These estates are owned mainly by private companies or through partnerships. The majority of these independent estates are owned by members of the Chinese community in Malaysia. These estates are usually managed as independent units and are managed by members of the owners' families. The number of independent estates owned by private companies may be quite small and they will tend to be located close to one another.

3.4.1.3 Small Independent Estates

These are small estates, usually comprising fewer than 202 hectares. They are usually owned by separate families or through partnerships, which is the more common form of ownership. The owners are people with small businesses such as proprietors of general stores, as well as professional people such as doctors and lawyers. These estates are managed as an independent unit. Due to their relatively small size, estates are usually managed by a senior field conductor, who though not a manager, has extensive experience in the operation of an estate. Absentee owners, such as doctors and lawyers, often employ visiting managers to make periodic inspections of an estate to ensure that it is being properly managed.

3.4.2 Smallholdings

An area planted with rubber which is less than 40 hectares is categorised as a small holding. Smallholdings are by far the most common form of rubber cultivation in Malaysia. In 1995 the total area planted with rubber comprising smallholdings was 1,424,600 hectares. Though by definition a smallholding is one which is less than 40 hectares, the vast majority of smallholdings in Malaysia are normally less than four hectares.

There are two types of smallholdings. The first consists of individual enterprises which are wholly owned and under the control of individuals or their families. This type of smallholding is typically a small plot of land planted with rubber which provides the main livelihood of its owners. The majority of the smallholdings are primarily owned by the Malay community. Some smallholdings are also owned by the Chinese and Indian communities. Most are located in rural areas of the country. In order to raise the socio-economic status of the smallholders, the government assists them through the Rubber Industry Smallholders Development Authority (RISDA).

The second type of smallholding consists of land development schemes undertaken by the government, through two main agencies: the Federal Land Development Authority (FELDA) and the Federal Land Consolidation and Rehabilitation Authority (FELCRA). The former was established to undertake a programme of opening new land for cultivation of commercial crops such as rubber and oil palm. Landless rural dwellers are brought into newly opened land schemes. Each family is given a plot of land of around four hectares, planted mainly with rubber or oil palm and sometimes other cash crops. The authority provides the management expertise while the families provide labour for their new plot of land. FELDA exercises control over the settlers until they have repaid the initial cost of developing the land. The title of the land then is passed over to the settler. Besides managing the new land development schemes, FELDA also purchases the crop from the settlers.

The Federal Land Consolidation and Rehabilitation Authority was established to assist smallholders who own smallholdings on the fringes of major cultivation areas. The role of this authority is generally confined to clearing the smallholding of undergrowth, providing good planting materials, and supplying fertilisers and chemicals. FELCRA also provides limited supervision to the smallholders to ensure that they can sustain a decent livelihood from cultivation of rubber on their individual plot of land.

3.5 PRODUCTION OF NATURAL RUBBER

The technology of producing rubber is basic to the development of the industry since its founding in the late nineteenth century. The technology of producing rubber has steadily progressed over the years. The Rubber Research Institute of Malaysia (RRIM), established in 1925, has played a key role in the progress of the industry. The RRIM was instrumental in developing high yielding rubber trees and new techniques in the exploitation of rubber trees. Both these advances have enabled productivity in rubber estates and smallholdings to increase rapidly. In the next section basic elements of rubber production are discussed. These include the botany, breeding and selection, exploitation, and upkeep of rubber trees (Barlow, 1978).

3.5.1 The Botany of the Rubber Tree

Rubber trees are tall slender trees averaging 25-30 metres high when fully mature. The branches of the tree extend upwards diagonally to a height of around 3 m and forms the canopy of the tree. Figure 3.1 shows rows of mature rubber trees in a rubber estate. A rubber tree normally takes 5-6 years to mature from planting. However advances in the propagation of rubber trees have reduced this period to about 4-5 years. A mature rubber tree will lose or 'winter' its leaves at least once a year during dry weather conditions. In Malaysia this usually occurs from February to April. During this period the yield of rubber declines substantially.

Figure 3.1 Rows of Mature Rubber Trees in a Rubber Estate

Source: Colin Barlow (1978), p. 122

Rubber trees begin flowering at 5 -6 years, though in the fast maturing tree, this occurs a little earlier. The fertilised flowers form into a ripe fruit in about 5 months. When the fruit matures, it bursts and throws its contents of three seeds to the ground. The bark is the most important part of the of the rubber tree. The bark contains vessels which produces a white milky substance called latex. The bark or outer tissue comprises several layers. Adjoining the hard inner wood is the cambium and on the outside of the cambium is the soft bark which contains the latex vessels.

Rubber trees requires an equable, warm, and humid atmosphere for optimum growth. The trees need an even temperature of 24-28° C and a well distributed annual rainfall of at least 1800-2000 mm. Rubber trees grow well up to an altitude of 300 m above sea level. Given proper drainage, they flourish on most types of soil.

3.5.2 Breeding and Selection

High yielding rubber trees have been produced through a process of systematic breeding and selection. In the early years of the industry, rubber trees were produced from seedlings which were bred through cross-fertilisation of male and female organs. The rubber trees were then propagated through vegetative methods involving the multiplication of the stock from a particular mother tree. Through this method rubber trees from seeds of high yielding trees were bred in nurseries. One disadvantage of rubber trees raised from seedling stock is that the trunk of the tree is not uniform. It is broad at the bottom and becomes smaller at the top. This affects the yield of the tree as less bark is tapped during the initial productive phase of the tree and gradually increases as tapping reaches the bottom of the tree.

An advance was made in the breeding and selection of rubber trees through a technique called bud grafting. In this method buds from high yielding rubber trees were grafted on to seedling stocks. Rubber trees produced through this method are called clones.

An important feature of clone trees is the uniform size of the trunk from the bottom to the top of the tree. A further improvement was made to the budding technique called green budding. In this technique, a small dormant bud slip is cut from the axial of a leaf stalk in young green budwood. The bud slip is then placed into a space on a seedling stock, created by removing a flap of bark. The bud slip is then bound to the seedling stock using polythene strip. After three weeks the polythene strip is removed and the seedling is severed a few centimetres above the budpatch. The grafted bud is then allowed to grow into a new rubber tree.

Another technique of breeding and selecting high quality rubber trees is called crown budding. In this technique green buds from trees with a superior crown (canopy) are budded on to clones which have high yielding trunks but whose crowns are susceptible to wind damage. This technique of breeding produces clones that are both high yielding in rubber as well as able to withstand strong winds, thus minimising trunk damage.

In most rubber estates breeding of rubber trees takes place in a well established nursery on the plantation. The young seedlings are planted in the nursery at least a year in advance of field planting. Seeds are first germinated in the nursery. When the seedlings are well established, they are budgrafted with green budwoods taken from selected clones. The budded stumps are then left to grow in the nursery for at least 12 months before it is transplanted in the field.

The propagation of rubber trees through breeding and selection has produced some superior clone materials. Much of the breeding and selection work has been carried out by RRIM. Among some of the superior rubber clones produced since the 1970s are RRIM600, RRIM705, RRIM901, RRIM908, RRIM916, PB235, PB260, PB326, and PB328.

3.5.3 Planting

There are two types of planting: new planting and replanting. New planting is normally undertaken in newly opened virgin jungle land. The jungle is cleared of all trees, shrubs and undergrowth. The land is then prepared for planting. This involves ploughing the land and removing all wood stumps and roots. In hilly terrain, terraces are cut into the hillside. When this is done, the land is then marked to determine the position of the planting points. Cover crops, a form of legume, are planted over the cleared land. The cover crop minimises land erosion and leeching of fertilisers. The young rubber trees raised in the nursery, which are about 12 months old, are then transplanted to the field. Planting in the field is normally carried out around August to September, before the onset of the rainy season. In replanting, old rubber trees are felled and replaced with new rubber trees. Then the same process of clearing the land, planting cover crops, marking the planting points and transplanting to the field and planting, as described above, is carried out.

An important factor in planting rubber trees involves determining the density of the number of new rubber trees planted on a hectare of land. The density of planting is normally in the region of 350-400 trees per hectare. In more advanced planting methods, the density may reach up to 450 trees per hectare. By the time the trees are mature, the density will have decreased to about 300-350 trees per hectare through wind damage, disease and other natural causes. The density of planting is crucial in influencing the yield of rubber per hectare of land. The greater the number of trees planted on each hectare, the higher the yield per hectare will be, as there are more rubber trees to tap. However the yield per tree may decline, as each individual tree may suffer greater competition from other trees for light and nutrients. The overcrowding of trees will affect the amount of latex produced by a rubber tree and subsequently the amount of rubber in the latex.

Rubber trees planted in the field usually takes 4 to 5 years to mature. New advances in breeding however have reduced this time. During this period, the immature rubber tree is regularly pruned in order to produce a clean and straight trunk and to minimise branching. The rubber trees are ready for exploitation when the girth of the tree has reached 50 cm. The point of first incision is normally opened on the virgin bark at around 125-150 cm above ground level. This height is approximately the shoulder height of an average man or woman.

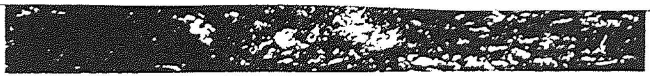
3.5.4 Exploitation

Exploitation of rubber trees for latex involve the controlled wounding of the latex vessels in the bark. The action of tapping cuts across the latex vessels at an angle of 25^{o}-30^{o} from high on the left of the tree to low on its right. This allows the maximum number of latex vessels to be severed per centimetre of incision. Figure 3.2 shows the various tapping knives used to tap rubber trees. The latex produced during the first tapping is small in volume, concentrated and viscous. However, during successive incisions, a larger and more dilute flow of latex which contains a greater overall quantity of dry rubber will be produced. Latex as it emerges from a cut is a colloidal suspension of particles in an aqueous solution or serum. The particles of latex are mainly rubber hydrocarbons which form between 25-45 % of its volume. The normal dry rubber content (drc) in latex is between 28-30 percent of the weight of the latex. Figures 3.3 and 3.4 shows the action of tapping a rubber tree, and latex emerging from a cut respectively.

Figure 3.2 Tapping Knives

source: Colin Barlow (1978), p. 127

Figure 3.3 Action of Tapping a Rubber Tree



source: Colin Barlow (1978) p. 128

Figure 3.4 Latex Emerging from a Cut

Aston University

Illustration removed for copyright restrictions

Source: Colin Barlow (1978), p. 128

One important factor that influences the flow of latex from the tapping cut is the hydrostatic or tugor pressure within the latex vessels. Tugor pressure in the latex vessels of rubber trees is usually highest during the night and early morning and lowest during midday when the trees experience heavy transpiration. As greater pressure in the latex vessels results in the expulsion of a larger volume of latex, tapping is always carried out during the early morning. When a cut is opened during the morning the latex will flow progressively for around 1-3 hours. After that the latex vessels will become plugged at the severed end. When the same cut is tapped again, the latex flow will resume. In rubber estates, the same tree is tapped again only after the tree has been rested and that depends on the frequency of tapping. The frequency of tapping may be alternate days, every third day, or every fourth day. Frequency of tapping affects the production of latex. If the tree is tapped too frequently, the tree may be susceptible to a problem called dryness, whereby the tree stops yielding latex after a period of intensive tapping. However if the tree is tapped too infrequently, then this becomes economically unsustainable to the estate. Most rubber estates generally employ the alternate day system which is denoted as d/2. In this system a rubber tree is tapped every second day. During labour shortages, which are a serious problem in many of the estates, a third daily system (d/3) is practised. In this system a tree is tapped every third day.

Rubber trees are generally tapped on a half spiral system which is denoted as S/2. In this system the bark of the rubber tree is cut on one half of the circumference of the tree. This cut is then progressively tapped according to the frequency of tapping. Therefore in an intensive tapping system a tree could be tapped on half spiral every alternate day. The notation for this tapping system is called S/2, d/2. There are other tapping systems used in rubber estates. Appendix 4 lists some of the tapping system notations.

During each tapping a rubber tapper shaves 1.6 mm of bark from the tree. When a tree is tapped on alternate days, the total bark consumption will be 22-25 cm over 155 tappings per tree for 310 working days in a year. Based on this bark consumption, one half of the spiral from the point of first incision (125-150 cm) to the bottom of the tree takes approximately five years to complete tapping. When this happens, the rubber tapper will switch to the other half of the spiral and commence tapping from the new point of incision at 125-150 cm from the bottom of the tree. During the second five years of tapping, the bark on the first half of the spiral will regenerate. When the bark on the second half of the spiral has been exploited, the tapper will revert to the regenerated bark of the first tapping. The same will happen on the regenerated bark of the second tapping. A rubber tree can be tapped for approximately 20 years on virgin and regenerated bark. After 20 years, virgin bark above the 125-150 cm mark of first incision is tapped. This is called upward tapping and the bark is cut in a V shape for another 5 to 10 years using a long tapping knife and a ladder.

In recent years RRIM have begun to introduce new less intensive tapping methods, such as quarter spiral (S/4) on low frequency tapping (d/4 and d/6) and Controlled Upward Tapping (CUT) method. However these systems are still at the experimental stage and their effect on the yield of rubber trees has yet to be determined. The majority of rubber estates in Malaysia use the half spiral system on d/2 or d/3 frequency.

There are two aspects that are closely monitored by management during tapping activity: depth of tapping and bark consumption. Depth of tapping involves the penetration of the tapping knife into the bark. The tapping knife has to penetrate deep enough for most of the latex vessels to open up. When there is insufficient depth, many latex vessels are not severed and this produces a reduction in the latex yield. During tapping, if the tapping knife penetrates the cambium, it will cause wounding to the bark. This will cause gaps on the bark during regeneration and the tapping surface will become uneven. This will make subsequent tapping on the regenerated bark difficult and will affect the production of latex. When wounding occurs to the cambium, special grease is applied by the rubber tapper to the affected area to heal the wound quickly. Bark consumption involves the amount of bark shaved during tapping. A rubber tapper shaves 1.6 mm of bark during each tapping. Thick shavings of more than 1.6 mm do not necessarily yield more latex. On the contrary, they reduce the economic life of the rubber tree. In order to control bark consumption, the management of rubber estates require every tapper to put a spot mark at the last tapping of every month. The length between the current and the previous spot mark is measured to ensure it does not exceed at least 2.0 cm in any one month.

Finally, chemical stimulants are widely used to boost latex production. The most widely used stimulants are ethylene based chemicals. Ethylene gas stimulates the flow of latex, thus allowing more latex to flow during tapping. The stimulant is applied on the bark below the cut usually on a monthly basis. With the help of stimulants, estates are able to obtain more latex from rubber trees. Stimulants are widely used on regenerated bark. They are also used in conjunction with less intensive tapping systems.

3.5.5 Upkeep

The upkeep of rubber trees is an important aspect of the rubber production. The various activities involved in the upkeep of rubber trees are weeding, manuring and the control of pests and disease. These activities are briefly described below.

3.5.5.1 Weeding

Weeding is the removal of plants and noxious weeds that are harmful and detrimental to the growth of rubber trees, as well as those which impede the work of a rubber tapper. The rows and inter-rows of rubber trees have to be kept clear of noxious weeds and unwanted plants. If left unchecked noxious weeds will compete with the rubber trees for nutrients and will stunt their growth. Woody plants that gain a foothold on the strip of rubber trees can affect the work of the rubber tappers, as they will impede the movement of the tappers from one tree to another, thus hindering their work. Rubber trees will be left untapped, affecting the output of latex for the estate and also the earnings of the rubber tapper. Therefore in order for the rubber trees to grow well and the trees to be tapped regularly, all noxious weeds and unwanted plants have to be weeded regularly, either manually or chemically.

3.5.5.2 Manuring

Manuring is the application of fertilisers to the rubber trees. The fertilisers supplement nutrients that are already found in the soil but are not available in sufficient quantity for the healthy growth of the rubber trees. The main elements provided by the fertilisers are nitrogen, phosphorus, and potassium. The application of fertilisers is usually carried out manually. Leaf samples are taken annually by agronomists and analysed to determine the quantity and type of fertilisers to be applied to the trees in the following year.

3.5.5.3 Control of Pest and Disease

Pest problems are a major concern in rubber estates. Among the more serious pests are elephants which could break and uproot young trees and strip the bark from older ones. Monkeys are also a major pest. They have a tendency to destroy the young saplings of immature trees, as well as the plants in the nursery. Another example of pests that could damage a rubber tree are cattle, which are commonly found on rubber estates.

Rubber trees are also very prone to diseases. Most of the common diseases in rubber trees are caused by parasitic fungi. Among the most dangerous diseases that afflict rubber trees are root diseases. Other major diseases are leaf disease, such as leaf blight, and stem disease, such as pink disease. These diseases are contagious and if not checked and treated will destroy the rubber trees and bring economic ruin to the estate.

3.6 MANAGEMENT OF RUBBER ESTATES

The management of rubber estates will be discussed from two perspectives. First, the overall management of all rubber estates belonging to a company will be examined. Second, the management of an individual rubber estate will be outlined.

3.6.1 Overall Management of Rubber Estates

The majority of rubber estates in Malaysia are centrally managed. Companies that own many rubber estates set up management bodies or planting agencies to manage these estates, which are geographically dispersed across the country. Different companies have different management structures. However the basic key functions that are important to any centrally managed company are the plantation division, factory division, marketing division and administration and finance division. The following is a brief outline of the activities of these divisions.

3.6.1.1 Plantation Division

The plantation division is responsible for the overall operations of all the rubber estates in the company and sets the planting policies that are adopted by all the rubber estates. Such policies may relate to the type of rubber clones planted on the estate; the establishment of rubber nurseries; tapping policies; maintenance schedule of rubber trees, including the type and quantity of chemicals and fertilisers used; and how the latex is treated and despatched to the rubber factory.

The plantation division monitors the operation of the rubber estates through monthly progress reports sent by the individual estates to the headquarters. The reports include information on the amount of rubber exploited each month, the labour out-turn in each month, which also includes information on absenteeism among the work force; all field maintenance, such as weeding, manuring and pest and disease control carried out each month; and operational details of all vehicles and machinery on the rubber estates. The plantation division will review this report and give its comments to the managers of the estates, indicating whether the operations carried out for the month are satisfactory and on schedule. If they are not satisfactory, for example, targets not met, then appropriate actions are suggested.

The plantation division has a team of planting advisers, also called visiting agents, who visit the estates under their charge regularly. Each visiting agent may have responsibilities for a number of estates. The role of the visiting agent is to monitor the operations of the estates to ensure that estate managers are meeting all the targets established and are keeping the estate's operation within its budget. The visiting agent also acts as a 'troubleshooter' in the event of a crisis in the estates, such as labour disputes, crop failures, or damage to plants, vehicles and machinery.

3.6.1.2 Factory Division

The factory division is responsible for the operations of all rubber factories belonging to the company. Most big companies have rubber factories on rubber estates. The rubber factory processes the latex from the estate into various form of rubber, such as latex concentrate, rib-smoked sheets or creep rubber. Not all rubber estates have a factory on their grounds. A rubber factory may be established to process latex from one or more estates that are located near one other. Besides processing latex from its own estates, a factory may also purchase latex from neighbouring estates belonging to other companies.

3.6.1.3 Marketing Division

The marketing division is responsible for the sale of the rubber produced by the company. It enters into a contract to sell rubber to major local and overseas buyers. The marketing division monitors the output of latex and rubber from the estates and the production of rubber from the factories. It then sells it to its customers. Rubber produced at the factory is then distributed from the factory to the local customers. Where the rubber is destined for export, the division will make the necessary arrangements with shipping agents for the despatch of the consignment to its overseas customers.

3.6.1.4 Administration and Finance Division

The administration division handles all other matters related to the management of rubber estates. This includes human resource policies such as wages and salaries, employee leave, and provision of basic amenities on the estates. Besides that, the division is also responsible for matters related to land title and tax related to it, insurance of all vehicles and machinery on the estates, and legal matters related to the estates such as labour disputes and cases involving an industrial tribunal.

The finance division handles all the financial aspects of estate management. Here the division monitors the financial performance of the estates to ensure they keep their operations within budget. The division also undertakes on-site auditing of the estate's accounts to ensure no financial irregularities occur.

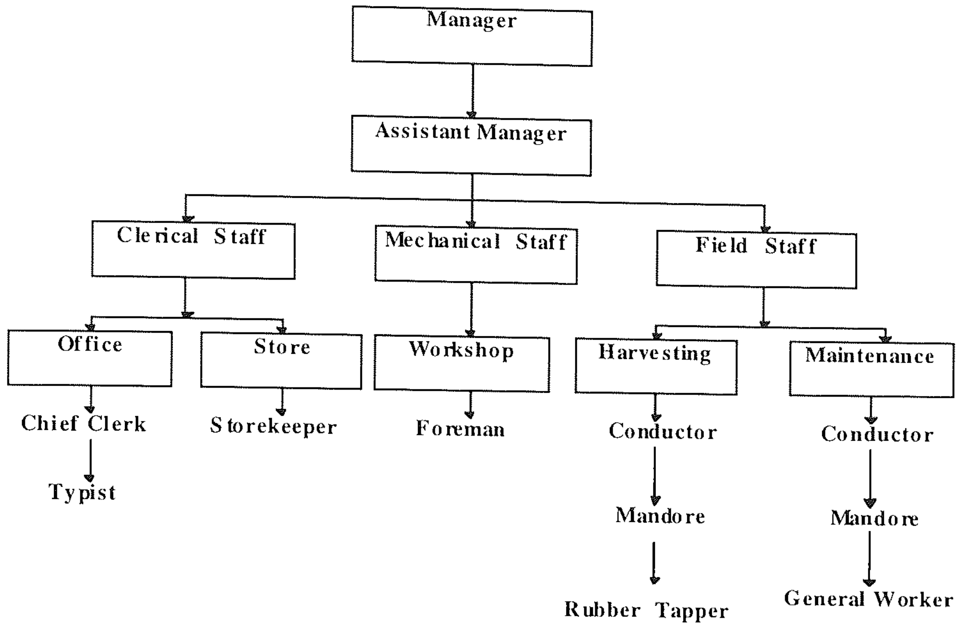
3.6.2 Management of an Individual Rubber Estate

This section discusses the management of a rubber estate. First it looks at the organisational structure of a rubber estate. Then it discusses the activities involved in managing a rubber estate.

3.6.2.1 Organisational Structure of a Rubber Estate

The organisational structure of a rubber estate is shown in Figure 3.5. The management of a rubber estate is the overall responsibility of an estate manager. The estate manager lives and work full-time on the plantation. He is sometimes assisted by one or two assistant managers. The number of assistant managers employed in the rubber estate is based on the size of the estate. In general, an estate of less than 1000 hectares does not have an assistant manager and is wholly managed by the manager. But an estate that is over 1000 hectares usually has one assistant manager.

Figure 3.5 Organisational Structure of a Rubber Estate



Generally every increase of 1000 hectares requires an additional assistant manager to assist the manager in running the estate. The manager and assistant managers comprise the management team.

The management team is assisted by two sets of staff: the field staff and the clerical staff. The field staff consist of field conductors who supervise the daily work of harvesting crop (exploiting the rubber trees) and maintaining them. The conductors are assisted by a team of mandores (field supervisors). Below the mandores are the rubber tappers and general workers. The job of the rubber tappers is to work on the rubber trees, while that of the general workers is to maintain the upkeep of the rubber trees.

The clerical staff comprise the office administration staff and the storekeeper. The role of the office administration is to maintain all the estate records and to correspond with the headquarters, suppliers and government agencies. The storekeeper's function on the other hand is to keep proper records of the movement of all stocks of chemicals, fertilisers, and utensils used on the estate. Finally, the function of the foreman is to maintain in good working order all the vehicles and machinery, such as tractors, trailers, and lorries belonging to the estate.

An interesting characteristic of personnel employed in a rubber estate is that all managers, assistant managers, field conductors and tapping mandores are male.

3.6.2.2 Operational Activities Involved in Managing Rubber Estates

There are several key operational activities involved in the management of a rubber estate. These operational activities can be categorised into two functions: harvesting and maintenance of rubber trees.

3.6.2.2.1 Harvesting Rubber Trees

Harvesting rubber trees involve the exploitation of all mature rubber trees for their latex. On average there are 300 rubber trees in a hectare of land. Therefore an estate with a size of 1000 hectares will have approximately 300,000 trees. The rubber trees are classified as mature and immature trees. Mature trees are those trees that are currently being exploited for their latex. Immature trees are those trees that have not achieved the necessary girth for exploitation. An established rubber estate may either consist of all mature trees or of a mixture of both mature and immature trees.

Rubber tappers are employed by the estate to exploit rubber trees for their latex. Each rubber tapper works on approximately 500 trees a day, which is called a tapping task. The number of trees in a tapping task assigned to a tapper is based on the number of cuts on the tree. Generally, each tree has only one cut, mainly a half spiral cut. However in older trees a tapper may work on two cuts, that is an upward V cut and a half spiral basal cut at the bottom of the tree. Where a tree has two cuts, the number of trees the tapper works on may be half the usual number of 500 trees. In hilly and difficult terrain, the number of trees with one cut worked by the tapper may be slightly less than 500 trees. In areas with new trees that have just been opened for tapping, a tapper working in that area will be assigned 600 trees. The extra trees are to compensate for the lower yield produced by new trees. Appendix 5 shows an example of the maximum task size set out in an agreement between management and rubber tappers.

The number of tapping tasks assigned to a rubber tapper is based on the frequency of tapping. Where the frequency of tapping is alternate days (d/2) then the tapper will have two tapping tasks. However if the tapping frequency is three days (d/3), then the tapper is assigned three tapping tasks. Therefore, if the tapping frequency is high the number of tasks is low. Conversely, if the tapping frequency is low then the number of tasks assigned to the tapper will be high.

The assignment of the tapping task is carried out by the field conductor. Once a task has been assigned, the tapper will only work on that task. Tapping tasks are normally distributed evenly among the tappers. If an estate has both hilly and flat terrain, then the tapper will be assigned tasks on both types of terrain. The conductor, with the help of the mandore, regularly does re-tasking to ensure the number of trees tapped by the tappers does not fall below the stipulated number of trees the tapper must tap. This can happen for instance when the trees are damaged by strong wind or through diseases. Re-tasking is also done when an estate changes its tapping system, such as from half spiral to quarter spiral.

The management keeps a daily record of all the tasks tapped, the quantity of latex and scrap rubber obtained, and the dry rubber content (drc) in the latex. The task tapped is recorded daily to ensure a task is not over or under exploited. Latex and scrap rubber obtained by a tapper is recorded daily by the conductor with the help of the mandores. The latex is first weighed and its weight recorded in a crop register. A small amount of the latex is taken to determine the dry rubber content of the latex. The dry rubber content in the latex is measured by an instrument called a metrolex. The amount of dry rubber content in the latex as measured by the metrolex is used to calculate the amount of rubber obtained by the tapper from the latex harvested in the day. In some rubber estates the dry rubber content is measured by another method called the 'chee' method. In this method a small amount of latex is taken from the tapper's daily harvest. The latex is then quickly coagulated by the mandore using a chemical. The coagulated latex is then pressed and allowed to dry for a day. The dried strip of rubber is then weighed. The weight of the rubber is used to calculate the amount of rubber in the latex harvested by the tapper on the previous day.

Latex harvested by all the rubber tappers in a day is stored in a large tank at the reception station. The estate management must ensure that this latex does not coagulate until it reaches the rubber factory. The field conductor is required to apply ammonia gas to the latex to prevent it from coagulating until it reaches the factory. The latex is transported to the rubber factory during the same day by a tanker lorry to be processed into intermediate rubber.

3.6.2.2.2 Maintenance of Rubber Trees

Rubber trees need to be well maintained in order for them to produce latex throughout their life spans. As mentioned earlier, among the maintenance activities that need to be carried out are weeding, manuring and pest and disease control. Additionally, for immature rubber trees, the trees have to be regularly pruned to ensure they produce a smooth trunk. All these activities cannot be carried out at the same time. Therefore the management have to plan these activities properly so that they can be accomplished within the stipulated time.

The manager prepares a schedule for all maintenance activities for the year and the assistant manager and field conductors implement them. The planning and execution of these maintenance activities are constrained by many factors. The main constraint faced by the estate is availability of labour. Generally the maintenance activities are carried by the general workers employed by the estate. However due to the limited supply of labour and the extent of the area that needs to be maintained, certain maintenance work, such as chemical weeding, is done by private contractors. The management therefore has to monitor closely the work of the private contractors to ensure they carry out the work effectively and do not incur cost over-runs. Planned maintenance work carried out manually by the estate general workers is usually affected by absenteeism. When the general workers are absent from work, the inevitable result is that targets are not met and a backlog of work is created. This will have a 'knock-on effect' on other planned work activities and will distrupt all other scheduled maintenance work.

Other constraints faced by management include storage space for fertilisers used on the estate. Storage space for fertilisers is very limited. Therefore not all the fertilisers required in a year can be stored in the estate. The schedule of delivery of the fertilisers from the suppliers has to be closely co-ordinated with the actual work programme. As bulk purchases of chemicals and fertilisers are handled centrally by headquarters, the managers are under pressure to ensure that all the scheduled work is completed on time. Any delay can affect the delivery and storage of the fertilisers. Further, machinery such as tractors and trailers have to be readily available to transport the fertilisers from store to the field. Any breakdown, which happens frequently on the estates, can have serious implications for the completion of the scheduled maintenance programme. Finally, the weather also plays an important role. During the rainy season any maintenance work carried out, such as spraying weeds and the application of fertilisers, will be wasted, as the rain will sweep away the fertilisers and the chemicals. This will have a detrimental effect on the rubber trees.

The management staff and the field conductors constantly work under pressure as a result of these constraints. In less efficiently managed estates, it is common for management to miss targets for scheduled programmes. This affects the growth of the rubber trees and their yield. This in turn affects the earnings of rubber tappers as they are unable to obtain a good harvest of latex.

3.6.2.3 Labour Relations in Rubber Estates

A rubber estate is a place where people live and work. Most of the workers, including the management staff, live on the rubber estate. It is a self-contained community with houses for workers and staff, a grocery shop, place of worship, a health clinic and, in some estates, a primary school. The manager, besides being responsible for the operations of the rubber estate, is also responsible for maintaining a vibrant and harmonious social life in the estate. The manager also has to display excellent leadership skills and foster good labour relations with his workers in order to earn their loyalty and commitment to the estate. The manager has to use his managerial skills to motivate his workforce to work hard to achieve his operational targets. The manager also needs to work very closely with the workers' local union to resolve any disputes arising from work such as pay, benefits, leave, health facilities, transport, accommodation, and so on. Minor disputes, if left unresolved, could lead to a breakdown in labour relations between workers and management. This ultimately could lead to industrial action by the workers which would be detrimental to the estate and the company.

3.7 EMPLOYMENT IN RUBBER ESTATE

3.7.1 Demography of Employees in Rubber Estates

The rubber industry is a major component of the agricultural sector in Malaysia. The agriculture, forestry, livestock and fishing sectors employed 1,428,700 (18.0%) of the total workforce of 7,915,400 in Malaysia in 1995. The rubber estates employed 53,126 people in 1995 (including tappers, general workers, staff and management). There has been a steady decline in the number of people employed in rubber estates. In 1985 there were 123, 763 people employed in rubber estates. In 1995, this figure has declined by more than half. In 1985, 44% of rubber estate employees were male and 56% female. The proportion of Malays was 32%, of Indians 54% and of Chinese 12%. Two percent of the employees were of other races. Current figures are not available.

3.7.2 Job Characteristics of a Rubber Tapper

The job of a rubber tapper can be characterised as a blue-collar job. The work is very strenuous as it involves moving from one tree to another and climbing up and down terraces, especially in hilly and undulating terrains, tapping rubber trees and collecting latex. On average a rubber tapper will work on approximately 500 trees in a day. Appendix 6 shows the job analysis of a rubber tapper. A description of the various daily activities carried out by a rubber tapper is given below.

3.7.2.1 Attend Muster

The rubber tapper attends muster at 6.00 am every working day. The field conductor takes a roll-call of all the rubber tappers in the estate and makes a note of those who attend and those who are absent for the day in an attendance register called a checkroll.

After the attendance register has been taken, tappers go to their assigned tapping task for the day. The tappers either travel to their tapping task on their own motor cycles or use the estate's tractor which carries them to their tapping task on a trailer. By 6.30 am the tappers will have arrived at their assigned tapping task and commence work.

3.7.2.2 Clean Latex Collection Cups and Spouts

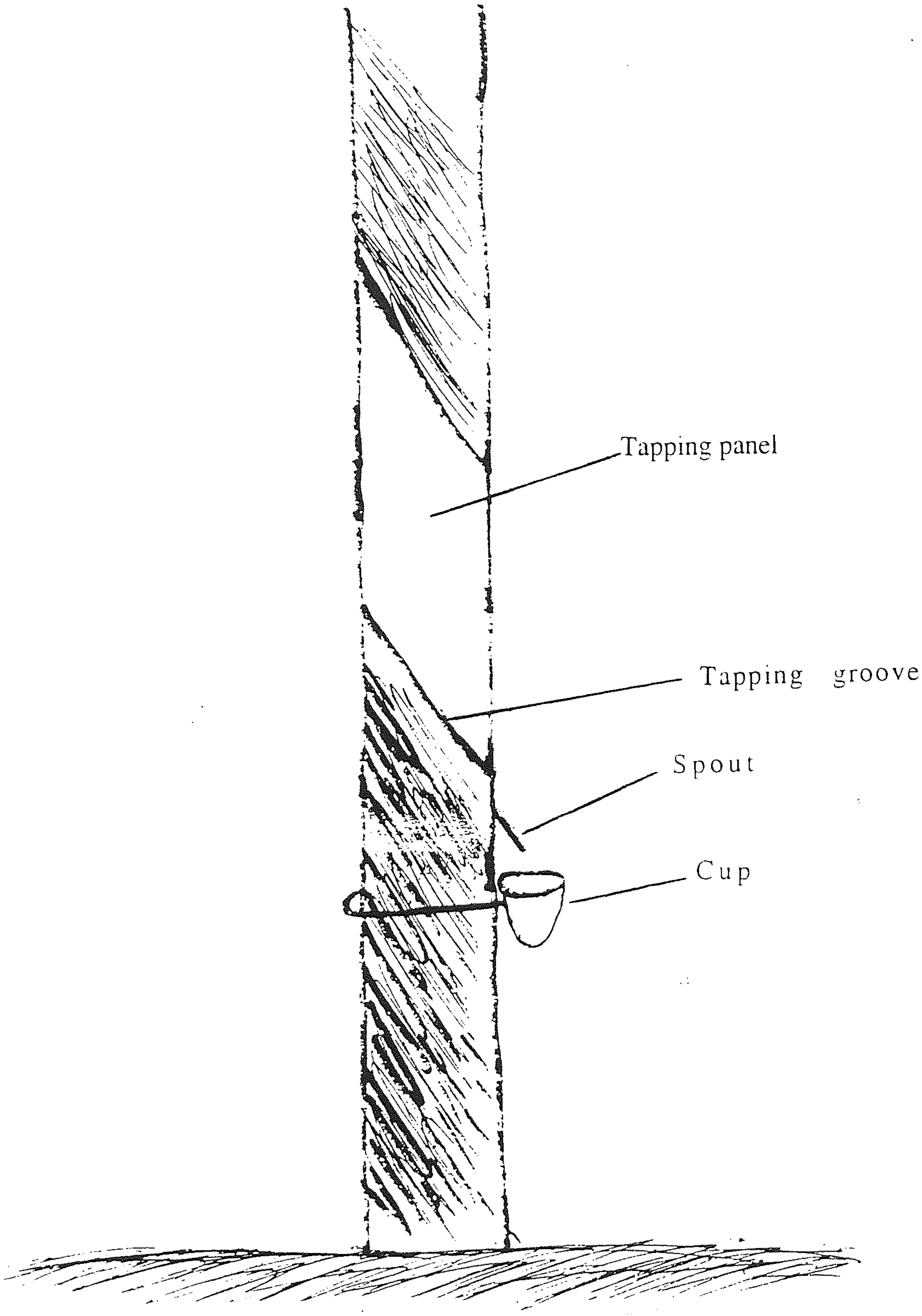
Figure 3.6 overleaf shows a schematic diagram of a rubber tree. The first activity the tapper undertakes is to clean the latex collection cups by removing 'cup lumps' from the cups. Cup lumps are coagulated latex which are formed by 'late dripping' from the previous tapping. During the previous tapping, when the tapper has collected the latex from the cups, some latex may continue to drip into the cup. This latex remains in the cups overnight and coagulates into a lump of rubber. The tapper collects these cup lumps and places them in a plastic bag which is weighed later at the reception station as scrap rubber.

The tapper cleans the spouts through which latex flows into the cups, removing any debris. Hardened rubber on the spout is also removed as scrap rubber. The spouts need to be cleaned to ensure clean and uninterrupted flow of latex into the cup when the trees are tapped.

3.7.2.3 Clean Tapping Panel

The area of the tree trunk in which the tapper works on a rubber tree is called the tapping panel. The tapping groove is the area on the panel where the tapper shaves the bark to harvest the latex. At the tapping groove, the tapper removes hardened rubber called 'tree lace'. The tree lace is a strip of scrap rubber which forms when the latex vessels stop producing latex during the previous tapping. The tapper removes this tree lace and places it together with the other scrap rubber.

Figure 3.6 Schematic Diagram of a Rubber Tree



3.7.2.4 Taping Rubber Trees

When the above activities has been completed the tapper begins to tap the rubber trees. The tapper uses a special tapping knife called the Jebong knife (see Figure 3.2) to shave a thin layer of bark at the tapping groove. After tapping a tree, the tapper quickly moves to the next tree in the row and repeats the same tapping activity. This activity is repeated until all the trees in the tapping task are completed. During tapping the tappers must ensure that they do not press the knife too deeply into the bark, as it will wound the bark by damaging the cambium of the rubber tree. When tappers make a wound to the bark, they must apply a special grease to the affected area of the bark to ensure that it heals quickly. During tapping the tappers also must ensure they do not shave off more than 1.6 mm of bark during each tapping. The tapper usually completes tapping all the rubber trees in the tapping task by 10.00 am. When the tapping is completed, the tapper takes a break for about one hour. Tappers normally have a small meal during this time.

3.7.2.5 Latex Collection

At around 11.00 am, the tapper commences the latex collection. By this time the latex cups are already filled with latex. Carrying a bucket, the tapper moves from one tree to another, lifting the latex cups and pouring the contents into a bucket. When the bucket is almost full, the tapper transfers the latex into a churn which is placed by the roadside close to the tapping task. This activity is repeated until the latex from all the trees has been collected. The tapper then secures the lid of the churn tightly to ensure debris does not get into the churn and contaminate the latex. The cup lumps and other scrap rubber which has been placed earlier in a plastic bag are secured tightly with string. The latex collection activity is usually completed by the tapper by around 12.00 noon.

3.7.2.6 Transport Latex and Scrap Rubber to Reception Station

The churn filled with latex and plastic bags containing scrap rubber are transported either by motor cycle, or by tractors using a trailer, to a reception station for weighing. The reception station is a small shed where the tappers congregate to have their latex weighed and delivered to the estate. At the reception station there is a weighing machine, a huge metal tank to store the latex, and a cylinder of ammonia gas. The field conductor, assisted by a mandore, supervises the weighing of the latex and scrap rubber which commences at 1.00 p.m.. When the latex and scrap rubber have been weighed, they are then recorded into the crop register under the name of the tapper. A sample of the latex is taken by the mandore to measure the dry rubber content by using a metrolex or chee method. The amount of dry rubber content in the sample of latex is then used to determine the amount of rubber in the latex produced by the tapper for that day.

When the tappers have completed weighing the latex, they then clean their buckets, churns, tapping knife and plastic bags. By 2.00 p.m. the tappers have completed their work for the day.

3.7.2.7 Miscellaneous Duties

There are a number of miscellaneous duties that the rubber tapper has to undertake. At the end of each month, the tapper must place a spot mark on the tapping panel to indicate the amount of bark shaved in a month. The mandore will measure the new mark against the previous mark to determine the bark consumption. The rubber tapper is also required, if instructed by management, to apply stimulants to the rubber trees. The stimulants are applied by brush on the bark just below the tapping grove, at least once a month. The tapper must also inform the mandore or field conductor of any damage to the rubber trees in their tapping task as a result of wind damage or animals.

3.7.3 Overview of the Job of a Rubber Tapper

On the whole a rubber tapper's job is an unskilled one. The only skill requirement of the job is the handling of the tapping knife during tapping activity. A 'skilled' rubber tapper needs agility in handling the tapping knife to shave a thin layer of bark to ensure that the greatest number of latex vessels are severed during the tapping activity. At the same time 'skilled' tappers must ensure that they do not damage the rubber tree through wounding of the bark, which occurs when tappers press their knives too deeply until they damage the cambium.

The skill necessary to handle the tapping knife can be acquired relatively quickly by a new tapper. The management usually provides training for new tappers by allowing them to practice tapping skills on very old rubber trees supervised by a mandore. This training usually takes place for a few days. When the new tapper is comfortable with handling the knife and is able to use it to shave the required amount of bark without wounding the tree, the tapper is recruited first as a reserve tapper. A reserve tapper, also called a *ganti tapper* , does not have a fixed tapping task. Reserve tappers are usually assigned to a task when a regular tapper is absent from work . During periods of acute labour shortages, rubber tappers are recruited and straightaway assigned their tapping tasks. The mandores are then required to supervise closely these new tappers to ensure that they adapt well to their work and to the work environment. Besides the handling of the tapping knife, no other skill is really essential in the job of a rubber tapper.

3.7.4 Wage Structure of a Rubber Tapper

Rubber tappers are paid through a variable piece rate system. According to this system the amount paid to a tapper for the output of rubber produced in a day is based on the price of rubber in the market. Under this wage system, the rubber tapper's daily wages are comprised of three elements: the basic wage, the bonus based on the rubber price and the incentive payment for output above a basic weight of rubber. Table 3.4 shows the price bonus, incentive payment and price of scrap rubber paid according to the various price zones of rubber.

Table 3.4 Price Bonus, Incentive Payment and Price for Scrap Rubber According to the Various Price Zones

Price Zone (RM/kg)	1.60-1.80	above 1.80	above 1.90	above 2.00	above 2.20	above 2.40	above 2.60	above 2.80	above 3.00	above * 3.20
Price Bonus (RM/task)	Nil	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
Incentive above 11kg/task (RM/kg)	0.31	0.35	0.36	0.38	0.41	0.43	0.45	0.47	0.49	0.51
Scrap Rubber (RM/kg)	0.14	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17

* for every RM0.20 increase in the price of rubber above the price zone of RM3.20, an additional price bonus of RM0.20 is paid for each day of work.

In 1996 the basic wage of a rubber tapper was RM10.40 (sterling equivalent: £2.60) for each completed tapping task in a day. A rubber tapper can work on more than one tapping task in a day. For each additional tapping task completed, the tapper is paid an additional RM10.40. The price bonus paid is based on the price of RSS1 grade rubber during each month. The incentive payment for output is based on a basic weight of 11kg of rubber per day's tapping. Based on this the tapper is paid an incentive for the output of every kilogram of rubber produced above 11kg. Almost all the centrally managed estates use this wage system which was designed through a collective agreement between the association of rubber producers and the plantation workers union.

3.7.5 Fringe Benefits Received By Rubber Tappers

There are several fringe benefits received by rubber tappers. These benefits are briefly discussed below.

3.7.5.1 Accommodation

A rubber tapper is provided with free accommodation on the rubber estate. The rubber tappers and their families are provided with a two-or three-bedroom dwelling. Where the estate generates its own electricity and has its own water treatment facility, these amenities are provided free to the tapper. However if these basic amenities are provided through the government supply system, the estate management in some plantations subsidises tappers for the provision of these amenities. Where tappers live outside the estate in their own home or rented accommodation, the tapper is given a housing allowance of RM30.00 per month. Where husband and wives are rubber tappers on the same estate, only one spouse is paid the housing allowance.

3.7.5.2 Health Care

The estate management provides free health care for rubber tappers. Where health care is provided on the estate, the management employs a qualified hospital assistant to manage the estate clinic. In isolated rubber plantations, a visiting medical officer from a nearby government health centre or private practice makes routine visits every week to check on the health of rubber tappers. If the estate is quite close to a town, tappers can go for treatment at a private practice or government hospital. The estate undertakes to pay the medical bills for such treatments. The estate also provides an ambulance service to take seriously ill workers to hospitals for emergency treatment.

3.7.5.3 Crèche

The estate provides a crèche for rubber tappers' young children. The estate employs the crèche supervisor and staff and provides free milk. When the parents go to work in the morning, they leave their children in the crèche and collect them when they return from work in the afternoon. This service is provided free by the estate management.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 INTRODUCTION

This chapter will outline the research methodology used in the study. The chapter will first discuss the rationale for the research by exploring the theoretical and empirical considerations underpinning the research and the need to study rubber tappers. The independent and dependent variables of the research were identified and operationalised in the context of the work behaviour of rubber tappers. A pilot study was then carried out and the results analysed. The considerations to be taken into account in the subsequent larger study, with the inclusion of additional variables, are then discussed. The chapter then provides a brief description of the company and the estates involved in the study. Following this, the selection of the rubber tappers as participants in the study and the process of collecting the data are described. This chapter concludes with an outline of the statistical procedures used to analyse the data and a discussion of the limitations of the study.

4.2 RATIONALE FOR THE RESEARCH

4.2.1 Theoretical and Empirical Considerations

There are relatively very few organisational research studies carried out on sex differences and age differences in job performance and absenteeism. There are even fewer studies that have investigated sex differences in job performance among blue-collar workers using production data. Most of the studies that have examined sex differences in job performance have generally focused on performance evaluations using ratings and rankings, usually by supervisors or managers (Arvey, Landon, Nutting, & Maxwell, 1992; Latack, Josephs, Roach, & Levine, 1987; Pulakos, Oppler, White, & Borman, 1989; Schul & Wren, 1992; Shore & Thornton, 1986; Thompson & Thompson, 1986). Relatively few studies have investigated sex differences in job performance using objective measures such as production records (Inwald & Shusman, 1984; Shye, 1991; Vasil, 1992; Weisman & Teitelbaum, 1987; Wood, 1980) and generally these studies have investigated the job performance of white collar employees such as law enforcement officers (Inwald & Shusman, 1984), physicians (Shye, 1991; Weisman & Teitelbaum, 1987), and academics (Vasil, 1992). One study has looked at the job performance of blue-collar workers doing comparable work in a packaging plant (Wood,1980).

There is thus a dearth of studies investigating the job performance of blue-collar workers using production data. One of the main reasons cited for the dearth of studies comparing blue-collar male and female workers in industrial settings is that very few studies have been able to compare male and female workers doing essentially similar jobs (Loscocco, 1990; Mannheim, 1983). The present research is one of the few investigations examining sex differences in the job performance of blue-collar workers using production data. The blue-collar workers participating in the study are rubber tappers, who, as noted earlier, are basically unskilled workers. The male and female rubber tappers do essentially the same work and both are paid the same piece-rate for work done. This study is different from other job performance studies because it uses production data to compare the job performance of male and female blue-collar workers doing the same job.

The study also investigated sex differences in absenteeism and job satisfaction because both these factors are associated with work behaviour and are related to job performance (Landy & Farr, 1983; Rhodes, 1983). Absenteeism has also been found to be weakly associated with job satisfaction (Nicholson, Brown, & Chadwick-Jones, 1976). There are strong empirical grounds to suggest sex differences in absenteeism and job satisfaction. A consistent finding from research on sex and absenteeism indicates that women tend to be absent from work more often than men (Fitzgibbons & Moch, 1980; Johns, 1978; Markham, Dansereau, & Alutto, 1982; Vanden Heuval & Wooden, 1995). Avoidable absence was also found to be more pronounced for men than for women (Nicholson, Brown, & Chadwick-Jones, 1977). Rhodes (1983) suggested that one of the key reasons for women having higher absenteeism than men is their inability to get to work due to the primary role they play in family responsibilities such as child care. Studies investigating age differences in absenteeism have found avoidable absence to be inversely related to age (Hackett, 1990; Martocchio, 1989; Nicholson, Brown, & Chadwick-Jones, 1977), while unavoidable absence was found to increase linearly with age (Nicholson, Brown, & Chadwick-Jones, 1977). These findings suggest that older employees generally have lower unsanctioned absence compared to younger workers. Nevertheless older workers are prone to be absent from work for longer periods due to sickness or injury. Much of the research on absenteeism has investigated office workers (Garrison & Muchinsky, 1977) and blue-collar manufacturing workers (Nicholson, Brown, & Chadwick-Jones, 1977; VandenHeuval & Wooden, 1995). Therefore it was considered desirable in the present study to examine sex and age differences in absenteeism among blue-collar agricultural workers, namely rubber tappers.

Empirical studies of sex differences in job satisfaction have generally yielded inconsistent findings. Some studies report women have higher job satisfaction (Murray & Atkinson, 1981) while others report men to be more satisfied with work than women (Burke, 1996; Dodd-McCue & Wright, 1996). Yet other studies report that men and women do not differ significantly in overall job satisfaction (Smith, Smits & Hoy, 1998; Weeks & Nantel, 1995). Studies on the relationship between age and job satisfaction have generally concluded that job satisfaction is higher among older workers (Bourne, 1982; Davies & Sparrow, 1985; Rhodes, 1983). Older workers are generally more satisfied than younger workers because they are relatively settled in their work and their expectations of the values and rewards in a job are more realistic. The differences in the findings relating to sex differences in job satisfaction could be attributed to several factors, such as differences in expectations between men and women (Mottaz, 1986); different emphasis on work values (McNeilly & Goldsmith, 1991; Mottaz, 1986; Nieva & Gutek, 1981); differences in personal factors such as education, age, and family status (Mannheim, 1983); or differences in the position in organisational hierarchy (Burke, 1996). The study investigated sex differences and age differences in the job satisfaction of rubber tappers to determine the overall job satisfaction of male and female workers doing a similar job (Loscocco, 1990; Mannheim, 1983). The study also examined the age-job satisfaction relationship of blue collar-workers in the agricultural sector, as relatively little research has been carried out in this area.

A second consideration examined in the present study concerned age differences in job performance, absenteeism and job satisfaction. There are many methodological and practical difficulties encountered in studies of age differences in organisational settings (Griew, 1959; Smith, 1981; Welford, 1958). The participation of rubber tappers in this study is envisaged to overcome certain of these methodological difficulties. First, as noted in Chapter 2, any age comparison of job performance is only likely to be useful when internal transfer rates and turnover are low (Davies, Matthews, & Wong, 1991). In the context of rubber tappers, the recruitment of rubber tappers is entirely external. Rubber tappers usually join an estate as newly hired workers or they are recruited from those who resign from another estate. There is a high level of lateral mobility among rubber tappers in the rubber industry. Rubber tappers leave one estate to join another estate for two main reasons. First, they may leave an estate because of social problems with other workers or they may have disagreements with management regarding work or their welfare on the estate. Second, they may leave an estate because the working conditions in another estate may be better for them. For example, a new estate may have a flatter terrain or younger rubber trees than their current estate. Further, the internal transfer rate is non existent as rubber tappers have no promotional opportunities open to them.

The investigation was conducted on a total sample of rubber tappers from nine plantations (N = 2266). There were 508 rubber tappers (22.4%) who left the estates in 1996. Similarly 335 rubber tappers (14.8%) joined the estates during the same period. Therefore the attrition rate for rubber tappers in 1996 was 7.6%. An examination of the age of the rubber tappers who leave or join an estate revealed that the highest proportion of leavers and joiners were in the 16-29 years age group. In 1996, 38.4% of this age group left the estates. Likewise, 47.6% of rubber tappers from the same age group joined the estates. In the 30-39 years age group, 35.8% left and 31.9% joined the estates. In the 40-49 years age group, 20.2% left and 18.5% joined the estates. Finally for the over 50 years age group, 5.6% left but only 2.0% joined the estates.

A second practical consideration that needs to be addressed in any age comparison of job performance is the requirement for a large sample of workers within different age groups who are all engaged on exactly the same work (Welford, 1958). Welford (1958) suggested that any minor differences in job characteristics may conceal major differences in the demands made on a worker's skills and abilities. An investigation of rubber tappers in this context is appropriate as rubber tappers do essentially the same work regardless of their age. Young and old rubber tappers essentially use the same skills and abilities in the work they perform. Therefore given the large numbers of rubber tappers participating in the study, a meaningful comparison of age differences in job performance may be made.

Finally, Avolio and Waldman (1987) pointed out that an association between age and job performance may result from cohort effects, such as age differences in educational levels. Older cohorts generally have lower educational attainment compared to the younger cohorts. In the context of rubber tappers, a survey of a sub-sample of rubber tappers (N = 166) revealed that rubber tappers have a minimal educational attainment. The majority of the rubber tappers (35.5%) had only six years of formal education. About 20% of the rubber tappers were found to have no education at all. Only three rubber tappers (0.018%) had 11 years of formal education, the average educational attainment of the general population in Malaysia. The educational levels of older and younger rubber tappers in the sub-sample were found to be comparable. Among the young rubber tappers (23 - 40 years), 16.9% had no formal education; 63.9% had 1-6 years formal education; and 19.2% had 7-11 years formal education. Similarly for the older rubber tappers (40 - 56 years), 22.9% had no formal education; 68.7% had 1-6 years formal education; and 8.4% had 7-11 years formal education. Therefore, it can be suggested that age differences in educational level were relatively small among the sample of rubber tappers studied.

Studies investigating age differences in job performance have generally concluded that job performance is influenced more by experience than by age (Giniger, Dispenzieri, & Eisenberg, 1983; Schwab & Heneman, 1977; Sparrow & Davies, 1988). Rubber tappers are essentially unskilled workers. The only necessary 'skill' needed for the job is the ability to manipulate a tapping knife to extract latex from rubber trees. The present research examined whether rubber tappers with longer service, and therefore more experience, performed better than less experienced rubber tappers. Therefore in addition to examining age differences in job performance, the effects of experience (tenure, or length of service) were investigated.

Finally, rubber tappers in Malaysia are of various racial backgrounds. Rubber tappers are predominantly Indian, followed by Malays and a few Chinese. The present study therefore, also investigated whether race interacted with sex, age and experience to affect job performance. Previous research has indicated that race can affect job performance (Landau, 1995; Pulakos,Oppler, White, & Borman, 1989).

4.2.2 Aims of the Study

The present study thus proposed to investigate sex, age, experience and race differences in various aspects of work behaviour among rubber tappers in Malaysia. Specifically, the study aimed to determine whether there are reliable differences in job performance, absenteeism, and job satisfaction between male and female, younger and older, more experienced and less experienced, and Malay and Indian rubber tappers. Further, the study also investigates whether the terrain of the estate and the level of rain saturation in an estate affects individual differences in work behaviour among rubber tappers.

The principal concern of the study was whether sex, age, experience and race significantly affect job performance, absenteeism, and job satisfaction. Further, the study also determined to what extent terrain and rain saturation interacted with sex, age, experience, and race to affect job performance, absenteeism and job satisfaction of rubber tappers.

The study was carried out in nine rubber estates managed by a plantation agency called ESPEK in Malaysia. The study selected one plantation company for the research because of the need to maintain uniformity in the data collected, as different plantation companies have different methods of reporting attendance and production data, which are the two main measures used in the present research.

The findings of this research have practical implications for rubber plantation companies in Malaysia. The main practical implication of the findings concerns the selection of rubber tappers. In an increasingly competitive world market, plantation companies have to constantly strive to increase the productivity of rubber tappers. Rubber tappers who are highly productive and have low absence rates are crucial to the survival and progress of the company and of the industry as a whole. Therefore identifying the productive rubber tappers and instituting the right human resource policies should be the primary concern of estate management in the future.

4.3 RESEARCH VARIABLES

From the preceding discussion on the theoretical and empirical considerations of the research, several dependent and independent variables were identified. The dependent variables investigated were job performance, absenteeism and job satisfaction. The independent variables were sex, age, experience, and race. Two mediating variables were also included: terrain and rain saturation. The rationale for including these two variables are further discussed below (Section 4.4.5). Briefly, these two variables were included because the estates selected for the study have different topographical characteristics and rainfall patterns. It is possible that these variables may influence the work behaviour of rubber tappers.

4.3.1 Independent Variables

4.3.1.1 Sex

The information about the sex of rubber tappers was obtained from the employee personal record and was double checked with the management of the estate.

4.3.1.2 Age

The chronological age of the rubber tapper was determined from the date of birth obtained from the employee personal record. Age was calculated in years and to the nearest month as at 31 December, 1996. For some older rubber tappers, the date of birth in the employee personal record was recorded as the year of birth only. The date and month of birth was missing because these rubber tappers lost all their personal documents during the Second World War and were unable to remember their date of birth precisely. In such cases, the estate management standardised the date of birth as the 1st of January in the year of birth. The rubber tappers were grouped into three age groups. The first age group was 16 - 35 years The second age group was 35 - 45 years and the third age group was 45 years and above.

4.3.1.3 Experience

Two levels of experience were used: truncated and total experience. Truncated experience is the length of service based on the date of employment recorded on the employee personal record. Length of service is truncated because when a rubber tapper quits and joins another estate, his/her service in the previous estate is not included in the service of the new estate. Therefore the service of the rubber tapper in the new estate starts from scratch. Total experience is the truncated experience and the previous experience added together. Details of previous experience were obtained from a questionnaire that was used on a sub-sample of rubber tappers.

Truncated experience was calculated from the date of employment of the rubber tapper. It was calculated in years to the nearest month as at 31 December, 1996. While measuring the truncated experience of rubber tappers in one estate, Inas, it was found that almost all the rubber tappers in that estate had a common date of employment. This date of employment was 1 May 1992. An inquiry was made with ESPEK and it was revealed that this estate previously belonged to another plantation company. The management of this estate was taken over by ESPEK on 1 May 1992 and the rubber tappers on this estate were offered employment with ESPEK on that date. In the analysis for experience, the rubber tappers from Inas were excluded from the analysis because all the rubber tappers had a similar length of service.

Rubber tappers were categorised into two groups based on truncated experience. The two groups were less experienced and more experienced tappers. Using the median experience of 4.87 years, the less experienced group of rubber tappers included all those who had less than 4.87 years of service with the estate. Similarly the more experienced group of rubber tappers included all those who had more than 4.87 years of service with the estate.

Total experience was determined by adding truncated and previous experience. Once again rubber tappers were categorised into less experienced and more experienced groups. Using the median total experience of 13.50 years, the less experienced group of rubber tappers included all those with less than 13.50 years of experience. Similarly, the more experienced group of rubber tappers include all those with more than 13.50 years of experience.

4.3.1.4 Race

The sample of rubber tappers in the study consists predominantly of two races: Malay and Indian. The race of the rubber tapper was identified from their names and was cross-checked with the estate management.

4.3.1.5 Terrain

The rubber estates included in the study are located in different geographical regions of the country and therefore have different topography. The topography of an estate is classified according to the terrain. There are three classifications of terrain: hilly, undulating and flat. The classification of the terrain according to hilly, undulating and flat is based on the gradient of the slope of the terrain. The classification of the estates included in the study according to the type of terrain is discussed below (Section 4.5.2.1.1)

4.3.1.6 Rain Saturation

Estates located in different geographical areas of the country have different rainfall patterns. Some estates have a high annual rainfall while in others the annual rainfall is much lower. Estates can thus be classified according to the level of rain saturation. The level of rain saturation is determined as the amount of rainfall per hectare of land. Estates with high levels of rain saturation can be classified as wet estates, while those with low levels of rain saturation can be classified as dry estates. The classification of the estates included in the study according to level of rain saturation is discussed below (Section 4.5.2.1.2)

4.3.2 Dependent Variables

4.3.2.1 Job Performance

Four measures of job performance were identified in the study. The four measures are total crop, total earnings, out-turn, and output per man-day.

4.3.2.1.1 Total Crop

The total crop is the combination of latex and scrap produced by the rubber tapper in a year. It is obtained by adding the latex and scrap rubber produced by the rubber tappers from January to December 1996. The total crop is measured in kilograms and is an indicator of the total output of rubber produced by the rubber tapper in 1996. An important consideration when using performance measures is the reliability of the measure used in the study (Landy & Farr, 1983). The total crop for 1996 comprised output from January to December. A check was made on the internal consistency of the crop for the 12 months. The coefficient alpha obtained was 0.94. The results of the reliability analysis are given in Appendix 7.

4.3.2.1.2 Total Earnings

Total earnings comprise the basic earned wages and work allowances received for attendance at work. The basic earned wages are derived from the production of latex and scrap rubber on normal days worked (basic wage) and on rest days and holidays (rest day/holiday wage). The work allowances consist of vacation leave pay, holiday pay and out-turn incentive. The vacation leave pay is paid to the rubber tapper if the attendance exceeds 80 percent of work days offered by management during the year. The holiday pay is paid to rubber tappers when they attend work on the day prior to and the day after each public holiday. There are twelve public holidays in a year. Finally the out-turn incentive is paid to the rubber tapper if the monthly attendance exceeds 80 percent of work days offered by management during the month. For the purpose of paying vacation leave pay and out-turn incentive, the attendance of rubber tappers is determined by adding normal work days and double tappings. Double tapping is the additional task a rubber tapper undertakes on a voluntary basis beyond the normal daily task. Every additional task worked is considered as an extra work day for the rubber tapper. The total earnings can be summarised by the following formula:

Total Earnings = Basic wage + Rest day/holiday wage + Vacation leave pay + Holiday pay + Out-turn incentive

4.3.2.1.3 Out-turn

Out-turn is a measure derived from attendance during normal work days. During a regular year the estate management offers 301 possible days of work to its rubber tappers. In 1996, however there were 302 possible days because it was a leap year. The 302 possible days are derived as follows:

Possible days in 1996 = 366 days - 52 rest days - 12 public holidays

The total number of possible days offered by the estate management in a year may be affected by rainy days. When there is prolonged rain on an estate, the management cannot offer work to its rubber tappers. When this happens the management will declare that day as a day not offered. The days not offered vary from one estate to another because of differences in rain patterns in different geographical locations. In order to derive a standard measure of possible work days for all the nine estates, the days not offered for each estate must be subtracted from the 302 possible days. The formula for calculating out-turn is as follows:

Out-turn = Attendance on normal days / [302 days - days not offered]

The out-turn is a suitable indicator of job performance because it indexes the attendance of the rubber tapper during normal days and excludes rest days, holidays and double tappings.

4.3.2.1.4 Output Per Man-day

The final measure of job performance is output per man-day. The output per man-day is derived by obtaining the average daily production of rubber. The formula for calculating output per man-day is as follows:

Output per man-day = Total crop / Total man-days

where

Total man-days = Normal days work + Rest day work + Holiday work + Number of double tappings

4.3.2.2 Absenteeism

There are two types of absenteeism investigated in the study, avoidable absence and unavoidable absence (Nicholson, Brown, & Chadwick-Jones, 1977).

4.3.2.2.1 Avoidable Absence

Nicholson, Brown, and Chadwick-Jones (1997) identify unsanctioned absence as avoidable absence. Avoidable absence is operationalised as the total number of unsanctioned absences taken by the rubber tapper in a year. Therefore avoidable absence is measured as the total number of absent days taken by the rubber tapper in 1996.

4.3.2.2.2 Unavoidable Absence

Nicholson, Brown, and Chadwick-Jones (1977) identify absence due to sickness as unavoidable absence. Unavoidable absence is operationalised as the total number of absences due to sickness. There are two type of sick leave given to rubber tappers: non-hospitalised sick leave and hospitalised sick leave. Unavoidable absence is therefore measured as the total number of non-hospitalised and hospitalised sick leave days taken by the rubber tapper in 1996.

4.3.2.3 Job Satisfaction

The study defined job satisfaction as the overall affective orientation of rubber tappers towards their work (Kalleberg, 1977). According to Kalleberg (1977), the job satisfaction of workers may be characterised by their attitude towards their total job situation. This may be measured by the overall job satisfaction of a worker with the job.

Job satisfaction was measured using the overall job satisfaction scale developed by Kalleberg (1977). Overall job satisfaction was assessed from the responses of the rubber tappers to five questions concerning how satisfied they were with their job. These questions included " such direct inquiries as 'how satisfied are you with your job', as well as indirect measures, such as whether the worker would recommend the job to a friend, whether the worker plans to look for a new job within the next year, whether the worker would take the same job again if given a choice, and how the job measures up to the sort of job the worker wanted when he took it" (Kalleberg, 1977; p. 126). These questions were reconstructed into statements and a four point Likert scale was used to measure the items. The scale ranged from 1 (strongly disagree) to 4 (strongly agree).

The job satisfaction scale developed by Kalleberg (1977) used the English language. However the national language of Malaysia is Bahasa Malaysia. Therefore the English version of the job satisfaction scale had to be translated into Bahasa Malaysia. In order to ensure that the meaning of the English version was not lost during the translation into Bahasa Malaysia, the Bahasa Malaysia version of the job satisfaction scale was translated back into English. The original English version of the job satisfaction scale was then compared to the Bahasa Malaysia to English translation version to ensure they both corresponded in text and meaning. Only then was the Bahasa Malaysia job satisfaction scale used to measure the job satisfaction of rubber tappers. The job satisfaction scale used is shown in Appendix 8. Prior to data collection work in Malaysia, the Bahasa Malaysia version of the questions was pre-tested on the rubber tappers. The rubber tappers had difficulty responding to the item "whether the job you do measures up to your initial expectations" because they had difficulty understanding what the question meant. This difficulty could be the result of a lack of education. This item was therefore dropped from the job satisfaction scale.

The overall level of job satisfaction was determined by computing the mean of the ratings for the four remaining items. The reliability of the four items was measured using Cronbach's coefficient alpha. The coefficient alpha obtained was 0.79. Kalleberg (1977) in his study using the original scale, obtained a reliability coefficient alpha of 0.77. The results of the reliability analysis are given in Appendix 9.

4.4 PILOT STUDY

In early 1997, a pilot study was carried out to examine sex, age and experience differences on job performance and absenteeism among rubber tappers. The aim of the pilot study was to determine whether there were reliable differences in job performance and absenteeism between male and female, younger and older, and less experienced and more experienced rubber tappers. The study used a sample of 51 rubber tappers from one estate managed by ESPEK. There were 23 males and 28 females in the sample. The average age of rubber tappers was 40 years and the average length of service of rubber tappers was 11.5 years

4.4.1 Variables

The independent variables examined in the study were sex, age, and experience. The rubber tappers were grouped into two age groups; young and old. Young rubber tappers were categorised as those below the median age of 40.30 years and the old rubber tappers were categorised as those above the median age. Rubber tappers were also grouped into two separate experience categories: less and more experienced rubber tappers. The less experienced rubber tappers were those with less than the median experience of 11.30 years. The more experienced rubber tappers were those above the median.

The dependent variables were job performance and absenteeism. Job performance was measured by total crop, total earnings, out-turn and output per man-day. There were two absenteeism measures: avoidable and unavoidable absence. Avoidable absence was measured as the total number of absent days. Unavoidable absence was measured as the total sick leave (both non-hospitalised and hospitalised) taken.

4.4.2 Source of Data

Data were obtained from the estate checkroll report over a 12-month period from 1 January 1996 to 31 December 1996. The checkroll report contains all the information on attendance, crop production and earnings of each rubber tapper. A copy of the checkroll report is given in Appendix 10. Data on the rubber tapper's age and experience were obtained from the employee's personal record.

4.4.3 Analysis

The input and analysis of the data for the pilot study was carried out using SPSS Version 7.5. The data was analysed using univariate analysis. The statistical test used was the t-test for independent samples (Pedhazur & Schmelkin, 1991).

4.4.4 Results

The results of the analysis of the pilot study is shown in Tables 4.1, 4.2 and 4.3. Table 4.1 shows the result on sex differences on job performance and absenteeism. Table 4.2 and Table 4.3 show the results for age and experience for job performance and absenteeism respectively.

Table 4.1 Comparison of Job Performance and Absenteeism According to Sex

Variable	Male		Female		Sig.
	Mean	SD	Mean	SD	
Total crop	10123.17	2453.13	11665.04	3632.99	0.089
Total earnings	6362.41	1265.66	7261.41	1701.22	0.041*
Out-turn	0.6836	0.0919	0.7190	0.0607	0.311
Output per man-day	41.4855	6.8600	45.6187	11.9876	0.205
Avoidable absence	24.17	20.07	15.78	12.18	0.315
Unavoidable absence	13.65	8.86	19.53	10.06	0.033*

* significant at $p < 0.05$

Table 4.2 Comparison of Job Performance and Absenteeism According to Age

Variable	Young		Older		Sig.
	Mean	SD	Mean	SD	
Total crop	11170.13	4049.47	10805.04	2406.26	0.691
Total earnings	6963.35	1937.49	6767.77	1225.07	0.663
Out-turn	0.7029	0.09845	0.7032	0.06275	0.609
Output per man-day	44.1083	12.0718	43.4642	8.4322	0.824
Avoidable absence	22.34	19.66	17.28	13.52	0.501
Unavoidable absence	15.60	8.55	17.92	10.92	0.410

Table 4.3 Comparison of Job Performance and Absenteeism According to Experience

Variable	Less		More		Sig.
	Mean	SD	Mean	SD	
Total crop	10150.72	2485.41	11757.15	3674.95	0.075
Total earnings	6419.32	1415.13	7275.83	1626.99	0.051
Out-turn	0.6628	0.07235	0.7417	0.06767	0.000**
Output per man-day	42.7207	7.8537	44.7489	11.9971	0.480
Avoidable absence	27.80	17.29	11.65	11.42	0.000**
Unavoidable absence	19.64	9.01	14.23	10.15	0.050*

* significant at $p < 0.05$
** significant at $p < 0.01$

Briefly, as can be seen from Table 4.1, the results indicated that women rubber tappers on the whole performed better than men on all the job performance measures. Women produced more rubber and had higher income compared to men. They also worked more days and had higher daily crop production levels compared to men. The results also indicate that male rubber tappers on the whole had a higher avoidable absence rate than did female rubber tappers, while female rubber tappers had higher unavoidable absence rates than did males. The results for age indicated that there were no significant differences for absenteeism and job performance between older and younger rubber tappers. However for experience, there were significant differences in absenteeism and job performance. The more experienced rubber tappers had higher job performance levels and lower avoidable and unavoidable absence rates than did the less experienced rubber tappers.

4.4.5 Discussion and Conclusion

By and large the results of the pilot study were consistent with previous work. Experience rather than age was related to job performance. The results also indicated women rubber tappers consistently performed better than men on the performance measures.

The results of the pilot study were based on rubber tappers from one estate and it was decided to extend this research to a wider sample of rubber tappers. This involved the inclusion of more estates in the research sample. However the inclusion of more estates requires the investigation of several mediating variables on job performance and absenteeism. This is because estates in Malaysia are geographically dispersed. Consequently, they have different physical and climatic characteristics, principally topography and rainfall pattern. The topography of a rubber estate may be hilly, undulating or flat, or a combination of all three. Generally, an estate with an area of hilly terrain will be more difficult to work, compared to an area of undulating or flat terrain. This difficulty arises as a result of the physical movement of the rubber tapper during rubber tapping and latex collection. In a hilly terrain, rubber tappers must move from one rubber tree to another on narrow terraces cut into a steep terrain to tap the tree and collect latex. The movement from one terrace to another involves climbing up and down the terraces along a steep terrain, which requires strenuous physical activity on the part of the rubber tapper. On the other hand, the physical activity of rubber tappers working in undulating terrain is less demanding as movement from one terrace to another during tapping and latex collection is much less strenuous, because of the gentler slopes. Similarly in a flat terrain, tapping and latex collection will be relatively less strenuous than hilly and undulating terrain. The different levels of strenuous physical activity required in different types of terrain thus may affect job performance and absenteeism among rubber tappers. Therefore the possible influence of work environment (type of terrain) on individual differences in job performance and absenteeism was examined (Blumberg & Pringle, 1982; Waldman & Spangler, 1989). Specifically, the study investigated whether there are sex, age, and experience differences in job performance and absenteeism between rubber tappers working in hilly, undulating and flat terrains.

The rainfall pattern in estates vary due to their different geographical locations. Some estates have high annual rainfall while others have low. Thus, estates can be differentiated in terms of the level of rain saturation. Estates with high level of rain saturation are of course wetter and consequently are more difficult to work in than are estates with low rain saturation, which are mostly dry. Climatic differences among estates may also affect the physical well-being of rubber tappers and consequently affect absenteeism levels. Rubber tappers may be more prone to sickness in dry climatic conditions because of the harshness of the heat compared to a more humid environment which is relatively much cooler. Therefore once again, the study examines how work environment (level of rain saturation) affects individual differences in job performance and absenteeism (Blumberg & Pringle, 1982; Waldman & Spangler, 1989). Specifically, the study investigated whether there are sex, age, and experience differences in job performance and absenteeism between rubber tappers working in dry and wet conditions.

The pilot study examined individual differences that included sex, age and experience. The study looked at race differences in job performance and absenteeism, since as mentioned earlier, the rubber tappers in the pilot study were of two different races: Indian and Malay. An examination of race differences in job performance and absenteeism may provide some insight into sex , age, and experience differences in job performance and absenteeism, as race may interact with these variables.

Finally, the pilot study only examined individual differences in job performance and absenteeism. Previous research have shown that job satisfaction also influences work behaviour (Iaffaldano & Muchinsky, 1985; Nicholson, Brown, & Chadwick-Jones, 1976; Steers & Rhodes, 1978). Therefore, the study examined whether there are sex, age, experience, and race differences in job satisfaction.

4.5 MAIN STUDY

4.5.1 Background of the Company

The focus of this research is on one rubber plantation company called Estet Pekebun Kecil Sendirian Berhad (ESPEK). ESPEK is a wholly owned subsidiary of the Rubber Industry Smallholders Development Authority (RISDA) of Malaysia. RISDA is a government body established to assist smallholders in the rubber industry. It owns several large rubber and oil palm estates. In order to manage these estates efficiently and on a par with estates owned by private plantation companies, RISDA established ESPEK as a private enterprise to manage its estates on a commercial basis. ESPEK has over 20 years of experience and expertise in the plantation sector. The organisational structure of ESPEK is given in Appendix 11.

ESPEK has 27 estates under its management. The estates managed by ESPEK are grouped into six zones based on geographical location. Appendix 12 shows the location of these estates in Malaysia. There are two main crops planted on these estates: rubber and oil palm. Appendix 13 gives the type of crop planted in the estates managed by ESPEK. Sixteen of the estates are planted mainly with oil palm while six of the estates are planted mainly with rubber. The remaining five estates are planted with a mixture of rubber and oil palm.

4.5.2 Research Sample

4.5.2.1 Estates

This study is concerned with rubber tappers and it therefore focuses on estates planted with rubber. There are a total of 11 estates managed by ESPEK planted with rubber or a mixture of rubber and oil palm. The eleven estates are: Bukit Kota 1, Bukit Kota 2, Bukit Kota 3, Tanjung Genting, Serigala, Ulu Slim, Inas, Palong 1, Palong 2, Ladang Abdullah Kadir, and Ulu Cheka. Out of the eleven estates only nine were involved in the study. Two of the estates (Ladang Abdullah Kadir and Ulu Cheka) was excluded from the study because the rubber tappers employed in these estates are hired on a contract basis, while the other nine estates employ their rubber tappers permanently. The rubber tappers working on these two estates are supplied by private contractors. As contract workers, the rubber tappers are not bound by the terms and conditions of employment applicable to the rubber tappers employed permanently by the other estates. Rubber tappers employed permanently by an estate have an employment contract that stipulates the terms and conditions of employment, as well as provisions relating to fringe benefits. Estates that employ rubber tappers permanently maintain a proper checkroll. The information on the checkroll is used to compute the wages and benefits for the rubber tapper every month. However in the estates that employ rubber tappers through the service of private contractors, the level of information kept by the estate management is minimal. The important information recorded by the estate is the daily crop production of the rubber tappers. This information is then used to compute the wages of the rubber tappers which is based on a negotiated fixed rate between the estate management and the private contractors. Beyond the fixed wages, the contract rubber tappers are not paid any other benefits such as sick leave pay, holiday pay and vacation leave pay. Therefore information on sick leave and absent days are not recorded by the estate management in the checkroll for contract rubber tappers. Since data on attendance, absent days, sick leave, crop production and earnings are crucial to the study, the two estates employing contract rubber tappers were excluded. The study therefore focuses on the rubber tappers employed permanently by the estate management. Table 4.4 shows the estates involved in the study and the details of the area of the estate planted with rubber and oil palm.

Table 4.4 Estates Involved in the Study and the Area Planted with Rubber and Oil Palm (in hectares)

Estate	Rubber	Oil Palm
Tg. Genting	1067.95	0
Bt. Kota 1	1358.00	434.50
Bt. Kota 2	985.68	0
Bt. Kota 3	660.00	0
Serigala	1537.00	0
Ulu Slim	959.00	0
Inas	1347.00	0
Palong 1	1330.00	588.00
Palong 2	1279.54	804.26

Six of the estates are planted wholly with rubber while three other estates are planted with a mixture of rubber and oil palm. The estates planted wholly with rubber are Tanjung Genting, Bukit Kota 2, Bukit Kota 3, Serigala, Ulu Slim and Inas. The estates planted with a mixture of rubber and oil palm are Bukit Kota 1, Palong 1 and Palong 2. The estates involved in the study are all located on the west coast of the Malaysian peninsula. There are three distinct clusters in the location of these estates (see Appendix 12). In the south, one cluster of estates include Inas, Palong 1 and Palong 2. In the central region, the cluster of estates include Serigala and Ulu Slim. In the north, the cluster of estates comprises Bukit Kota 1, Bukit Kota 2, and Bukit Kota 3. Tanjung Genting is the only estate located on its own in the far north of the country. The rubber trees planted on the estates are of two different types: mature and immature rubber trees. The rubber tappers employed by the estates work in the area of mature rubber trees, since these are the trees that produce the rubber. Table 4.5 shows the actual size of the estates planted with mature and immature rubber.

Table 4.5 Areas Planted with Mature and Immature Rubber Trees (in hectares)

Estate	Mature Rubber	Immature Rubber	Total Area
Tg. Genting	1065.95	2.00	1067.95
Bt. Kota 1	1358.00	0	1358.00
Bt. Kota 2	985.68	0	985.68
Bt. Kota 3	660.00	0	660.00
Serigala	1454.00	83.00	1537.00
Ulu Slim	767.00	190.00	957.00
Inas	1347.00	0	1347.00
Palong 1	1330.00	0	1330.00
Palong 2	1279.54	0	1279.54

4.5.2.1.1 Terrain

The nine rubber estates are located in different geographical regions of the country and therefore have different topographies. The topography of the estate is classified according to the terrain. The terrain of the estate is classified by ESPEK according to three different categories: hilly, undulating and flat. The classification of the terrain according to hilly, undulating and flat is based on the gradient of the slope of the terrain. The three classifications of the terrain according to the gradient of the slope are as follows:

hilly terrain : gradient of the slope is greater than 12^o

undulating terrain : gradient of the slope is 2^o - 12^o

flat terrain : gradient of the slope is 0^o - 2^o

The type of terrain of each of the nine estates is indicated in the Rubber Crop Statement report shown in Appendix 14. Using the information from this report, the proportion of mature areas categorised as hilly, undulating and flat terrain, was determined. Table 4.6 shows the areas of the estates categorised as hilly, undulating and flat.

Table 4.6 Proportion of the Mature Area of Estate Planted with Rubber According to Terrain

Estate	Size (hectare)	Hilly (%)	Undulating (%)	Flat (%)
Tg. Genting	1066	19	81	0
Bt. Kota 1	1358	100	0	0
Bt. Kota 2	986	100	0	0
Bt. Kota 3	660	28	72	0
Serigala	1454	77	0	23
Ulu Slim	767	100	0	0
Inas	1347	100	0	0
Palong 1	1330	0	100	0
Palong 2	1280	53	40	7

Table 4.6 shows that several estates have a mixed terrain. These estates are Tanjung Genting, Bukit Kota 3, Serigala and Palong 2. Tanjung Genting and Bukit Kota 3 have a mixed hilly and undulating terrain; Serigala have a mixed hilly and flat terrain; and Palong 2 has a combination of hilly, undulating and flat terrain. All the other estates have either hilly or undulating terrain only.

From Table 4.6 it can be seen that the proportion of area that is flat is relatively small and only two of the estates have flat terrain. Therefore for the purpose of the study, the terrain of the estates were categorised into two groups: hilly and undulating. Estates with mixed terrain were categorised into hilly or undulating terrain depending on whether the terrain is predominantly hilly or undulating. Table 4.7 shows the new classification of the estates' terrains.

Table 4.7 Classification of Estate by Terrain

Estate	Terrain
Tg. Genting	Undulating
Bt. Kota 1	Hilly
Bt. Kota 2	Hilly
Bt. Kota 3	Undulating
Serigala	Hilly
Ulu Slim	Hilly
Inas	Hilly
Palong 1	Undulating
Palong 2	Hilly

4.5.2.1.2 Rain Saturation

The amount of annual rainfall varies from one estate to another depending on its geographical location. Table 4.8 shows the annual rainfall and rain saturation of the estates for 1996. The annual rain fall was obtained from the Rubber Crop Statement report. The rain saturation is determined as the amount of rainfall per hectare of land. The rain saturation was derived by dividing the annual rainfall by the total planted area of the estate. The total planted area include area planted with rubber and oil palm. The total planted area was used instead of the area planted with mature rubber because the annual rain fall measurement encompasses the whole estate, rather than just the area planted with mature rubber.

The estates were grouped into two categories according to the level of rain saturation. The two categories are wet and dry. The mean rain saturation of 1.59 mm/ha was used to divide the estates into the two categories. Estates with rain saturation of more than 1.59 mm/ha were categorised as wet estates. Estates with less than 1.59 mm/ha of rain saturation were categorised as dry estates. The new categorisation of the estates based on the rain saturation is shown in Table 4.9.

Table 4.8 Annual Rainfall and Rain Saturation for 1996

Estate	Size (hectare)	Annual Rainfall (mm)	Rain Saturation (mm/ha)
Tg. Genting	1068	1674.5	1.57
Bt. Kota 1	1793	2149.0	1.19
Bt. Kota 2	986	1662.5	1.69
Bt. Kota 3	660	1602.0	2.43
Serigala	1537	3017.5	1.96
Ulu Slim	1259	2504.6	1.98
Inas	1347	1478.7	1.10
Palong 1	1918	2034.2	1.06
Palong 2	2084	2913.6	1.39

Table 4.9 Categorisation of Estate According to Rain Saturation

Estate	Rain Saturation
Tg. Genting	Dry
Bt. Kota 1	Dry
Bt. Kota 2	Wet
Bt. Kota 3	Wet
Serigala	Wet
Ulu Slim	Wet
Inas	Dry
Palong 1	Dry
Palong 2	Dry

4.5.2.2 Rubber Tappers

As indicated above, the rubber tappers included in the study are the permanent rubber tappers employed in the selected nine estates. However not all the rubber tappers from the nine estates participated in the study. The criteria for selection of rubber tappers as participants was that they should have worked for a continuous 12-month period from 1 January, 1996 until 31 December, 1996, the period covered by the study. Rubber tappers who did not work for a continuous twelve months were excluded from the study.

Table 4.10 shows the number of rubber tappers in the nine estates who worked for 12 months and less than 12 months in 1996. The rubber tappers who worked for less than 12 months are those who joined the estate before 1 January, 1996 but left during 1996. A second group of rubber tappers are those who joined after 1 January, 1996 and continued working into 1997. The third group of rubber tappers are those who joined and left the estate in 1996. The proportion of rubber tappers who worked for less than twelve months in 1996 was 47 percent of the total sample. There were 508 (22%) rubber tappers who left in 1996. But 335 (15 %) rubber tappers joined the estates in 1996. Further there were 227 (10%) who joined the estates for only a few months in 1996 but left soon after.

Among the rubber tappers who worked for twelve months, the study also excluded female rubber tappers who took maternity leave, foreign rubber tappers, and rubber tappers whose data were incomplete. There were 81 rubber tappers who took maternity leave in 1996. These rubber tappers did not work for a continuous 12-month period and were thus excluded. There was a total of 30 foreign rubber tappers mainly employed in two estates, Inas and Palong 1. The foreign rubber tappers are mainly from Indonesia and Bangladesh. Since the number of foreign rubber tappers are few and are not categorised as Malay or Indian under racial groupings, they were excluded from the study. There were also 32 rubber tappers whose data in the checkroll were incomplete and were thus excluded from the study. Table 4.11 shows the number of rubber tappers who worked from January to December, 1996 that were selected for and excluded from the study.

Table 4.10 The Total Number of Rubber Tappers for 1996

Estate	Work for 12 months	Work for Less than 12 Months		
		Left in 1996	Joined in 1996	Joined & Left in 1996
Tg. Genting	202	11	1	2
Bt. Kota 1	165	77	40	41
Bt. Kota 2	128	17	18	8
Bt. Kota 3	102	31	21	1
Serigala	118	39	86	28
Ulu Slim	102	11	12	7
Inas	111	108	11	8
Palong 1	149	95	106	86
Palong 2	119	119	40	46
Total	1196	508	335	227

Table 4.11 Rubber Tappers' Selected and Excluded from the Study

Estate	Selected for Study	Excluded from Study			Total
		Maternity	Foreigner	Incomplete data	
Tg. Genting	182	14	0	6	202
Bt. Kota 1	147	14	0	4	165
Bt. Kota 2	115	11	0	2	128
Bt. Kota 3	89	11	0	2	102
Serigala	112	3	0	3	118
Ulu Slim	95	3	0	4	102
Inas	86	7	13	5	111
Palong 1	120	7	17	5	149
Palong 2	107	11	0	1	119
TOTAL	**1053**	**81**	**30**	**32**	**1196**

4.5.2.3 Sub-sample of Rubber Tappers

A sub-sample of rubber tappers were taken from two estates: Tanjung Genting and Bukit Kota 1. A survey was carried out among others to measure overall job satisfaction among the sub-sample of rubber tappers. The survey also obtained information on the most frequent reason for absences; information on previous experience; and personal information such as education, marital status, number of children, and whether the spouse also works as a rubber tapper. A questionnaire was developed to obtain the above information (see Appendix 8).

The number of rubber tappers surveyed in Tanjung Genting was 100 while in Bukit Kota 1 it was 88. In Tanjung Genting only 87 questionnaires were usable as eight rubber tappers were on maternity leave in 1996 and five did not work for a full twelve months. In Bukit Kota 1 the number of usable questionnaires was 79. Eight rubber tappers were on maternity leave while one rubber tapper did not work for the full 12 months.

4.5.3 Source of Data

There are three main sources of data used in the study: the estate checkroll report, the employee personal record, and the questionnaire described above.

4.5.3.1 Estate Checkroll Report

The monthly estate checkroll report contains all the information about the rubber tappers earnings, allowances, employer and employee contributions to employment funds, wage deductions, attendance records, and latex and scrap rubber production. Appendix 10 shows a page from the monthly checkroll report. This report is generated by the Estate Computer System (ECS) on each estate. It is produced from two sources: the daily pocket checkroll and the daily tapping record.

4.5.3.1.1 Daily Pocket Checkroll

The daily pocket checkroll captures information on the daily attendance of the rubber tapper. The field conductor records the attendance of the rubber tapper in the daily pocket checkroll during each working day. Appendix 15 shows a daily pocket checkroll. The notations used in the daily pocket checkroll are as follows:

1. NP (Normal Day Present)

   the tapper is present for work offered on weekdays.

2. RP (Rest Day Present)

   the tapper is present for work offered on a rest day which could be a Sunday or a Friday, depending on the location of the estate.

3. HP (Holiday Present)

the tapper is present for work offered on public holidays. There are 12 public holidays in a year.

4. DT (Double Tapping)

double tapping is recorded when a tapper completes an extra tapping task during a working day. Each additional task tapped is recorded as an additional man-day worked. The tapper is paid an additional basic wage of Ringgit Malaysia, RM10.40 (Sterling equivalent is £2.60 at the 1996 exchange rate of approximately £1= RM4.00) for each additional task tapped in a day.

5. AB (Absent)

the tapper is absent from work without excuse.

6. AL (Approved Leave)

unrecorded leave approved by the estate management. This is usually given for unforeseen circumstances and the tapper is unable to apply for leave through the normal procedure.

7. ML (Maternity Leave)

leave given to a women rubber tappers after delivery of a baby. The maximum paid maternity leave is 60 days. Paid maternity leave is only given up to a maximum of 5 children.

8. DU (Day not Offered)

days during which work is not offered by management, due mainly to weather conditions, and also sometimes for special religious festivals.

9. SH (Sick Hospitalisation)

tapper unable to work due to illness which necessitates hospitalisation. The maximum paid sick leave is 60 days in a year.

10. SN (Sick Non-hospitalisation)

the tapper is unable to work due to illness which does not require hospitalisation. The number of days paid sick leave for which a rubber tapper is eligible varies according to the years of service. Rubber tappers employed for less than two years are eligible for 14 days paid sick leave in a year. Those employed for two - five years are eligible for 18 days paid sick leave. Rubber tappers employed for more than five years are eligible for 22 days of paid sick leave.

11. VL (Vacation Leave)

the annual leave entitlement of the rubber tapper. The number of days leave entitlement is based on the length of service with the estate. Rubber tappers employed for a period of less than five years are eligible for 14 days paid annual leave. Rubber tappers who are employed for more than five years are eligible for 16 days paid annual leave.

12. SO (Socso Claim)

the days the tapper is unable to work due to employment injury which necessitates prolonged absence form work. During the period of absence, the tapper is paid compensation from an employment injury insurance fund.

13. PH (Public Holiday)

paid public holiday which is for 12 days in a year. Rubber tappers are only entitled to a paid public holiday when they worked the day prior to and the day after the public holiday.

14. UH (Unpaid Holiday)

paid public holiday forfeited because the tapper was absent on the day before or the day after the public holiday.

15. T (Transfer to Other Checkroll)

the tapper transferred to another checkroll such as a general worker or oil palm harvester checkroll.

16. IA (Industrial Action)

tapper facing disciplinary action or having a case before an industrial tribunal.

At the end of every month the information recorded in the daily pocket checkroll is collated and summarised in a Pocket Checkroll Summary shown in Appendix 16. The summarised information is then entered into the Estate Computer System to generate the monthly checkroll report.

4.5.3.1.2 Daily Tapping Record

The daily production of latex and scrap rubber by the rubber tapper is recorded in the daily tapping record. The field conductor records the daily weight of the latex and scrap at the reception station. The daily metrolex reading of the dry rubber content is used to calculate the amount of rubber in the latex. The total amount of rubber produced by the rubber tapper at the end of every month is entered into the Estate Computer System to compute the wages of the rubber tapper.

4.5.3.2 Employee Personal Record

The employee personal record contains personal information about the rubber tapper which includes the date of birth, the date of employment and the date the tapper left the estate. This information is stored in the Estate Computer System. The date of employment recorded is the most current date of employment as some rubber tappers quit the estate only to rejoin it at a later date. When the tapper rejoins the estate, the new date of employment is recorded in the employee personal record and is used to determine the number of days of vacation leave, sick leave and other fringe benefits to which the tapper is entitled.

4.5.4 Data Collection

Data collection for the research was carried out during September and October, 1997 in Malaysia. Prior to the actual data collection work, the researcher wrote to the General Manager of ESPEK requesting permission to collect data from 11 of the company's rubber estates. A supporting letter from the researcher's supervisor was attached to the application letter to reassure the company that market sensitive information will not be used in the research. Permission from the company was received in August, 1997. The Administration Department at ESPEK's headquarters wrote to all the 11 managers notifying them of the research being carried out and the necessary co-operation to be given to the researcher.

The data collection started at Tanjung Genting in the north and proceeded south until Palong 2 which was the last estate completed. At all the estates the monthly checkroll report from January, 1996 to December, 1996 was photocopied. Using a form shown in Appendix 17 called a Rubber Tapper Information Sheet, data on the gender, race, nationality, employment status, date of birth and date of employment were gathered from the estate's employee personal record. During the data collection stage at Tanjung Genting and Bukit Kota 1, additional data from the rubber tappers from these two estates was collected using the questionnaire.

At the headquarters of ESPEK in Kuala Lumpur, the capital of Malaysia , the monthly Rubber Crop Statement of each of estate was obtained from the Plantation and Agricultural Services Department. This report provides information on when the rubber trees were planted, the type of rubber clones planted, the size of the area planted with mature and immature rubber trees, the type of terrain, type of soil series, type of tapping system, the total latex and scrap production, and the annual rainfall in the estate. Appendix 14 shows a Rubber Crop Statement for December 1996. All the data collected were then brought back to the UK for analysis.

4.5.5 Data Extraction

Data extraction from the checkroll report commenced in early November, 1997. The first stage of the data extraction involved identifying the rubber tappers in all the estates who worked for a complete twelve months from 1 January 1996 to 31 December 1996. In order to do this, a form called Rubber Tapper Monthly Summary Information sheet was used. This form is shown in Appendix 18. Each page of the checkroll report was examined to identify the rubber tappers' names and employee numbers and their work details for each month. When the name and details appeared on the checkroll for a particular month a tick was placed on the corresponding month on the summary information sheet. When this was completed, all the rubber tappers who worked for twelve months were identified. The data on these rubber tappers were then extracted from the checkroll report from January to December, 1996. The data extracted included attendance, earnings and crop production. To accomplish this, a form called Checkroll Report Data for 1996, as shown in Appendix 19, was used to extract the data for each of the 1053 rubber tappers. To simplify and speed up the data extraction process, the data on attendance and earnings were extracted from the December, 1996 checkroll report. The report for December, 1996 contains the cumulative figures for attendance and earnings. However the data on latex and scrap do not appear as a cumulative figure in the December report. Therefore it has to be extracted on a month-to-month basis from January to December. Data on gender, race, nationality, date of birth, and date of employment were taken from the Rubber Tapper Information Sheet and transferred on to this form. The data were then entered into the Statistical Package for the Social Sciences (SPSS) Version 7.5 for analysis.

4.5.6 Data Analysis

Several statistical procedures were used to analyse the data. The principal statistical procedures used were bivariate correlations, independent t - tests and analyses of variance (ANOVA) (Keppel & Zedeck, 1989; Pedhazur & Schmelkin, 1991).

Bivariate correlation analysis was used to examine the relationships between age and experience with job performance, absenteeism and job satisfaction. Partial correlation techniques were also used to examine the correlation between age and experience with job performance when one of the independent variables was controlled (Giniger, Dispenzieri, & Eisenberg, 1983; Schwab & Heneman, 1977). An independent t - test was carried out on the data to investigate sex, race and experience differences on job performance, absenteeism and job satisfaction. This was done to examine whether there were significant differences on the dependent variables between men and women, Malays and Indians, and more and less experienced rubber tappers. One-way ANOVAs were used to examine age differences in job performance, absenteeism and job satisfaction.

Finally , ANOVAs were used to examine the main and interactive effects for sex, age, experience, race, terrain, and rain saturation on job performance and absenteeism using high order factorial designs. Two separate four-way ANOVA were conducted on the data for job performance and absenteeism. The first four-way ANOVA examined possible sex by age by race by terrain interactions. The second four-way ANOVA examined possible sex by experience by race by terrain interactions. Analyses of variance was conducted separately for age and experience because these factors were correlated. The strength of effect for each significant main and interaction effect was calculated using the estimated epilson squared (ε^2) index (Keppel & Zedeck, 1989). The estimated epilson squared index explains the percentage of total variance accounted for by an independent variable in main and interaction effects. No four-way ANOVA was done for job satisfaction because the sample size was very small (N = 166).

4.6. LIMITATIONS

The study used a sub-sample instead of surveying the total sample of rubber tappers to obtain information on job satisfaction because of practical difficulties and time constraints in conducting a full survey. One of the practical difficulties is that the survey has to be done using an in-depth interview. This is because rubber tappers are not very highly educated and some have no education at all. Therefore it was not practical to leave the questionnaire with the rubber tappers with instructions on how to respond to the questionnaire as most of the rubber tappers cannot read or write. Conducting the survey using the interview method also posed some logistical difficulties. Conducting the interview during working hours was difficult because the rubber tappers were not concentrated in one particular location on the estate but were spread throughout the estates in their respective tapping tasks. Therefore locating every rubber tapper during working hours was a major difficulty and only a handful of them were interviewed at their tapping task with the help of a mandore. Those that were interviewed at the task were rubber tappers who lived outside the estate. In overcoming this difficulty, there were two options available to the researcher. One was to interview the rubber tappers at the reception station when they brought in the latex and scrap rubber for weighing. However, this strategy enabled only a handful of rubber tappers, mostly those living outside the estate, to be interviewed. Most of the rubber tappers left for home as soon as they completed weighing the latex and scrap rubber. The second option was to interview the rubber tappers in their homes after work. However this could only be done for rubber tappers living on the estate. Those rubber tappers who lived outside the estate could not be interviewed outside working hours as they lived some distance away. Given these difficulties and the limited time available for data collection, the survey was carried out in two estates only.

Another limitation is the choice of total crop as a measure of job performance. Rubber is extracted from trees, which are living objects. The yield of rubber from trees is affected by many extraneous factors such as the type of clones of rubber trees, the type of soil the trees were planted in, the age of the trees, weather, as well as maintenance of the trees such as manuring, weeding and pest and disease control (Mohamad Bakri, Abdullah & Wan Salleh, 1991). All these factors vary between estates. Thus a comparison of total crop among rubber tappers from different estates may be confounded by these factors. Therefore, it was necessary to check whether total crop is a reliable measure when more than one estate is involved in the study. This was done by testing the internal consistency of total crop for the nine estates. However, since estates vary in sizes in terms of hectare, the appropriate measure of crop output is the yield per hectare. Yield per hectare is derived by dividing the total rubber produced by the area of planted rubber. The yield per hectare for the nine estates was obtained over a twelve-year period from 1987 to 1998, from ESPEK. Prior to 1987, data were not available because the computerisation of the estate records only commenced in 1987. The yield per hectare for Inas was only available from 1992 (the year the management of Inas was taken over by ESPEK). Therefore Inas was excluded in the analysis. The Cronbach's coefficient alpha obtained for yield per hectare was 0.77. The high internal consistency suggest that the use of a single-occasion data (1996 output data) was appropriate (Landy & Farr, 1983). The results of the analysis of reliability estimates for yield per hectare for the eight estates are given in Appendix 20.

Finally, this study used ANOVA as one of the statistical techniques to investigate individual differences in the work behaviour of rubber tappers. ANOVA is appropriate for exploratory factor analysis. It does not allow for the specification and testing of path models that allows the understanding of the causal processes that give rise to job performance, absenteeism and job satisfaction. A more appropriate approach to understanding these phenomena would be structural equation modelling, which is a more powerful means of assessing the quality of the measurements and the predictive relationships between age and experience with job performance, absenteeism and job satisfaction (Kelloway, 1998). Also a more robust multi-group comparison of sex, age, experience, race, terrain and rain saturation with job performance, absenteeism and job satisfaction would have been possible with structural equation modelling. One of the most widely used structural equation modelling technique is LISREL (Jöreskog & Sörbom, 1992). LISREL would probably have been a more appropriate technique than ANOVA for use in this study. However, it was imposible to employ LISREL in the data analysis as the software necessary to carry out the analysis using this technique only became available to doctoral students at Aston Business School in early March, 1999 . It would have taken the researcher at least a month to become familiar with the software before any data analyses could be initiated. Given the time constraint, it was decided not to use structural equation modelling to analyse the data.

CHAPTER 5 : INDIVIDUAL DIFFERENCES IN JOB PERFORMANCE

5.1 INTRODUCTION

In Chapter 4 four key measures of the job performance of a rubber tapper were identified. These were total crop produced in a year; the total income derived from producing the crop as well as achieving a good work attendance; the out-turn for work which is based on normal work days; and the output of rubber per man-day worked. This chapter presents the findings of the analysis on individual differences on the four measures of job performance. In presenting the findings, the chapter first provides the descriptive statistics for all the independent and dependent variables. The intercorrelation matrix of the four job performances measures is presented and partial correlations of the job performance measures with age and experience are described. The main findings concerning individual differences in job performance are then reported.

5.2 DESCRIPTIVE STATISTICS FOR THE INDEPENDENT VARIABLES

5.2.1 Descriptive Statistics for Sex

The breakdown of rubber tappers in the nine estates, with respect to sex is given in Appendix 21. The total number of rubber tappers in the main sample was 1053. The number of male rubber tappers was 461 and the number of female rubber tappers was 592. Male rubber tappers constituted 44% of the total sample and female rubber tappers 56%. In all the nine estates except Inas, the proportion of female rubber tappers was higher than was that of male rubber tappers. In Inas, the proportion of male rubber tappers on the estate was 52% while female rubber tappers was 48%.

The cross tabulation of rubber tappers according to terrain and rain saturation with sex is given in Appendix 22. Almost two thirds of the rubber tappers are grouped into hilly terrain and one third in undulating terrain. A similar proportion of two thirds of rubber tappers were grouped in dry conditions and one third in wet conditions. The proportion of female rubber tappers in both hilly and undulating terrain was higher than that of male rubber tappers in similar terrains. Similarly the proportion of female rubber tappers in both dry and wet conditions was higher than that of male rubber tappers in similar conditions. A 2 x 2 Chi-square test was carried out to determine whether there were differences in the proportions of male and female rubber tappers in both undulating and hilly terrain as well as in dry and wet conditions. There was no significant difference in the proportions of male and female rubber tappers in undulating and hilly terrains, (χ^2 = 1.245, df = 1, p = 0.265). The results of the Chi-square test for rain saturation indicated that there were no significant differences in the proportions of male and female rubber tappers in dry and wet conditions ($\chi2$ = 0.319, df = 1, p = 0.572). These results indicated that there was no sex bias in the distribution of rubber tappers according to terrain and rain saturation. The results of the Chi-square analysis are given in Appendix 22.

5.2.2 Descriptive Statistics for Age

The breakdown of rubber tappers in the nine estates with respect to age is given in Appendix 23. Rubber tappers in the study were grouped into three age groups. The first group consisted of young rubber tappers who ranged in age from 16 to 35 years. The second group consisted of middle-aged rubber tappers (age range 35 - 45 years). Finally, the third group consisted of older rubber tappers aged 45 years and above.

There were 317 rubber tappers in the young age group. The mean age of this group was 28.91 years and the standard deviation was 4.97 years. The middle-aged group consisted of 461 rubber tappers. The mean age for this group was 40.21 years and the standard deviation was 2.72 years. Finally, the older group consisted of 269 rubber tappers. The mean age of this group was 49.61 years and the standard deviation was 3.97 years.

The proportion of young rubber tappers in the main sample was 30%. The proportions of middle-aged and older rubber tappers were 44% and 26% respectively. Inas, Palong 1 and Palong 2 has a high proportion of young rubber tappers compared to the other six estates. In Inas, the proportion of young rubber tappers was slightly more than 50% of the estate sample. In Palong 1 the proportion of young rubber tappers was 36% and at Palong 2 the proportion was 45%. Ulu Slim on the other hand has a high proportion of older rubber tappers compared to the other eight estates. At Ulu Slim, the proportion of older rubber tappers in the estate sample was 40%. Bukit Kota 2 has the highest proportion of middle-aged rubber tappers, slightly more than 50% of the estate sample. The mean age of the rubber tappers in the nine estates ranged from 36 years in Palong 2 to 42 years in Ulu Slim. The overall mean for the main sample of 1047 rubber tappers was 39.20 years, with a standard deviation of 8.66 years. The lowest age of rubber tappers in the main sample was 16.5 years and highest 64.0 years. There were six rubber tappers who had missing data, as their date of birth could not be ascertained. These six rubber tappers were excluded from the analysis. Appendix 23 also gives the descriptive statistics for age of rubber tappers in the nine estates.

Appendix 24 gives the cross tabulation of age groups of rubber tappers according to terrain and rain saturation. The proportion of middle-aged and older rubber tappers working in undulating terrain was larger than the same age group of rubber tappers in hilly terrain. However among the young rubber tappers, a higher proportion worked in hilly terrain compared to undulating terrain. A 3 x 2 Chi-square test was carried out to determine if there were significant differences in the proportions of the different age groups working in undulating and hilly terrains. The results indicated that there was no significant difference ($\chi^2 = 2.729$, df = 2, p = 0.255). Examining the age distribution of rubber tappers working in dry and wet conditions, it was found that there was a higher proportion of middle-aged and older rubber tappers in wet conditions compared to dry conditions. However there was a higher proportion of young rubber tappers in dry conditions compared to wet conditions. The 3 x 2 Chi-square test indicated that there was a significant difference in the proportion of rubber tappers in the three age groups in dry and wet conditions ($\chi^2 = 6.543$, df = 2, p = 0.038). These results indicated that there was no age bias in the distribution of rubber tappers according to terrain. This suggest that age was not confounded with terrain. However, there was an age bias in the distribution of rubber tappers according to rain saturation. This suggests that age was confounded with rain saturation. Therefore any significant interaction between age and rain saturation may be a result of the confounding of these two variables. The results of the Chi-square analysis for the cross tabulation of age with terrain and rain saturation is provided in Appendix 24.

The mean age of rubber tappers in undulating terrain was 39.65 years with a standard deviation of 8.41 years. The mean age of rubber tappers in hilly terrain was 38.93 years and the standard deviation was 8.81 years. The mean age of rubber tappers in dry condition was 38.72 years and the standard deviation was 8.40 years. The mean age of rubber tappers in wet condition was 39.94 years and the standard deviation was 9.02 years.

5.2.3 Descriptive Statistics for Experience

The experience of rubber tappers in the main sample of study was found to be truncated. This was because the experience was determined based on the date of employment of the rubber tapper with the estate. As noted in Chapter 4, information on previous experience as a rubber tapper was not available for the main sample in the study. However, information on previous experience as a rubber tapper was obtained for the sub-sample of rubber tappers from Tanjung Genting and Bukit Kota 1.

5.2.3.1 Main Sample of Rubber Tappers : Truncated Experience

The experience of rubber tappers in the main sample was grouped according to less and more experience. As mentioned in Section 4.3.1.3, the median experience of rubber tappers (excluding rubber tappers from Inas) was 4.87 years. Therefore rubber tappers with less experience are all those who have less than 4.87 years of service. On the other hand rubber tappers with more experience are all those who have more than 4.87 years of service. There were 481 rubber tappers grouped as less experienced. The mean experience of this group of rubber tappers was 2.56 years and the standard deviation was 1.33 years. There were 481 rubber tappers grouped as more experienced. The mean experience of this group of rubber tappers was 9.91 years and the standard deviation was 3.23 years. The overall mean experience of the main sample of 962 rubber tappers (excluding rubber tappers from Inas) was 6.24 years and the standard deviation was 4.41 years. The minimum experience of the rubber tapper was 0.91 years and the maximum experience was 23.0 years. Appendix 25 gives the breakdown of rubber tappers according to low and high experience for the eight estates (excluding Inas). There were five rubber tappers who had missing data, as their date of employment was not available in their personal record. They were excluded from the analysis.

The overall percentage of rubber tappers with less than 4.87 years of experience was 50.0%. The percentage of rubber tappers with more than 4.87 years of experience was also 50.0%. Tanjung Genting has the highest proportion of rubber tappers categorised as more experienced. More than two thirds of the rubber tappers in this estate have worked more than 4.87 years. On the other hand, two other estates, Palong 1 and Palong 2 have a high proportion of rubber tappers categorised as less experienced. More than two thirds of the rubber tappers in these two estates have less than 4.87 years of experience.

Appendix 25 also gives the descriptive statistics for experience for rubber tappers in the eight estates. The mean truncated experience of the main sample was 6.24 year with a standard deviation of 4.41 year. Rubber tappers in Tanjung Genting have the highest mean truncated experience of 8.87 years (SD = 4.38 years) among the eight estates, the while rubber tappers in Palong 2 have the lowest mean experience of 3.34 years (SD = 1.80 years).

Appendix 26 gives the cross tabulation of experience of rubber tappers according to terrain and rain saturation. In undulating terrain, the proportion of more experienced rubber tappers was greater than that of less experienced rubber tappers. In hilly terrain, the proportions of less experienced was greater than that of more experienced rubber tappers. A 2 x 2 Chi-square test was carried out to determine whether there were significant difference in the proportions of less and more experienced rubber tappers working in undulating and hilly terrain. The results indicated that there was no significant difference in these proportions ($\chi^2 = 2.085$, df = 1, p = 0.149). Examining the distribution of the less and more experienced rubbers in dry and wet conditions, it was found that there was a higher proportion of less experienced rubber tappers in dry conditions compared to wet. However, in wet conditions, it was found that there was a higher proportion of more experienced rubber tappers compared to less experienced rubber tappers. The 2 x 2 Chi-square test indicated there was a significant difference in the proportion of less and more experienced rubber tappers in dry and wet conditions (χ^2 = 6.797, df = 1, p = 0.009). These results indicated that there was no experience bias in the distribution of rubber tappers according to terrain, suggesting that experience was not confounded with terrain. However, there was an experience bias in the distribution of rubber tappers according to rain saturation. This suggests that experience was confounded with rain saturation. Therefore any significant interaction between experience and rain saturation may be a result of the confounding of these two variables. The results of the cross tabulation between truncated experience with terrain and rain saturation is provided in Appendix 26.

The mean truncated experience of rubber tappers in undulating terrain was 6.84 years (SD = 4.51 years). The mean truncated experience of rubber tappers in hilly terrain was 5.82 years (SD = 4.28 years). In dry condition, the mean truncated experience of rubber tappers was 5.99 years (SD = 4.53 years). Finally, the mean truncated experience of rubber tappers in wet conditions was 6.56 years (SD = 4.21 years).

5.2.3.2 Sub-sample of Rubber Tappers : Total Experience

In the sub-sample of rubber tappers, experience was also categorised as less and more. Rubber tappers with less experience had less than 13.50 years, while those with more experience had more than 13.50 years experience. Appendix 27 gives the descriptive statistics for total experience of the sub-sample of rubber tappers.

There were 83 rubber tappers (50%) categorised as less experienced. The mean total experience of this group was 8.13 years (SD = 4.07 years). There were 83 rubber tappers (50%) categorised as more experienced. The mean total experience of this group was 20.57 years (SD = 6.27 years). The minimum total experience of the sub-sample of rubber tappers was one year and maximum total experience was 40.75 years.

The overall mean total experience of the sub-sample of rubber tappers was 14.35 years with a standard deviation of 8.17 years.

Appendix 27 also gives the breakdown of rubber tappers in the sub-sample which was obtained from Tanjung Genting and Bukit Kota 1. Bukit Kota 1 has a higher percentage of less experienced rubber tappers (62.0%) compared to Tanjung Genting (39.1%). On the other hand, Tanjung Genting has a higher proportion of more experienced rubber tappers (60.9%) compared to Bukit Kota 1 (38.0%).

5.2.4 Descriptive Statistics for Race

Appendix 28 gives the breakdown for the race of rubber tappers in the nine estates. There were 467 Malay rubber tappers and 586 Indian rubber tappers in the main sample. Malay rubber tappers constituted 44% of the total sample and Indian rubber tappers 56%. The proportion of Indian rubber tappers in five estates was higher than that of Malay rubber tappers. These estates were Bukit Kota 3, Serigala, Inas, Palong 1, and Palong 2. In Bukit Kota 3 the proportion of Indian rubber tappers consisted of almost 90% of the estate sample. In Palong 1 and Palong 2 the proportion of Indian rubber tappers comprised almost two thirds of the estate sample. On the other hand Tanjung Genting has a high proportion of Malay rubber tappers compared to Indian rubber tappers. The proportion of Malay rubber tappers in this estate was almost two thirds of the estate sample.

Appendix 29 gives the cross tabulation of the race of rubber tappers with terrain and rain saturation. The proportion of Indian rubber tappers in both undulating and hilly terrain was higher than that of Malay rubber tappers. In both undulating and hilly terrain, the proportion of Indian rubber tappers was similar, at 56%, while the proportion of Malay rubber tappers in both terrains was 44%. The proportion of Indian rubber tappers in dry and wet conditions was again higher compared to the proportion of Malay rubber tappers. In dry conditions, the proportion of Indian rubber tappers was 53% and the proportion of Malay rubber tappers was 47%. In wet conditions, the proportion of Indian rubber tappers was 61% and the proportion of Malay rubber tappers was 39%. A 2 x 2 Chi-square test was carried out to determine if there were significant differences in the proportions of Malay and Indian rubber tappers in undulating and hilly terrains as well as in dry and wet conditions. The results indicated there was no significant difference in the proportions of Malay and Indian rubber tappers in undulating and hilly terrain ($\chi^2 = 0.000$, df = 1, p =1.00). The Malay and Indian rubber tappers were found to be evenly distributed in both the terrains. Examining the distribution of Malay and Indian rubber tappers in dry and wet conditions, the Chi-square analysis indicated a significant difference in the proportion of Malay and Indian rubber tappers in dry and wet conditions ($\chi^2 = 6.324$, df = 1, p = 0.012). These results indicated that there was no race bias in the distribution of rubber tappers according to terrain, suggesting that race was not confounded with terrain. However, there was race bias in the distribution of rubber tappers according to rain saturation. This suggests that race was confounded with rain saturation. Therefore any significant interaction between race and rain saturation may be a result of the confounding of these two variables. The results of the Chi-square analysis of the cross tabulation of race with terrain and rain saturation is provided in Appendix 29.

5.2.5 Summary of Descriptive Statistics for Independent Variables

In summary, the total sample of rubber tappers consists of a higher number of female rubber tappers (56%) compared to males (44%). The sample of rubber tappers was predominantly of two races, Malay and Indian. There was a higher proportion of Indian rubber tappers in the sample (56%) compared to Malay rubber tappers (44%). The mean age of rubber tappers in the sample was 39.20 years. The mean age of the young group of rubber tappers was 28.91 years. The mean age of the middle-aged group was 40.21 years and for the older group it was 49.61 years. The mean truncated experience of the main sample of rubber tappers was 6.24 years. The less experienced rubber tappers have 2.56 years of experience while the more experienced rubber tappers have 9.91 years of experience. In the sub-sample of rubber tappers, the mean total experience of less experienced rubber tappers was 8.13 years while the more experienced rubber tappers have 20.57 years of experience.

Two mediating variables were examined in the present study, terrain and rain saturation. The proportion of rubber tappers working in undulating terrain was 37% while the proportion of rubber tappers working in hilly terrain was 63%. The proportion of rubber tappers working in dry conditions was 61% while the proportion working in wet conditions was 39%. There were more female rubber tappers working in both undulating and hilly terrains compared to male rubber tappers. Similarly, there were more female rubber tappers working in dry and wet conditions compared to male rubber tappers. The proportion of Indian rubber tappers working in undulating and hilly terrains was higher than that of Malay rubber tappers. Similarly, the proportion of Indian rubber tappers working in dry and wet conditions was higher than that of Malay rubber tappers. The mean age of rubber tappers in undulating and hilly terrain was very similar (39.65 years and 38.93 years respectively). The mean age of rubber tapper in dry and wet conditions was again very similar (38.72 years and 39.95 years respectively). The mean truncated experience of rubber tappers working in undulating terrain was 6.84 years and in hilly terrain was 5.83 years. The mean truncated experience of rubber tappers in dry conditions was 5.99 years and in wet conditions was 6.56 years. Finally, Chi-square analyses indicated that the distribution of rubber tappers by sex, age, experience and race by terrain was not significant. This suggests that any differences that might occur in the work behaviour of rubber tappers mediated by terrain was not confounded by these independent variables. However, the distribution of rubber tappers in dry and wet conditions according to race, age and experience was found to be significant. Therefore any differences that might occur in the work behaviour of rubber tappers which was mediated by rain saturation could be confounded as a result of the disproportionate distribution of rubber tappers according to race, age and experience. Therefore the study only examined the possible interactions of sex, age, experience and race with terrain. The study did not examine the possible interactions of sex, age, experience and race with rain saturation.

5.3 DESCRIPTIVE STATISTICS FOR DEPENDENT VARIABLE OF JOB PERFORMANCE

There were four measures of job performance investigated in the study. The four measures were total crop, total earnings, out-turn, output per man-day. Appendix 30 gives the descriptive statistics for all four measures of job performance.

The mean total crop of rubber produced by rubber tappers was 10638 kg, with a standard deviation of 2820 kg. The lowest production of rubber achieved was 3701 kg while the maximum production achieved was 21586 kg. In terms of earnings related to the production of rubber and attendance at work, the mean total earnings of rubber tappers was Malaysia Ringgit RM6659.20 (Sterling equivalent: £1664.80) and the standard deviation was RM1549.52 (£387.38). The lowest earnings received was RM2924.94 (£731.24), while the highest earnings received was RM13472.17 (£3368.04) .

The out-turn is a measure of the proportion of normal days worked by the rubber tapper in relation to the possible days of work offered by management. The possible days of work was adjusted for days not offered because of differences in days not offered among the nine estates. The mean out-turn of the rubber tappers was 79% and the standard deviation was 9% . The lowest out-turn achieved by the rubber tapper was 44% while the highest was 98%. Finally, the output per man-day is a measure of the daily production of rubber. The mean daily production of rubber was 42.35 kg and the standard deviation was 8.97 kg. The minimum daily production of rubber achieved by the rubber tapper was 20.71 kg while the maximum daily production achieved was 74.95 kg.

In summary, there were considerable variations in the job performance measures among rubber tappers. The following section will examine the results of the analyses of sex, age, experience and race differences in job performance.

5.4 INTERCORRELATIONS AMONG THE JOB PERFORMANCE MEASURES

Before statistical tests were used to determine whether there were significant differences in the job performance of rubber tappers, a correlational analysis was conducted on the four job performance measures. A bivariate correlation was carried out to determine the magnitude and direction of the intercorrelations between total crop, total earnings, out-turn and output per man-day. The results of the analysis are provided in Appendix 31. Table 5.1 provides the results of the intercorrelations among the four job performance measures.

Table 5.1 Correlation Matrix of Job Performance Measures

	Total crop	Total earnings	Out-turn	Output/manday
Total crop	-			
Total earnings	0.95**	-		
Out-turn	0.61**	0.70**	-	
Output/manday	0.85**	0.67**	0.28**	-

** significant at $p < 0.01$

Table 5.1 shows the magnitude and direction of the relationships between the four job performance measures. In descending order, the strongest significant correlation obtained was that between total crop and total earnings (0.95). The common variance (r^2) between total crop and total earnings was 89%. The next strongest correlation was between total crop and output per man-day (0.85). This was followed by three modestly strong correlations: out-turn and total earnings (0.70); output per man-day and total earnings (0.67); and out-turn and total crop (0.61). Finally, the weakest correlation obtained was between out-turn and output per man-day (0.28), where the common variance between out-turn and output per man-day was very low (0.08%).

Total crop, total earnings, out-turn and output per man-day are all measures that assess the job performance of rubber tappers. Total crop, total earnings and output per manday are measures of output whereas out-turn is a measure of attendance (Landy & Farr, 1983). The intercorrelations between the four measures indicated that total crop, total earnings and output per man-day were highly correlated. On the other hand, out-turn was modestly correlated with total earnings and total crop and weakly correlated with output per man-day. The results of the correlational analysis suggest that output and attendance measures were modestly correlated. Therefore it would appear total crop, total earnings and output per man-day are the more appropriate measures of job performance. However, in the analysis of job performance, the study examined only total crop and out-turn as indicators of the job performance of rubber tappers. This was because these two indices measure output and attendance separately. The study excluded total earnings and output per man-day because both these measures are affected by output and attendance together (see section 4.3.2.1). Although the total earnings measure is mainly affected by total crop, the pattern of attendance may also influence total earnings. Rubber tappers may derive high earnings by working on rest days and public holidays (rest day wages), where the rate of pay is twice and triple the rate of pay on normal work days (basic wages) respectively. Therefore rubber tappers may absent on normal work days and compensate for their loss of earnings by working on rest days and public holidays. As a result they will achieve high levels of job performance because the monetary value of their output is relatively high. Similarly output per man-day is also affected by attendance. Rubber tappers may be absent from work on normal work days but work on rest days and do double tapping to recover lost production. They may thus have a poor attendance on normal work days and yet achieve a high level of productivity. Therefore in order to assess objectively the job performance of rubber tappers, analyses were confined to total crop and out-turn.

5.5 RESULTS OF INDIVIDUAL DIFFERENCES IN JOB PERFORMANCE

Individual differences in job performance of were examined using independent t - tests and one-way ANOVAs. The independent t - test analysis was carried out to determine whether there were significant differences in job performance with respect to sex, experience, and race. A one-way ANOVA was used to determine whether there were significant age differences in job performance.

5.5.1 Results of Sex Differences in Job Performance

Table 5.2 overleaf provides the results of the independent t - test analysis on sex differences in job performance (see also Appendix 32). There were significant differences between male and female rubber tappers with respect to total crop ($t = 3.72$, $df = 1051$, $p = 0.000$) and out-turn ($t = 3.84$, $df = 1051$, $p = 0.000$). As Table 5.2 indicates, female rubber tappers produced a significantly greater amount of rubber compared to male rubber tappers. As Table 5.2 also shows, female rubber tappers had a significantly higher out-turn than male rubber tappers.

Table 5.2 Results of t -test for Sex Differences in Job Performance

Measures	Male		Female		t	Sig.
	Mean	SD	Mean	SD		
Total crop	10274.07	2837.15	10921.81	2776.36	3.72	0.000*
Out-turn	0.779	0.097	0.802	0.094	3.84	0.000*

* significant at $p < 0.01$

5.5.2 Results of Age Differences in Job Performance

Age differences in job performance were analysed using a one-way ANOVA. The results of the one-way ANOVA are given in Appendix 33. A check on the assumption of homogeneity of variance between the three age groups indicated that there was a violation of this assumption (Gravetter & Wallnau, 1992: p. 255). The results of Levene's test of homogeneity of variance for total crop was found to be significant [$F(2, 1047) = 3.307$, $p = 0.037$]. This indicated that the variance for total crop was not homogenous (Foster, 1998: p. 155). However, Cooper and Emory (1995: p 457) stated that ANOVA is a reasonably robust statistical analysis and minor variations from normality and equal variance are tolerable. Therefore despite the variance for total crop being not homogenous, a parametric test was nevertheless used to analyse age differences in total crop. The homogeneity of variance check for out-turn indicated that Levene's test was not significant [$F(2, 1047) = 1.320$, $p = 0.268$]. This indicated that the equality of variance assumption was not violated. Therefore the variance for out-turn, was homogenous and the parametric test was the appropriate analysis.

5.5.2.1 Results of One-Way ANOVA for Age Differences in Total Crop

The results of the one-way ANOVA for age differences in total crop is provided in Appendix 33. The results indicated that there were significant age differences in total crop [$F(2, 1047) = 9.071$, $p = 0.000$]. A *post hoc* multiple comparison of means using Scheffé test was carried out to determine between which age groups the significant differences were to be found (Keppel & Zedeck, 1989: p. 173). The results of the *post hoc* analysis is provided in Appendix 33. Table 5.3 provides the summary results of the multiple comparison of means for total crop using Scheffé test.

Table 5.3 Multiple Comparison of Means Using Scheffé Test for Age Differences in Total Crop

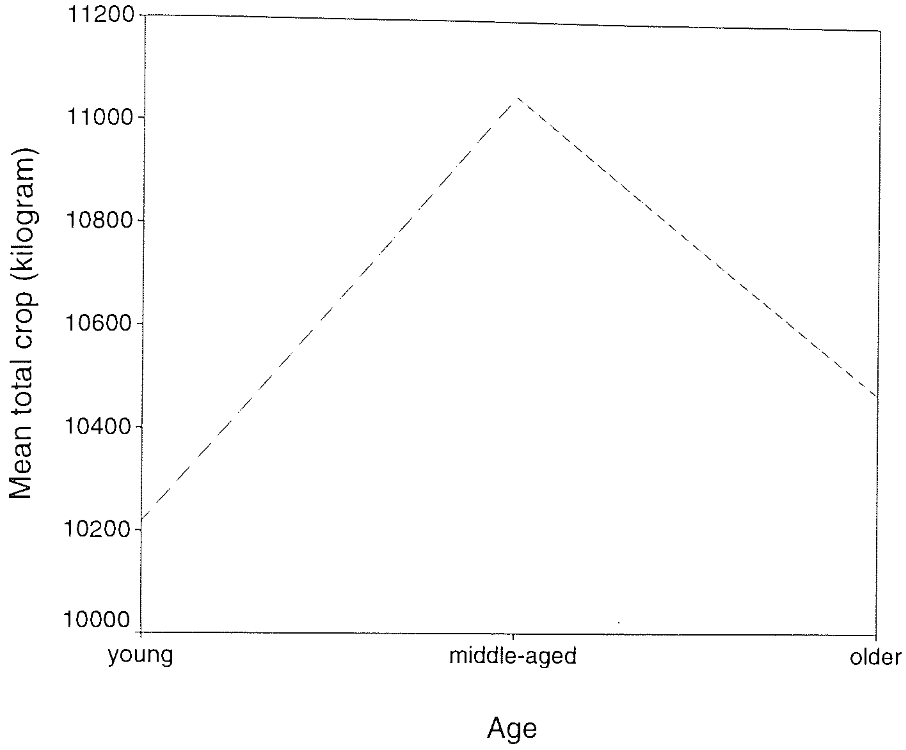
Age Group	Mean	Young	Middle Age	Old
Young	10218.438	-	0.000**	0.553
Middle Age	11052.289	0.000**	-	0.026*
Old	10471.253	0.553	0.026*	-

* significant at $p < 0.05$
** significant at $p < 0.01$

The results of the Scheffé test indicated that there were significant differences in the mean total crop between middle-aged and young rubber tappers (see Table 5.3). There was also a significant difference in the mean total crop between middle-aged and older rubber tappers. However there was no significant difference in the mean total crop between young and older rubber tappers. These findings suggest that middle-aged rubber tappers perform significantly better than young and older rubber tappers with respect to total crop production. Older rubber tappers on the other hand performed equally well, if not better, than young rubber tappers. A comparison of the mean total crop between young and old rubber tappers in Table 5.3 indicated that the mean total crop for older rubber tappers is higher than that for young rubber tappers. However this difference was not significant.

Figure 5.1 overleaf shows the relationship between job performance (total crop) and age. The Figure indicated that the relationship between age and job performance took the form of an inverted-U. This suggest that job performance in terms of total crop production increases with age, peaking at mid forties and thereafter declines as age increases.

Figure 5.1 Relationship between Age and Total Crop



5.5.2.2 Results of the One-Way ANOVA for Age Differences in Out-turn

The results of the one-way ANOVA for age differences in out-turn is provided in Appendix 33. The results indicated that there were significant age differences in out-turn [$F(2, 1047) = 4.674$, $p = 0.01$]. A *post hoc* multiple comparison of means using Scheffé test was carried out to determine between which age groups significant differences were found. The results of the *post hoc* analysis is provided in Appendix 33. Table 5.4 overleaf provides the results of the multiple comparison of means for out-turn using Scheffé test.

The results of the Scheffé test indicated that there was a significant differences in the mean out-turn between young and middle-aged rubber tappers. However the results indicated no significant difference in mean out-turn between young and older rubber tappers or between middle-aged and older rubber tappers. These findings suggest that middle-aged rubber tappers perform significantly better than young rubber tappers, while older rubber tappers perform equally well, if not better than middle-aged and young rubber tappers. Older rubber tappers have a higher mean out-turn than do young rubber tappers (see Table 5.4) although this difference was not found to be significant. The mean out-turn for middle-aged and older rubber tappers was found to be almost identical (see Table 5.4), and the difference was therefore also not significant.

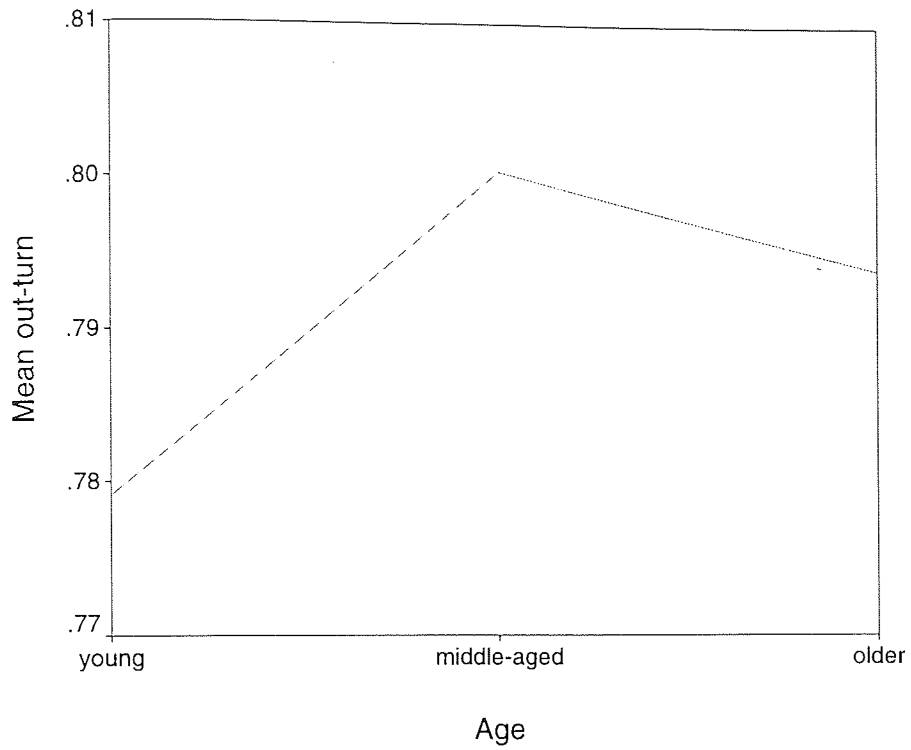
Table 5.4 Multiple Comparison of Means Using Scheffé Test for Out-turn

Age Group	Mean	Young	Middle Age	Old
Young	0.7791	-	0.010*	0.173
Middle Age	0.8003	0.010*	-	0.688
Old	0.7940	0.173	0.688	-

* significant at $p < 0.01$

Figure 5.2 shows the relationship between job performance (out-turn) and age. The Figure indicates that the relationship between age and job performance of rubber tappers in terms of out-turn increases with age until it peaks in the mid-forties and then levels off. This suggests that normal daily work attendance peaks in the mid-forties and remains relatively stable thereafter.

Figure 5.2 Relationship between Age and Out-turn



5.5.3 Results of Experience Differences in Job Performance

It was expected that there would be a significant difference in job performance between less experienced and more experienced rubber tappers. The results of the independent t - test analysis for experience is given in Appendix 34. Table 5.5 provides the summary results of the t - test analysis for differences in total crop and out-turn based on truncated experience.

Table 5.5 Results of t - test for Differences in Job Performance Based on Truncated Experience

Measures	Less Experienced		More Experienced		t	Sig.
	Mean	SD	Mean	SD		
Total crop	10124.99	2596.22	11175.12	2842.20	5.98	0.000*
Out-turn	0.775	0.098	0.807	0.094	5.16	0.000*

* significant at $p < 0.01$

The results of the t - test analysis indicate there was a significant difference in total crop between less and more experienced rubber tappers (t = 5.98, df = 960, p = 0.000). The more experienced rubber tappers had a significantly higher mean total crop than did less experienced rubber tappers (see Table 5.5). There was also a significant difference in out-turn between less and more experienced rubber tappers (t = 5.16, df = 960, p = 0.000), with more experienced rubber tappers having a significantly higher mean out-turn than did less experienced rubber tappers (see Table 5.5).

An independent t - test analysis was also carried out for the sub-sample of rubber tappers to determine differences in job performance based on total experience. The results of the analysis are given in Appendix 35. The results of the independent t - test for total crop indicated a significant difference in total crop between less and more experienced rubber tappers (t = 2.496, df = 164, p = 0.014), with more experienced rubber tappers again having a significantly higher total crop (mean = 11484.83, SD = 3221.84) than did less experienced rubber tappers (mean = 10388.64, SD = 2373.40). The difference in out-turn between less and more experienced rubber tappers was close to significance (t = 1.892, df = 164, p = 0.06). More experienced rubber tappers had higher out-turn (mean = 0.825, SD = 0.085) than did less experienced rubber tappers (mean = 0.799, SD = 0.091).

5.5.4 Results of the Correlation Between Age, Experience and Job Performance.

One aim of this study was to investigate the relationship between age, experience and job performance. The study examined this relationship by analysing the linear correlational effects of age and experience with the job performance. Previous studies have shown that experience rather than age determines job performance (e.g. Giniger, Dispenzieri, & Eisenberg, 1983; Schwab & Heneman, 1977; Sparrow & Davies, 1988). In order to determine the effect of age and experience on job performance, a partial correlation analysis was carried out on job performance by controlling for age and experience respectively. The results of the analysis are given in Appendix 36. Table 5.6 shows the correlation between age, truncated experience and job performance. Table 5.7 shows the partial correlation between age and job performance when truncated experience was controlled. Table 5.8 provides the partial correlation between truncated experience and job performance when age was controlled.

Table 5.6 Correlation between Age, Truncated Experience and Job Performance

Variable	Age	Experience	Total Crop	Out-turn
Age	-			
Experience	0.307**	-		
Total Crop	0.086**	0.175**	-	
Out-turn	0.085**	0.228**	0.625**	-

** significant at $p < 0.01$

Table 5.7 Partial Correlation Between Age and Job Performance when Truncated Experienced was Controlled

Variable	Total Crop	Out-turn
Age	0.0325	0.0149

Table 5.8 Partial Correlation Between Truncated Experience and Job Performance when Age was Controlled

Variable	Total Crop	Out-turn
Experience	0.1544**	0.2096**

** significant at $p < 0.01$

The results of the correlation between age and truncated experience indicated a positive and significant, though modest, correlation between age and experience. As age increases, experience also increases. The results also indicated that the correlation between age and job performance was positive and significant. However the magnitudes of the correlations were weak. The correlation coefficient between age and total crop was 0.086 and between age and out-turn was 0.085. The significant relationship between age and job performance may be a result of the large number of rubber tappers in the sample (N = 961). The results of the correlation between truncated experience and job performance indicate a significantly positive and moderately strong relationship between experience and job performance. The correlation coefficient between experience and total crop was 0.175 and between experience and out-turn was 0.228. The total variance accounted for was 3% for total crop and 5% for out-turn.

The results of the partial correlation indicate that when truncated experience was controlled, the correlation between age and job performance was near zero and not significant. When age was controlled, the correlation between truncated experience and job performance remains positive and significant. However the magnitude of the correlation declined marginally. The correlation between experience and total crop was 0.154 and for out-turn was 0.210. The results of the partial correlation indicated that experience predicts job performance to a greater extent than does age.

Bivariate and partial correlations were also carried out on age, total experience and job performance for the sub-sample of rubber tappers. The results of the analysis are given in Appendix 37. The correlations between total crop and out-turn was positive and significant ($r = 0.705$, $p = 0.000$). The correlation between age and total experience was also positive and significant ($r = 0.366$, $p = 0.000$). This result indicated that older rubber tappers had more years of experience.

The results of the partial correlation indicated that when total experience was controlled, there was a small negative correlation between age and total crop ($r = -0.042$, $p > .50$), which was not significant. For out-turn, the partial correlation with age was also not significant ($r = 0.0635$, $p > .40$).

The results of the partial correlation when age was controlled indicated a positive and almost significant correlation between total experience and total crop ($r = 0.1506$, $p = 0.054$). This suggested that experience more than age determined job performance in terms of total crop production. The correlation between total experience and out-turn was found to be not significant ($r = 0.0396$, $p = 0.614$). The partial correlation between total experience and out-turn when age was controlled in the sub-sample was near zero, whereas in the main sample, the correlation was 0.210 and significant. This finding indicated that in the sub-sample, the daily attendance for work was unaffected by experience.

5.5.5 Results of Race Differences in Job Performance

The results of the t - test analysis provided in Appendix 38 indicated that the homogeneity of variance assumption for total crop was violated (Gravetter & Wallnau, 1992: p. 255). Levene's test for equality of variance was found to be significant ($F = 23.680$, $p = 0.000$) indicating that the variance for total crop was not homogenous (Foster, 1998; p. 155). Therefore race differences in total crop were analysed using the Mann-Whitney U-test. The results of this analysis are provided in Appendix 39. A check on the homogeneity of variance for out-turn using Levene's test was not significant ($F = 3.645$, $p = 0.056$). This finding indicated that the variance for out-turn was homogenous. Therefore the independent t- test was used to analyse race differences in out-turn .

5.5.5.1 Results of Mann-Whitney U-Test for Race Differences in Total Crop

Table 5.9 shows the results of the Mann-Whitney U test for race differences in total crop. The results indicated that there was significant differences in total crop between Malay and Indian rubber tappers (Z = 5.95, p = 0.000). The results indicated that for total crop, Indian rubber tappers had a higher total crop (mean = 11084.20, SD = 3029.13) than did Malay rubber tappers, whose total crop was (mean = 10078.63, SD = 2423.27).

Table 5.9 Results of Mann-Whitney U-Test for Race Differences in Total Crop

Measures	Malay		Indian		Z	Sig.
	Mean Rank	Sum Rank	Mean Rank	Sum Rank		
Total crop	464.58	216957	576.75	337974	5.95	0.000*

* significant at p < 0.01

5.5.5.2 Results of t - test for Race Differences in Out-turn

Table 5.10 shows the results of the t - test analysis of race differences in out-turn (see also Appendix 38). There was a significant difference between Malay and Indian rubber tappers with respect to out-turn(t = 2.817, df = 1051, p = 0.005). As Table 5.10 indicates, Indian rubber tappers have a significantly higher out-turn than do Malay rubber tappers.

Table 5.10 Results of t - test for Race Differences in Out-turn

Measures	Malay		Indian		t	Sig.
	Mean	SD	Mean	SD		
Out-turn	0.78	0.092	0.80	0.099	2.817	0.005*

* significant at p < 0.01

5.6 RESULTS OF UNIVARIATE ANALYSIS OF VARIANCE FOR JOB PERFORMANCE

A univariate analysis of variance using higher-order factorial design was used to examine the interaction of independent variables and its possible effect on job performance. The analysis was conducted using a four-way ANOVA for sex, race, and terrain with either age or experience being the fourth factor. The four-way ANOVA examined only terrain as a mediating variable. Rain saturation was excluded as a mediating variable because, as noted earlier, the distribution of rubber tappers by age, experience and race were quite dissimilar for dry and wet conditions. Therefore these variables may be confounded with rain saturation and any interactions observed in the analysis of variance may be spurious.

Four-way ANOVAs were conducted separately for total crop and out-turn. Two sets of four-way ANOVAs were analysed for both these measures. The first four-way ANOVA examined the interaction between sex, age, race, and terrain. The second four-way ANOVA examined the interaction for sex, experience, race and terrain. The general analytical approach of higher-order factorial design is to examine interactions in a descending order beginning with the highest order interaction (Pedhazur & Schmelkin, 1991). The four-way ANOVA for total crop and out-turn produced first-order interactions. Therefore, for each significant interaction, a simple main effects analysis was computed using single-factor analysis of variance (one-way ANOVA) (Keppel & Zedeck, 1989; Pedhazur & Schmelkin, 1991). The one-way ANOVA tests specific differences between means to determine which simple main effects were significant. Finally, the strength of effect for the simple main effect was calculated using the estimated epilson squared (ε^2) index (Keppel & Zedeck, 1989: p. 140). The estimated epilson squared index explains the percentage of the total variance accounted for by the independent variable in the interaction effect.

5.6.1 Results of the Sex by Age by Race by Terrain Interaction for Total Crop

The results of the sex by age by race by terrain interaction for total crop is provided in Appendix 40. The results indicated that sex [$F(1, 1047) = 4.96$, $p = 0.03$], age [$F(2, 1047) = 4.75$, $p = 0.009$], race [$F(1, 1047) = 10.84$, $p = 0.001$], and terrain [$F(1, 1047) = 21.11$, $p = 0.000$] all have significant main effects. The results also indicated that the only significant interaction obtained was for race by terrain [$F(1,1047) = 15.631$, $p = 0.000$]. However this interaction was found to account for only a very small proportion of the variance ($\varepsilon^2 = 1.63\%$). The mean total crop for race by terrain is shown in Table 5.11. The simple main effect was analysed using a one-way ANOVA. A significant difference for the mean total crop between Malay and Indian rubber tappers in the hilly terrain was obtained [$F(1, 662) = 49.407$, $p = 0.000$]. Indian rubber tappers had a significantly higher mean total crop (11670.63) than did Malay rubber tappers (10153.06). However there was no significant difference in the mean total crop between Malay and Indian rubber tappers working in undulating terrain [$F(1, 391) < 1$, $p > .50$]. This result suggests that the job performance of rubber tappers varies according to race in hilly, but not in undulating terrain.

Table 5.11 Mean Total Crop for Interaction of Race by Terrain

Terrain	Malay		Indian	
	Mean	N	Mean	N
Undulating	9952.12	173	10094.23	218
Hilly	10153.06	294	11670.63	368
Total	10078.62	467	11084.19	586

A significant difference was found between Indian rubber tappers working in undulating and hilly terrains [$F(1, 586) = 39.518$, $p = 0.000$]. Indian rubber tappers working in hilly terrain had a significantly higher mean total crop (11670.63) than did Indian rubber tappers working in undulating terrain (10094.23). However, there was no significant difference in total crop between the two terrains[$F(1, 467) < 1$, $p > .30$] for Malay rubber tappers (hilly = 10153.06; undulating = 9952.12). These finding suggest that the job performance of Indian rubber tappers was affected by terrain whereas that of Malay rubber tappers was not.

5.6.2 Results of the Sex by Experience by Race by Terrain Interaction for Total Crop

The results of the sex by experience by race by terrain interaction for total crop are provided in Appendix 41. The results indicated that sex [$F(1, 962) = 4.34$, $p = 0.038$], experience [$F(1, 962) = 44.81$, $p = 0.000$], race [$F(1, 962) = 27.13$, $p = 0.000$], and terrain [$F(1, 962) =37.17$, $p = 0.000$] all had significant main effects. The results also indicated that the only significant interaction obtained was for race by terrain [$F(1,962) = 11.18$, $p = 0.001$]. However this interaction was found to account for only a very small proportion of the variance ($\varepsilon^2 = 0.92\%$). The race by terrain interaction for mean total crop is shown in Table 5.12 overleaf. The simple main effect was analysed using a one-way ANOVA. Similar results to the sex by age by race by terrain interaction were obtained. A significant difference in mean total crop between Malay and Indian rubber tappers in the hilly terrain was obtained [$F(1, 576) = 45.25$, $p = 0.000$]. Indian rubber tappers had a significantly higher mean total crop (11764.00) than did Malays (10259.35). However there was no significant difference in mean total crop between Malay and Indian rubber tappers working in undulating terrain [$F(1, 391) <1$, $p > .50$]. This result once again suggests that the job performance of rubber tappers varies according to race in hilly, but not in undulating terrain.

A significant difference was again found between Indian rubber tappers working in undulating and hilly terrains [$F(1, 524) = 43.633$, $p = 0.000$]. Indian rubber tappers working in hilly terrain had a significantly higher mean total crop (11764.00) than did Indian rubber tappers working in undulating terrain (10094.23). However, there was no significant difference in total crop between the two terrains[$F(1, 443) = 1.69$, $p > .10$] for Malay rubber tappers (hilly = 10259.35; undulating = 9952.12). These findings confirm that the job performance of Indian rubber tappers was affected by terrain whereas that of Malays was not.

Table 5.12 Mean Total Crop for Interaction of Race by Terrain

	Malay		Indian	
Terrain	Mean	N	Mean	N
Undulating	9952.12	173	10094.23	218
Hilly	10259.35	270	11764.00	306
Total	10139.37	443	11069.33	524

5.6.3 Results of the Sex by Age by Race by Terrain Interaction for Out-turn

The results of the four-way ANOVA for out-turn is provided in Appendix 42. The results indicated that sex[$F(1, 1047) = 7.94$, $p = 0.005$] and age[$F(2, 1047) = 5.45$, $p = 0.004$] have significant main effects. The results indicated that there was a significant sex by race interaction [$F(1,1047) = 10.877$, $p = 0.001$]. However this interaction accounted for only a very small proportion of the variance ($\varepsilon^2 = 0.92\%$). The mean out-turn for sex and race is shown in Table 5.13 overleaf. The simple main effect was analysed using a one-way ANOVA. For mean out-turn there was a significant difference between female Malay and female Indian rubber tappers [$F(1, 592) = 13.161$, $p = 0.000$], with female Indian rubber tappers having a significantly higher mean out-turn (0.8131) than did female Malay rubber tappers (0.7847). However there was no significant difference in mean out-turn between Malay male and

Indian male rubber tappers [F(1, 461) <1, p >.70]. This suggests that for female rubber tappers, there were significant race differences in job performance, while for male rubber tappers there were not.

When a sex comparison was made within the same racial grouping, the results indicated a significant difference in out-turn for Indian rubber tappers [F(1, 586) = 18.450, p = 0.000] but no significant difference for Malay rubber tappers [F(1, 467) = 0.266, p = 0.606]. Female Indian rubber tappers were found to have a significantly higher mean out-turn (0.8131) than did male Indian rubber tappers (0.7777). On the other hand, the mean out-turn for Malay male and female rubber tappers was virtually identical (male: 0.7803; female: 0.7847). This finding suggests that on the whole, female Indian rubber tappers have a superior job performance in terms of out-turn compared to male Indian rubber tappers, but that there is no sex difference in job performance among Malay rubber tappers.

Table 5.13 Mean out-turn for Interaction of Sex by Race

	Malay		Indian	
Sex	Mean	N	Mean	N
Male	0.7803	232	0.7777	229
Female	0.7847	235	0.8131	357
Total	0.7825	467	0.7993	586

5.6.4 Results of the Sex by Experience by Race by Terrain Interaction for Out-turn

The results of the four-way ANOVA are given in Appendix 43. There were significant main effects of sex [F(1, 962) = 10.74, p = 0.001], experience [F(1, 962) = 39.41, p = 0.000] and race [F(1. 962) = 8.89, p = 0.003]. Significant interactions were obtained for sex by race [F(1, 962) = 10.22, p = 0.001] and for experience by terrain [F(1, 962) = 19.86, p = 0.000]. However these interactions accounted for only 0.88% and 1.8% of the total variance respectively. Mean out-turn values for the sex by race and experience by terrain interactions are shown in Tables 5.14 and 5.15 respectively. The simple main effects analysis for the sex by race interaction indicates a significant difference in the mean out-turn between female Malay and female Indian rubber tappers [F(1, 551) = 13.56, p = 0.000]. Female Indian rubber tappers had a significantly higher mean out-turn (0.8146) than did female Malays (0.7846). However there was no significant difference in the mean out-turn between Malay male and Indian male rubber tappers [F(1, 416) < 1, p > .50]. This suggests that for female rubber tappers, there were significant race differences in job performance, while for male rubber tappers there were not.

Table 5.14 Mean out-turn for Interaction of Sex by Race

	Malay		Indian	
Sex	Mean	N	Mean	N
Male	0.7786	218	0.7730	198
Female	0.7846	225	0.8146	326
Total	0.7816	443	0.7989	524

When a comparison was made within the same racial grouping, the results again indicated a significant difference in out-turn for Indian rubber tappers [F(1, 524) = 22.05, p = 0.000] but no significant differences for Malay rubber tappers [F(1, 443) < 1, p > .40]. Female Indian rubber tappers were found to have a significantly higher mean out-turn (0.8146) than did male Indian rubber tappers (0.7730). On the other hand, the mean out-turn for Malay male and female rubber tappers was very similar (male: 0.7786; female: 0.7846). It thus appears that female Indian rubber tappers have a superior job performance in terms of out-turn compared to male Indian rubber tappers, but that there are no sex differences in job performance among Malay rubber tappers.

The simple main effect analysis for the experience by terrain interaction obtained a significant difference in the mean out-turn between undulating and hilly terrain for less experienced [F(1, 481) = 3.47, p = 0.000] and more experienced [F(1, 481) = 4.85, p = 0.028] rubber tappers. Less experienced tappers working in hilly terrain had a significantly higher mean out-turn (0.7879) than did less experienced tappers working in undulating terrain (0.7547). More experienced tappers working in undulating terrain had a significantly higher mean out-turn (0.8180) than did more experienced tappers working in hilly terrain (0.7990).

Table 5.15 Mean out-turn for Interaction of Experience by Terrain

	Undulating		Hilly	
Experience	Mean	N	Mean	N
Less	0.7547	184	0.7879	297
More	0.8180	207	0.7990	274
Total	0.7882	391	0.7932	571

When a comparison was made between less and more experienced rubber tappers working in undulating terrain, a significant difference was obtained [F(1, 391) = 39.16, p = 0.000]. More experienced rubber tappers working in undulating terrain had a significantly higher mean out-turn (0.8180) than did less experienced rubber tappers (0.7547). However there was no significant difference in the mean out-turn of less experienced (0.7879) and more experienced (0.7990) rubber tappers working in hilly terrain [F(1, 571) = 2.07, p > .10] These findings suggest that less experienced rubber tappers working in undulating and hilly terrain have poorer job performance in terms of out-turn compared to more experienced rubber tappers working in similar terrains.

6.7 SUMMARY OF FINDINGS ON JOB PERFORMANCE

The results of the individual differences in job performance indicated that there were significant sex, age, experience, and race differences in job performance. Female rubber tappers had a significantly higher level of job performance compared to male rubber tappers in both total crop and out-turn measures. Significant age differences were also found in job performance. Middle-aged rubber tappers had significantly higher levels of total crop compared to young and older rubber tappers. For out-turn, there was a significant difference between middle-aged and young rubber tappers. The relationship between age and total crop production was an inverted U. Total crop production increased with age peaking in the mid-forties, and declining thereafter. However for out-turn, the study found the attendance of rubber tappers increased with age and plateaued after the mid-forties. A significant difference in job performance was obtained between less and more experienced rubber tappers. On both job performance measures, the more experienced rubber tappers had a significantly higher level of performance compared to less experienced rubber tappers. The results of the correlations between age, experience and job performance indicated that experience predicts job performance to a greater extent than does age. Examining race differences in job performance, it was found that Indian rubber tappers had a significantly higher level of job performance compared to Malay rubber tappers. The univariate analysis of variance examined separately the combined interaction of sex, age, race and terrain as well as sex, experience, race and terrain on the job performance of rubber tappers. The results indicated a significant interaction between race and terrain for total crop. The study also found a significant interaction between sex and race for out-turn when examining the sex by age by race by terrain interaction. In the sex by experience by race by terrain interaction, there were significant interactions between sex and race and also experience and terrain. The simple main effect analysis for the race and terrain interaction for total crop revealed that Indian rubber tappers had a far superior job performance in hilly terrain compared to Malay rubber tappers. Indian rubber tappers in hilly terrain were also found to perform better than Indian rubber tappers in undulating terrain. Malay rubber tappers on the other hand performed at about the same level in both undulating and hilly terrains. Finally, the simple main effects analysis for out-turn indicated that female Indian rubber tappers' job performance was far superior to that of female Malay rubber tappers. Female Indian rubber tappers also had a significantly higher out-turn compared to male Indian rubber tappers. Among Malay rubber tappers, the out-turn for male and female were more or less the same. The simple main effects analysis also indicated that less experienced rubber tappers working in undulating and hilly terrain had poorer job performance than did more experienced rubber tappers working in similar terrains.

CHAPTER 6: INDIVIDUAL DIFFERENCES IN ABSENTEEISM

6.1 INTRODUCTION

This chapter provides the results of the analysis of individual differences in absenteeism. The individual differences examined were sex, age, experience, and race. Two type of absenteeism were considered: avoidable and unavoidable absence. Interactions of sex, age, experience, and race with terrain for both absenteeism measures will also be reported.

The chapter begins by outlining the descriptive statistics on avoidable and unavoidable absence. The main findings of the individual differences in absenteeism are then described. The results of the correlations between age, experience, and the absence measures are also reported. Finally, the results of two four-way ANOVAs for sex by experience by race by terrain and for sex by age by race by terrain for avoidable and unavoidable absence are presented.

6.2 DESCRIPTIVE STATISTICS FOR ABSENTEEISM

Table 6.1 provides the descriptive statistics for avoidable and unavoidable absence measures. Avoidable absence was operationalised as the total unsanctioned absence taken in 1996, which was indexed by the number of absent days. Unavoidable absence was operationalised as the total sick leave taken in 1996, and was indexed by the amount of hospitalised and non-hospitalised sick leave.

Table 6.1 Descriptive Statistics for Absence Measures

Type of Absence	Mean	Median	Mode	SD	Min	Max
Absent days	30.84	26.0	17	22.7	0	117
Hospitalised sick leave	0.12	0	0	0.89	0	12
Non-hospitalised sick leave	6.98	5.0	0	6.82	0	41

Table 6.2 Descriptive Statistics for Avoidable and Unavoidable Absence

Absence Measure	Mean	Median	Mode	SD	Min	Max
Avoidable	30.84	26.0	17	22.7	0	117
Unavoidable	7.10	5.0	0	7.01	0	48

Table 6.2 provides the descriptive statistics for avoidable and unavoidable absence. The mean avoidable absence was 30.84 days with a standard deviation of 22.7 days and a modal value of 17 days. The minimum avoidable absence in the sample was zero days while the maximum avoidable absence was 117 days. Hospitalised and non-hospitalised sick leave were combined to provide a measure of unavoidable absence. From Table 6.1 it can be seen that rubber tappers generally take a higher number of non-hospitalised sick leave days (mean = 6.98, SD = 6.82) compared to hospitalised sick leave days (mean = 0.12, SD = 0.89). Table 6.2 provides the descriptive statistics for unavoidable absence. The mean unavoidable absence was 7.10 days with a standard deviation of 7.01 days. The mode was zero. The minimum unavoidable absence in the sample was zero days while the maximum unavoidable absence was 48 days.

6.3 RESULTS OF INDIVIDUAL DIFFERENCES IN ABSENTEEISM

Sex, experience and race differences in absenteeism were examined using independent t - tests, while age differences were examined using a one-way ANOVA. However, for sex, experience, and race, where a diagnostic check on the homogeneity of variance for avoidable and unavoidable absence using Levene's test indicated that the test was significant, a Mann-Whitney U test was carried out to determine individual differences in absenteeism.

6.3.1 Results of Sex Differences in Absenteeism

The Levene's test for homogeneity of variance was found to be significant for both avoidable (F = 5.962, p = 0.015) and unavoidable absence (F = 9.321, p = 0.002), indicating that the variance for both absence measure was not homogenous. The results of the analysis are given in Appendix 44. Table 6.3 provides the results of the Mann-Whitney U-test analysis on sex differences in absenteeism. The results are also given in Appendix 44.

Table 6.3 Results of Mann-Whitney U-Test for Sex Differences in Absenteeism

Absence	Male		Female		Z	Sig.
	Mean Rank	Sum Rank	Mean Rank	Sum Rank		
Avoidable	570.65	263069	493.01	291862	4.11	0.000*
Unavoidable	499.53	230281.5	548.39	324649.5	2.60	0.009*

* significant at p < 0.01

The results of the Mann-Whitney U test indicated that there were significant differences between male and female rubber tappers in both avoidable (Z = 4.11, p = 0.000) and unavoidable absence (Z = 2.60, p = 0.009). For avoidable absence, male rubber tappers had a higher mean absence (33.97 days) compared to female rubber tappers

(28.40 days). The results for unavoidable absence indicated that female rubber tappers had higher mean absence (7.66 days) compared to male rubber tappers (6.39 days).

6.3.2 Results of Age Differences in Absenteeism

Age differences in absenteeism were analysed using a one-way ANOVA. Data for avoidable and unavoidable absence are reported separately.

6.3.2.1 Age Differences in Avoidable Absence

The results of the one-way ANOVA for age differences in avoidable absence are given in Appendix 45. The results indicated that there were significant age differences in avoidable absence [$F(2,1047) = 7.804$, $p = 0.000$]. A *post hoc* multiple comparison of means using Scheffé test was carried out to determine between which age groups the significant age differences occurred. The results of the *post hoc* analysis is given in Appendix 45. Table 6.4 provides the results of the multiple comparison of means using Scheffé test.

Table 6.4 Multiple Comparison of Means Using Scheffé Test for Avoidable Absence

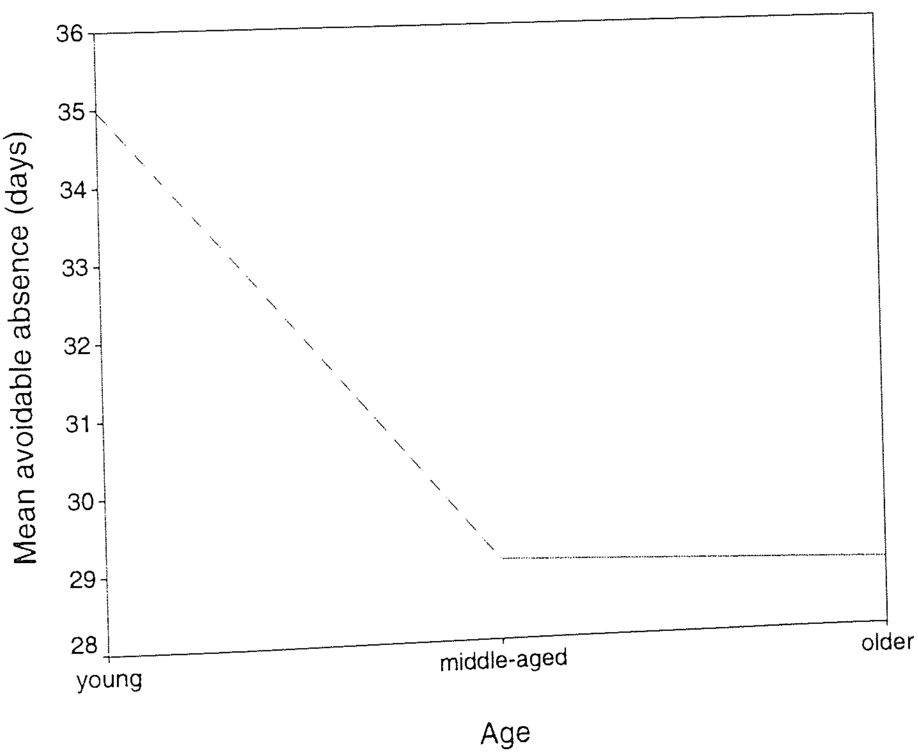
Age Group	Mean	Young	Middle-aged	Older
Young	34.98	-	0.002*	0.005*
Middle-aged	29.04	0.002*	-	0.995
Older	28.87	0.005*	0.995	-

* significant at $p < 0.01$

The results of Scheffé test indicated that there were significant differences in avoidable absence between younger and older rubber tappers, as well as between younger and middle-aged rubber tappers. There was no significant difference in avoidable absence between middle-aged and older rubber tappers. These findings suggest that young rubber tappers have a significantly higher avoidable absence compared to middle-aged and older rubber tappers.

A comparison of the mean avoidable absence in Table 6.4 indicated the younger rubber tappers have the highest mean avoidable absence (34.98 days) followed by middle-aged rubber tappers (29.04 days) with older rubber tappers having the lowest mean avoidable absence (28.87 days). Figure 6.1 shows the relationship between age and avoidable absence. It can be seen from Figure 6.1 that as age increases, avoidable absence decreases.

Figure 6.1 Relationship Between Age and Avoidable Absence



6.3.2.2 Age Differences in Unavoidable Absence

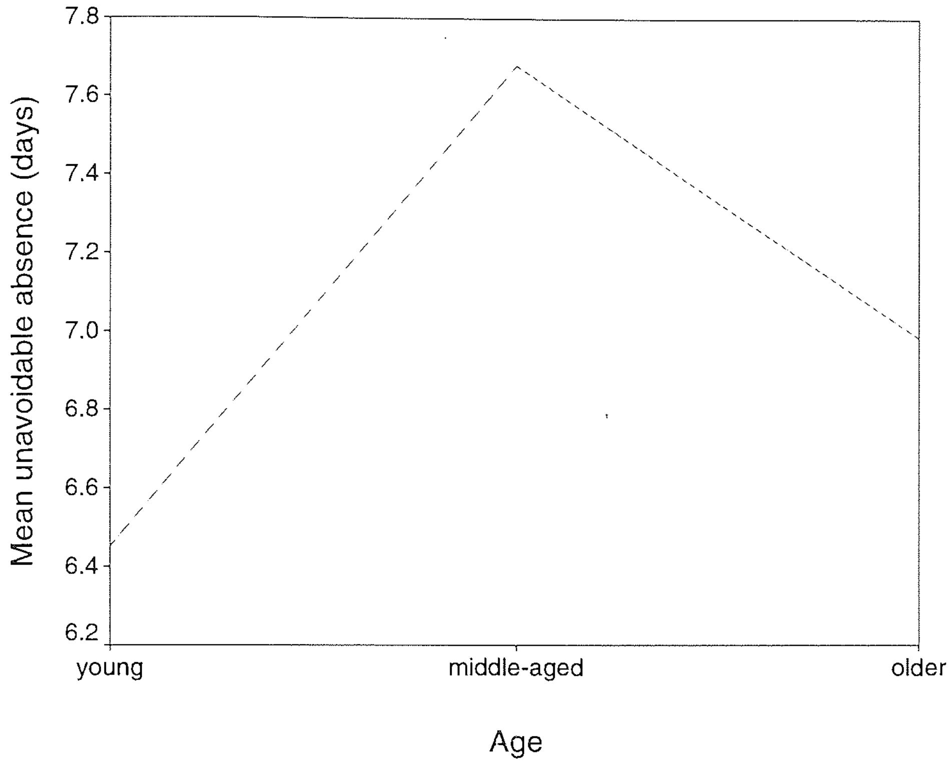
The results of the one-way ANOVA for age differences in unavoidable absence are given in Appendix 46. The results indicated age differences in unavoidable absence just failed to reach significance [$F(2,1047) = 2.966$, $p = 0.052$]. A *post hoc* multiple comparison of means using Scheffé test was carried out to determine between which age groups significant age differences occured, if any. The results of the *post hoc* analysis are given in Appendix 46. Table 6.5 provides the results of the multiple comparison of means using Scheffé test.

Table 6.5 Multiple Comparison of Means Using Scheffé Test for Unavoidable Absence

Age Group	Mean	Young	Middle-aged	Older
Young	6.45	-	0.056	0.655
Middle-aged	7.68	0.056	-	0.434
Older	6.99	0.655	0.434	-

The results of the Scheffé test indicated that the differences in unavoidable absence between young and middle-aged rubber tappers was close to significance. There was no significant difference in unavoidable absence between young and older rubber tappers or between middle-aged and older rubber tappers. A comparison of mean unavoidable absence in Table 6.5 indicated that middle-aged rubber tappers have the highest mean unavoidable absence (7.68 days) followed by older rubber tappers (6.99 days) with the youngest rubber tappers having the lowest mean unavoidable absence (6.45 days). Figure 6.2 shows the relationship between age and unavoidable absence. The figure shows an inverted-U relationship between age and unavoidable absence. Unavoidable absence initially increases with age, peaks in the mid-forties and declines thereafter.

Figure 6.2 Relationship Between Age and Unavoidable Absence



6.3.3 Experience and Absenteeism

Table 6.6 overleaf provides the results of the Mann-Whitney U-test for differences in avoidable and unavoidable absence, using truncated experience. The Levene's test for homogeneity of variance was found to be significant for both avoidable absence (F = 5.003, p = 0.026) and unavoidable absence (F 27.302, p = 0.000), indicating that the variance for both absence measures was not homogenous. The results of the Levene's and Mann Whitney U-tests are given in Appendix 47.

Table 6.6 Results of Mann-Whitney U-test for Absenteeism Using Truncated Experience

Absence	Less Experienced		More Experienced		Z	Sig.
	Mean Rank	Sum Rank	Mean Rank	Sum Rank		
Avoidable	547.40	263299.5	415.60	199903.5	7.36	0.000*
Unavoidable	436.25	209837.0	526.75	253365.98	5.07	0.000*

* significant at p < 0.01

The results of the Mann-Whitney U-test indicated that there were significant differences between less and more experienced rubber tappers in both avoidable absence (Z = 7.36, p = 0.000) and unavoidable absence (Z = 5.07, p = 0.000). For avoidable absence, less experienced rubber tappers had a higher mean absence rate (35.81 days) compared to more experienced rubber tappers (25.90 days). The results for unavoidable absence indicated that more experienced rubber tappers had a higher mean absence (8.67 days) compared to less experienced rubber tappers (6.14 days).

An analysis was also carried out to examine differences in avoidable and unavoidable absence based on total experience for the sub-sample of rubber tappers. The analysis used an independent t - test for avoidable absence, as the Levene's test for homogeneity of variance was not significant for avoidable absence (F = 1.954, p = 0.164). Unavoidable absence was analysed using a Mann Whitney U-test because the variance was not homogenous, as indicated by a significant Levene's test (F = 7.111, p = 0.008). The result of the analysis is given in Appendix 48.

There was a significant difference in avoidable absence rates between less and more experienced rubber tappers (t = 3.190, df = 164, p = 0.002). The results indicated that less experienced tappers had a higher mean avoidable absence rate (33.88 days) compared to more experienced tappers (23.53 days).

There was also a significant difference between less and more experienced rubber tappers in unavoidable absence (Z = 2.491, $p = 0.013$). More experienced tappers had a higher mean unavoidable absence rate (11.94 days) compared to less experienced tappers (8.41 days).

6.3.4 Results of Race Differences in Absenteeism

Table 6.7 provides the results of the t-test for race differences in absenteeism. The results of the analysis are given in Appendix 49. There was a significant difference in avoidable absence between Malay and Indian rubber tappers (t = 3.021, df = 1051, p = 0.003). Malay rubber tappers had a higher avoidable absence rate than did Indian rubber tappers (see Table 6.7).

The results also indicated that there was a significant difference in unavoidable absence rate between Malay and Indian rubber tappers (t = 2.849, df = 1051, p = 0.004), with Indian tappers having higher unavoidable absence rates than did Malays (see Table 6.7).

Table 6.7 Results of t - test for Race Differences in Absenteeism

Absence	Malay		Indian		t	Sig.
	Mean	SD	Mean	SD		
Avoidable	33.20	22.31	28.96	22.86	3.02	0.003*
Unavoidable	6.41	7.08	7.65	6.89	2.85	0.004*

* significant at $p < 0.01$

6.4 RESULTS OF CORRELATIONS BETWEEN AGE, EXPERIENCE AND ABSENTEEISM

The study examined the relationship between age, experience, and absenteeism by analysing the linear correlational effects of age and experience on avoidable and unavoidable absence. The correlation between age and experience was 0.307 ($p = 0.000$). A possible reason for the low correlation between age and experience is that the experience of rubber tappers was truncated. A bivariate correlation were carried out to determine the relationships between absenteeism, age and experience. The correlations between absenteeism, age and experience for the overall sample are provided in Table 6.8. The result of the analysis is given in Appendix 50.

Table 6.8 Correlation Between Absenteeism, Age and Experience

	Age	Experience	Avoidable absence	Unavoidable absence
Age	-			
Experience	0.307**	-		
Avoidable absence	-0.139**	-0.272**	-	
Unavoidable absence	0.052	0.197**	-0.142**	-

** significant at $p < 0.01$

The correlation coefficients in Table 6.8 shows the magnitude and direction of the relationship between age, experience and the absenteeism measures. The results indicated that the correlation between avoidable and unavoidable absence was negative and significant ($r = -0.142$, $p = 0.000$). However the magnitude of the relationship was weak. The amount of common variance (r^2) between avoidable and unavoidable absence was only about 2 percent.

The results of the correlation between age and avoidable absence was negative and significant ($r = -0.139$, $p = 0.000$). However the magnitude of the relationship is again weak. The negative correlation indicated that as age increases, avoidable absence slightly decreases. On the other hand, the relationship between age and unavoidable absence was found to be positive but not significant (r = 0.052, p = 0.110). The near zero correlation suggest that absence due to sickness was quite unrelated to age.

The results of the correlation between experience and avoidable absence indicated that the relationship was negative and significant (r = -0.272, p = 0.000). However the magnitude of this relationship is also weak. The negative correlation suggests that as length of service increases, avoidable absence decreases. On the other hand, the results of the correlation between experience and unavoidable absence was found to be positive and significant (r = 0.197, p = 0.000). The positive correlation suggests that as length of service increases, unavoidable absence also increases, albeit moderately.

In order to determine the effect of age and experience on absenteeism, a partial correlation analysis was carried out for avoidable absence and unavoidable absence by controlling for age and experience respectively. The results of the analysis are given in Appendix 50. Table 6.9 shows the partial correlations.

Table 6.9 Partial Correlation Between Age and Experience with Absenteeism

Variable	Control for	Avoidable Absence	Unavoidable Absence
Age	Experience	-0.0586	-0.0084
Experience	Age	-0.2423**	0.1897**

** significant at $p < 0.01$

The results of the partial correlation indicated that when experience was controlled, the significant correlation between age and avoidable absence disappeared. The correlation between age and avoidable absence was near zero, though, due to sample size, close to significance (r = - 0.0586, p = 0.07) The result of the correlation between age and unavoidable absence was near zero and insignificant (r = - 0.0084, p = 0.794). On the other hand, when age was controlled for, the correlation between experience and avoidable absence remained negative and significant (r = -0.2423, p = 0.000). Similarly, the correlation between experience and unavoidable absence also remained positive and significant (r = 0.1897, p = 0.000). The results of the partial correlation suggest that experience influences avoidable and unavoidable absence to a greater extent than age. As experience increases, the rate of avoidable absence decreases. Therefore, regardless of age, those rubber tappers with less experience have a higher rate of avoidable absence compared to those with more experience. In contrast, the results of the partial correlation for unavoidable absence indicated that as experience increases, the rate of unavoidable absence also increases. This result suggests that regardless of age, those rubber tappers with more experience generally have a higher rate of unavoidable absence compared to those with less experience.

6.5 RESULTS OF UNIVARIATE ANALYSIS OF VARIANCE FOR ABSENTEEISM

A univariate analysis of variance using a higher-order factorial design was used to examine the interaction of independent variables and their possible effects on absenteeism. The analysis was conducted using a four-way ANOVA that included sex, race and terrain. Age and experience were included separately in the four-way ANOVAs because the partial correlation discussed above suggested that experience more than age influences the rate of avoidable and unavoidable absence. Therefore these variables were considered separately in the four-way ANOVAs to determine their interaction with sex, race and terrain. Rain saturation was excluded from the analysis because, as mentioned in Chapter 4, age, experience and race were found to be potentially confounded with rain saturation.

Four-way ANOVAs were analysed separately for avoidable and unavoidable absence. Two sets of four-way ANOVAs were conducted for avoidable and unavoidable absence. The first four-way ANOVA examined possible interactions for sex, experience, race, and terrain. The second examined possible interactions between sex, age, race, and terrain. Strength of effect for each significant main and interaction effect was calculated using the estimated epilson squared (ε^2) index (Keppel & Zedeck, 1989). The results of the four-way ANOVA for sex by experience by race by terrain for unavoidable absence indicated the presence of two significant second-order interactions: sex by experience by terrain and experience by race by terrain. The four-way ANOVA for sex by age by race by terrain for unavoidable absence resulted in a significant third-order interaction. As mentioned previously, the general analytical approach of higher-order factorial designs is to examine the interaction in a descending order, beginning with the highest order interaction (Pedhazur and Schmelkin,1991). In the case of the significant second-order interaction, a simple interaction effect analysis was carried out using a two-factor ANOVA design to determine which of the simple interaction effects was significant. The simple interaction effect analysis was carried out to examine the interactions between two factors within each level of a third factor. A simple-simple main effects analysis was then carried out using a one-way ANOVA to determine which of the simple-simple main effects were significant. This analysis was done by examining the interaction between two factors by holding a third factor constant. In the case of the significant third-order interaction, graphs were plotted to examine the interactions. One-way ANOVAs were then conducted to determine simple main effects. A multiple comparison of means using Scheffé test was conducted to determine between which age groups the significant age differences occurred. The following section reports the four-way ANOVAs for avoidable and unavoidable absence.

6.5.1 Results of Four-Way ANOVA for Sex, Experience, Race, and Terrain for Avoidable Absence

The results of the sex by experience by race by terrain for avoidable absence are given in Appendix 51. The results indicated that sex [F(1, 962) = 8.90, p = 0.003], experience [F(1, 962) = 59.12, p = 0.000] and race [F(1, 962) = 9.73, p = 0.002] all had a significant main effects. The results also indicated a significant second-order interaction for sex by experience by race [F(1, 962) = 6.21, p = 0.013]. This interaction was found to account for 0.48% of the variance. A simple interaction effects analysis was carried out for the second-order interaction. The results of the two-factor ANOVA design to examine the simple interaction effects are given in Table 6.10. A simple-simple main effects analysis was then carried out for each of the significant simple interaction effects of Table 6.10 using a one-way ANOVA. The results of the simple-simple main effects are shown in Table 6.11.

Table 6.10 overleaf provides the summary of the tests of simple interaction effects for the sex by experience by race interaction. The results indicated that there were three significant simple interaction effects . The first was between sex and race for less experienced rubber tappers [F(1, 481) = 11.69, p = 0.001]. The second was between sex and experience for Indian rubber tappers [F(1, 520) = 4.26, p = 0.040]. The third was between experience and race for male rubber tappers [F(1, 415) = 9.87, p = 0.002].

Table 6.10 Summary of Tests of Simple Interaction Effects for Sex by Experience by Race Interaction

Source	ss	df	MS	F	Sig.
Sex x Race x Less Experience	6152.52	1	9152.52	11.69	0.001**
Sex x Race x More Experience	58.01	1	58.01	0.13	0.720
Sex x Experience x Malay	1678.11	1	1678.11	3.42	0.065
Sex x Experience x Indian	2065.33	1	2065.33	4.26	0.040*
Experience x Race x Male	5212.41	1	5212.41	9.87	0.002**
Experience x Race x Female	117.92	1	117.92	0.26	0.612

* significant at p < 0.05
** significant at p < 0.01

Table 6.11 Summary of Tests of simple-simple Main Effects for Sex by Experience by Race Interaction

Source	ss	df	MS	F	Sig.
Less Experienced Male x Race	1968.74	1	1968.74	3.80	0.053
Less Experienced Female x Race	4423.26	1	4423.26	8.30	0.004**
Less Experienced Malay x Sex	417.13	1	417.13	0.87	0.351
Less Experienced Indian x Sex	9601.05	1	9601.05	17.16	0.000**
Indian Male x Experience	15136.65	1	15136.65	26.69	0.000**
Indian Female x Experience	7203.04	1	7203.04	16.36	0.000**
More Experienced Indian x Sex	673.53	1	673.53	1.71	0.193
More Experienced Male x Race	3275.15	1	3275.15	6.07	0.015*
Malay Male x Experience	652.43	1	652.43	1.32	0.251

* significant at p < 0.05
** significant at p < 0.01

Table 6.11 provides the results of the simple-simple main effects for the three significant simple interaction effects of Table 6.10. The results indicated that there were five significant simple-simple main effects. The first significant simple-simple main effect was for the less experienced female rubber tappers and race [$F(1, 255) = 8.30$, $p = 0.004$]. A comparison of mean avoidable absence rates indicated that less experienced Malay female rubber tappers had a significantly higher avoidable absence rate (mean = 38.98, SD = 23.78) than did less experienced Indian female rubber tappers (mean = 30.09, SD = 22.75). The second significant simple-simple main effect was for less experienced Indian rubber tappers and sex [F(1, 286) = 17.16, p = 0.000]. A comparison of mean avoidable absence rates indicated that less experienced Indian male rubber tappers had a significantly higher avoidable absence rate (mean = 41.92, SD = 24.97) than did less experienced Indian female rubber tappers (mean = 30.09, SD = 22.75). The third significant simple-simple main effect was for Indian male rubber tappers and experience [F(1, 197) = 26.69, p = 0.000]. A comparison of mean avoidable absence rates indicated that less experienced Indian male rubber tappers had a significantly higher avoidable absence rate (mean = 41.92, SD = 24.97) than did more experienced Indian male rubber tappers (mean = 24.17, SD = 22.12]. The fourth significant simple-simple main effect was for Indian female rubber tappers and experience [F(1,323) = 16.54, p = 0.000]. A comparison of mean avoidable absence rates indicated that less experienced Indian female rubber tappers had a significantly higher avoidable absence rate (mean = 30.09, SD = 22.75) than did more experienced Indian female rubber tappers (mean = 20.62, SD = 18.51). The fifth significant simple-simple main effect was for more experienced male rubber tappers by race [F(1, 189) = 6.07, p = 0.015]. A comparison of mean avoidable absence rates indicated that the more experienced Malay male rubber tappers had a significantly higher avoidable absence rate (mean = 32.56, SD = 24.07) than did more experienced Indian male rubber tappers (mean = 24.17, SD = 22.12).

In summary, less experienced Malay female and Indian male rubber tappers had significantly higher avoidable absence than did less experienced Indian female rubber tappers. Also less experienced Indian male and Indian female rubber tappers had significantly higher avoidable absence than more experienced Indian male and female rubber tappers. Finally, more experienced Malay male rubber tappers had significantly higher avoidable absence than did more experienced Indian male rubber tappers. Figure

6.3 shows the sex by race interaction for less experienced rubber tappers. Figure 6.4 shows the sex by experience interaction for Indian rubber tappers. Finally, Figure 6.5 shows the sex by race interaction for more experienced rubber tappers.

Figure 6.3 Sex by Race Interaction for Less Experienced Rubber Tappers

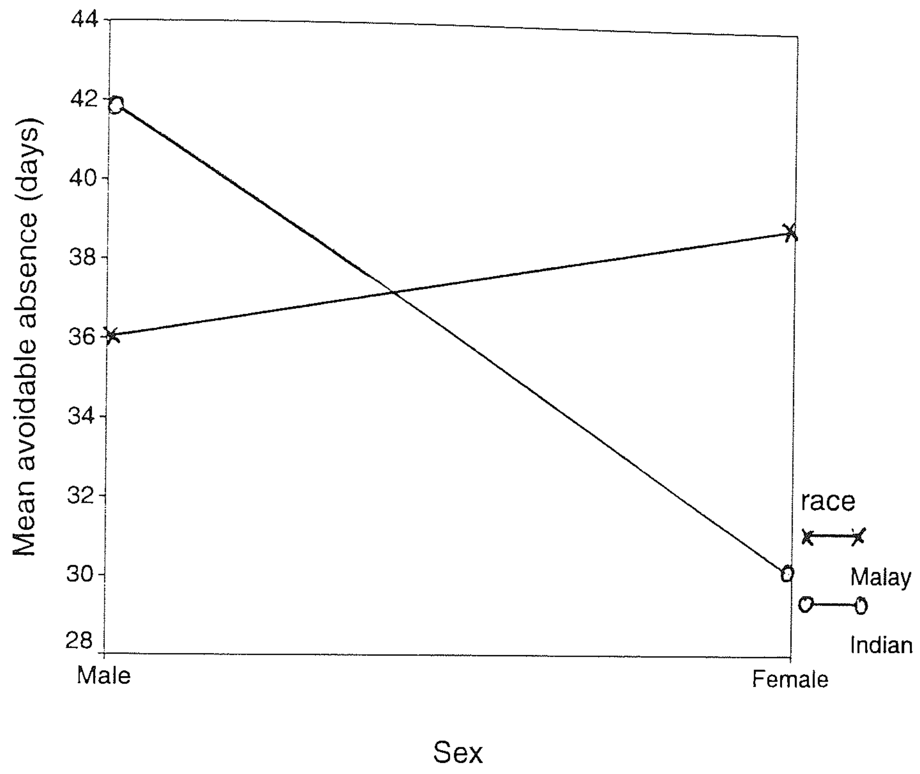


Figure 6.4 Sex by Experience Interaction for Indian Rubber Tappers

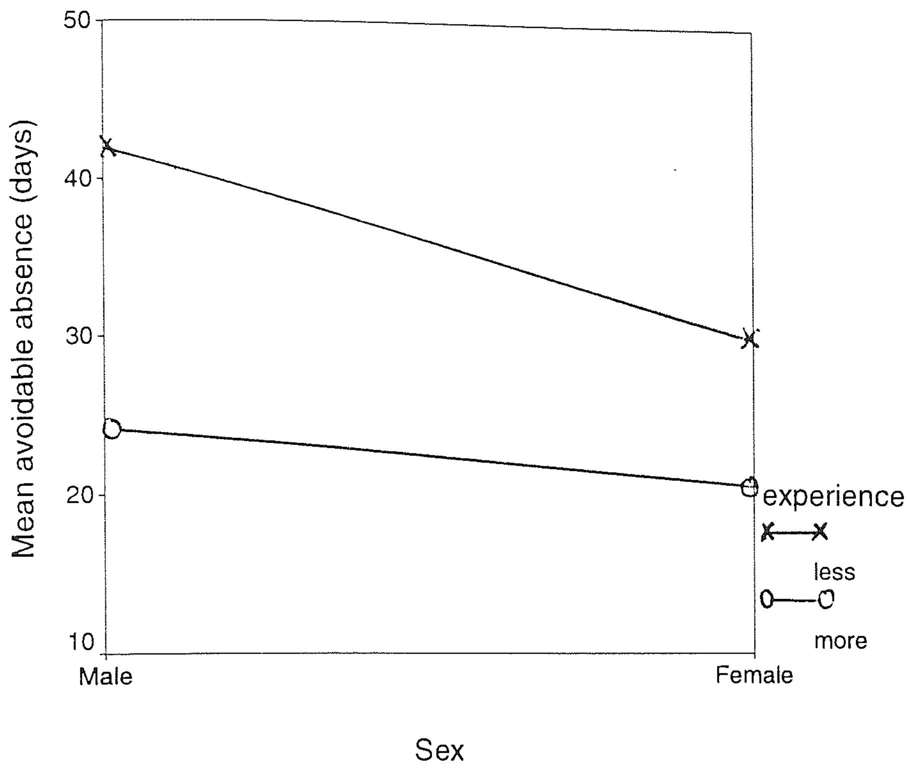
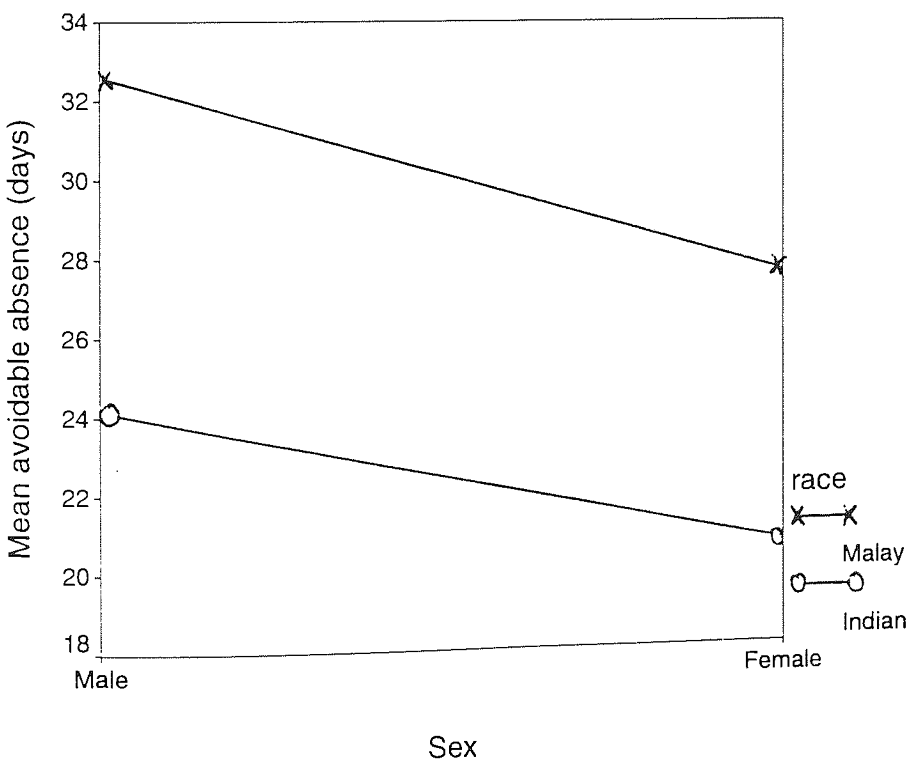


Figure 6.5 Sex by Race Interaction for More Experienced Rubber Tappers



6.5.2 Results of Four-Way ANOVA for Sex, Experience, Race, and Terrain for Unavoidable Absence

The results of the sex by experience by race by terrain interaction for unavoidable absence are given in Appendix 52. The results indicated that experience [F(1, 962) = 39.68, p = 0.000], race [F(1, 962) = 13.60, p = 0.000] and terrain [F(1, 962) = 35.79, p = 0.000] had significant main effects. The results also indicated that there were two significant second-order interactions. The first significant interaction was for sex by experience by terrain [F(1, 962) = 4.95, p = 0.026]. This interaction were found to account for 0.34% of the variance. The second significant interaction was for experience by race by terrain [F(1, 962) =6.36, p = 0.012]. This interaction was found to account for 0.46% of the variance. The results of the significant second-order interactions are reported separately.

6.5.2.1 Results of Sex by Experience by Terrain Interaction for Unavoidable Absence

Table 6.12 overleaf provides a summary of the tests of simple interaction effects for the sex by experience by terrain interaction. The results indicated there were three significant simple interaction effects. The first significant simple interaction effect was between sex and experience in undulating terrain [F(1, 391) = 4.56, p = 0.033]. The second significant simple interaction effect was between sex and terrain for more experienced rubber tappers [F (1, 481) = 5.70, p = 0.017]. The third significant simple interaction effect was between experience and terrain for female rubber tappers [F (1, 547) = 27.17, p = 0.000].

Table 6.12 Summary of Tests of Simple Interaction Effects for Sex by Experience by Terrain Interaction

Source	ss	df	MS	F	Sig.
Sex x Experience x Undulating	284.08	1	284.08	4.56	0.033*
Sex x Experience x Hilly	5.89	1	5.89	0.18	0.671
Sex x Terrain x Less Experience	10.24	1	10.24	0.28	0.596
Sex x Terrain x More Experience	302.14	1	302.14	5.70	0.017*
Experience x Terrain x Male	141.28	1	141.28	3.52	0.061
Experience x Terrain x Female	1308.60	1	1308.60	27.17	0.000**

* significant at $p < 0.05$
** significant at $p < 0.01$

Table 6.13 Summary of Tests of Simple-simple Main Effects for theSex by Experience by Terrain Interaction

Source	ss	df	MS	F	Sig.
Male in Undulating Terrain x Experience	386.79	1	386.79	7.27	0.008*
Female in Undulatin Terrain x Experience	2448.99	1	2448.99	35.64	0.000*
Less Experience in Undulating Terrain x Sex	0.003	1	0.003	0.00	0.993
More Experience in Undulating Terrain x Sex	602.64	1	602.64	7.68	0.006*
More Experience Male x Terrain	528.19	1	528.19	11.68	0.001*
More Experience Female x Terrain	3136.99	1	3136.99	54.01	0.000*
More Experience in Hilly Terrain x Sex	2.61	1	2.61	0.08	0.782
Less Experience Female x Terrain	7.69	1	7.69	0.21	0.648
Female in Hilly Terrain x Experience	5.89	1	5.89	0.18	0.675

* significant at $p < 0.01$

Table 6.13 provides the results of the simple-simple main effects for the three significant simple interaction effects of Table 6.12. The results indicated that there were five significant simple-simple main effects. The first was between the male rubber tappers working in undulating terrain and experience [$F(1, 162) = 7.27$, $p = 0.008$]. A comparison of mean unavoidable absence rates indicated that more experienced male rubber tappers working in undulating terrain had significantly higher unavoidable absence rates (mean = 9.63, SD = 7.71) than did less experienced male rubber tappers working in the same type of terrain (mean = 6.54, SD = 6.81). The second significant simple-simple main effect was between female rubber tappers working in undulating terrain and experience [F(1, 229) = 35.64, p = 0.000]. A comparison of mean unavoidable absence rates indicated that more experienced female rubber tappers working in undulating terrain had a significantly higher unavoidable absence rate (mean = 13.11, SD = 9.56) than did less experienced female rubber tappers working in the same terrain (mean = 6.55, SD =6.51). The third significant simple-simple main effect was between more experienced rubber tappers working in undulating terrain and sex [F (1, 207) = 7.68, p = 0.006]. A comparison of mean unavoidable absence rates indicated that more experienced female rubber tappers working in undulating terrain had a significantly higher unavoidable absence rate (mean = 13.11, SD = 9.56) than did more experienced male rubber tappers working in the same terrain (mean = 9.63, SD = 7.71). The fourth significant simple-simple main effect was between more experienced male rubber tappers and terrain [F(1, 189) = 11.68, p = 0.001]. A comparison of mean unavoidable absence rates indicated that more experienced male rubber tappers working in undulating terrain had a significantly higher unavoidable absence rate (mean = 9.63, SD = 7.71) than did more experienced male rubber tappers working in hilly terrain (mean = 6.27, SD = 5.82). The fifth significant simple-simple main effect was between more experienced female rubber tappers and terrain [F (1, 292) = 54.01, p = 0.000]. A comparison of the mean unavoidable absence rates indicated that more experienced female rubber tappers working in undulating terrain had a significantly higher unavoidable absence rate (mean = 13.11, SD = 9.56) than did more experienced female rubber tappers working in hilly terrain (mean = 6.47, SD = 5.83).

In summary, more experienced male and female rubber tappers working in undulating terrain had significantly higher unavoidable absence than did those working in hilly terrain. Also, more experienced male and female rubber tappers working in undulating terrain have higher unavoidable absence than did less experienced male and female rubber tappers working in similar terrain. Figure 6.6 shows the interaction between sex and terrain for more experienced rubber tappers. Figure 6.7 shows the interaction between sex and experience for rubber tappers working in undulating terrain.

Figure 6.6 Sex and Terrain Interaction for More Experienced Rubber Tappers

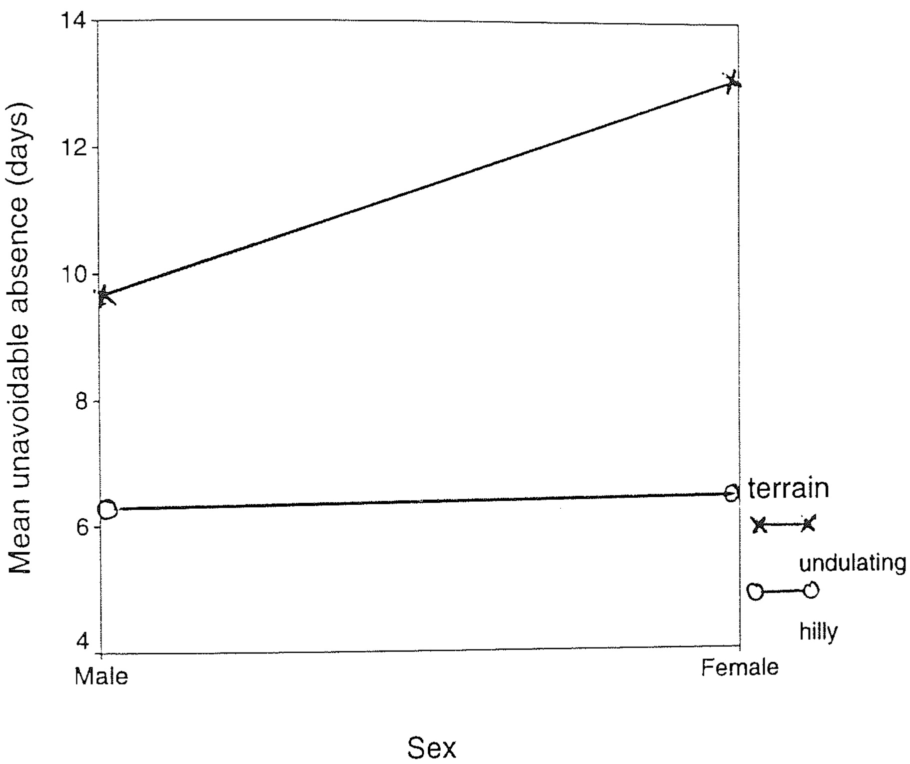
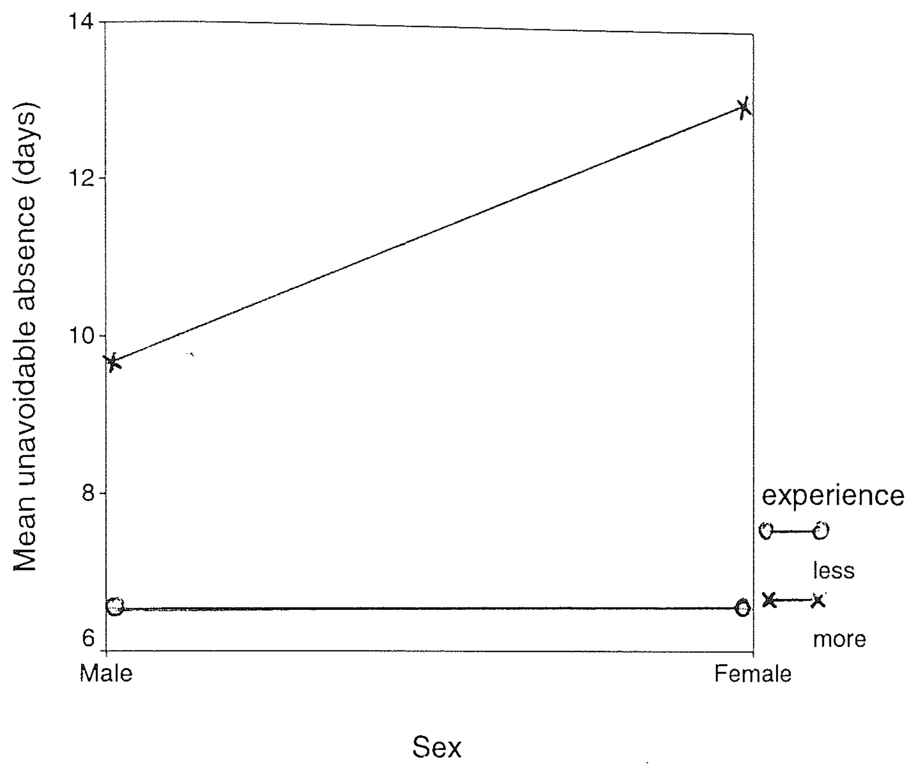


Figure 6.7 Sex and Experience Interaction for Rubber Tappers in Undulating Terrain



6.5.2.2 Results of Experience by Race by Terrain Interaction for Unavoidable Absence

Table 6.14 overleaf provides the summary of the tests of simple interaction effects for the experience by race by terrain interaction. The results indicated there were four significant simple interaction effects. The first was between experience and race for undulating terrain [F (1, 391) = 4.87, p = 0.028]. The second was between experience and terrain for Malay rubber tappers [F (1, 442) = 30.34, p = 0.000]. The third was between experience and terrain for Indian rubber tappers [F(1, 520) = 4.42, p = 0.036]. The fourth significant simple interaction effect was between race and terrain for more experience [F(1, 458) = 20.091, p = 0.000].

Table 6.14 Summary of Tests of Simple Interaction Effects for Experience by Race by Terrain Interaction

Source	ss	df	MS	F	Sig.
Experience x Race x Undulating	306.56	1	306.56	4.87	0.028*
Experience x Race x Hilly	17.37	1	17.37	0.58	0.447
Experience x Terrain x Malay	1195.51	1	1195.51	30.34	0.000**
Experience x Terrain x Indian	206.74	1	206.74	4.42	0.036*
Race x Terrain x Less Experience	47.17	1	47.17	1.35	0.250
Race x Terrain x More Experience	965.14	1	965.14	18.59	0.000**

* significant at $p < 0.05$
** significant at $p < 0.01$

Table 6.15 Summary of Tests of simple-simple Main Effects for Experience by Race by Terrain Interaction

Source	ss	df	MS	F	Sig.
Less experience in Undulating terrain x Race	108.89	1	108.89	2.50	0.115
More experience in Undulating terrain x Race	214.01	1	214.01	2.66	0.104
Malay in Undulating terrain x Experience	2010.04	1	2010.04	29.16	0.000**
Indian in Undulating terrain x Experience	652.45	1	652.45	11.19	0.001**
Less experience Malay x Terrain	55.28	1	55.28	2.48	0.117
More experience Malay x Terrain	4052.66	1	4052.66	76.64	0.000**
Malay in Hilly terrain x Experience	3.37	1	3.37	0.17	0.685
Indian in Hilly terrain x Experience	64.11	1	64.11	1.67	0.197
Less experience Indian x Terrain	2.51	1	2.51	0.06	0.810
More experience Indian x Terrain	318.89	1	318.89	6.27	0.013*
More experience in Hilly terrain x Race	934.78	1	934.78	30.68	0.000**

* significant at $p < 0.05$
** significant at $p < 0.01$

Table 6.15 provides the results of the simple-simple main effects for the four significant simple interaction effects of Table 6.14. The results indicated that there were five significant simple-simple main effects. The first was between Malay rubber tappers working in undulating terrain and experience [F (1,173) = 29.16, p = 0.000]. A comparison of mean unavoidable absence rates indicated that more experienced Malay rubber tappers working in undulating terrain had a significantly higher unavoidable absence rate (mean = 12.61, SD = 9.55) than did less experienced Malay rubber tappers working in the same terrain (mean = 5.42, SD = 5.06). The second significant simple-simple main effect was between Indian rubber tappers working in undulating terrain and experience [F(1, 218) = 11.19, p = 0.001]. A comparison of mean unavoidable absence rates indicated that more experienced Indian rubber tapper working in undulating terrain had a significantly higher unavoidable absence rate (mean = 10.57, SD = 8.19) than did less experienced Indian rubber tappers working in the same terrain (mean = 7.07, SD = 7.20). The third significant simple-simple main effect was between more experienced Malay rubber tappers and terrain [F(1, 247) = 76.64, p = 0.000]. A comparison of mean unavoidable absence rates indicated that more experienced Malay rubber tappers working in undulating terrain had a significantly higher unavoidable absence rate (mean = 12.61, SD = 9.55) than did more experienced Malay rubber tappers working in hilly terrain (mean = 4.49, SD = 4.48). The fourth significant simple-simple main effect was between more experienced Indian rubber tappers and terrain [F(1, 234) = 6.27, p = 0.013]. A comparison of mean unavoidable absence rates indicated that the more experienced Indian rubber tappers working in undulating terrain had a significantly higher unavoidable absence rate (mean = 10.57, SD = 8.19) than did more experienced Indian rubber tappers working in hilly terrain (mean =8.18, SD = 6.34). Finally, the fifth significant simple-simple main effect was between more experienced rubber tappers working in hilly terrain and race [F(1, 274) = 30.68, p = 0.000]. A comparison of mean unavoidable absence rates indicated that the more experienced Indian rubber tappers working in hilly terrain had a significantly higher unavoidable absence rate (mean = 8.18, SD = 6.34) than did more experienced Malay rubber tappers in the same terrain (mean = 4.49, SD = 4.48).

In summary, more experienced Malay and Indian rubber tappers working in undulating terrain had significantly higher unavoidable absence than did less experienced Malay and Indian rubber tappers working in undulating terrain. Also, more experienced Malay and Indian rubber tappers working in undulating terrain had a significantly higher unavoidable absence than did more experienced Malay and Indian rubber tappers working in hilly terrain. Finally, more experienced Indian rubber tappers working in hilly terrain had significantly higher unavoidable absence than did more experienced Malay rubber tappers working in hilly terrain. Figure 6.8 shows the interaction between race and experience for rubber tappers working in undulating terrain. Figure 6.9 overleaf shows the interaction between race and terrain for more experienced rubber tappers.

Figure 6.8 Race and Experience Interaction for Rubber Tappers in Undulating Terrain

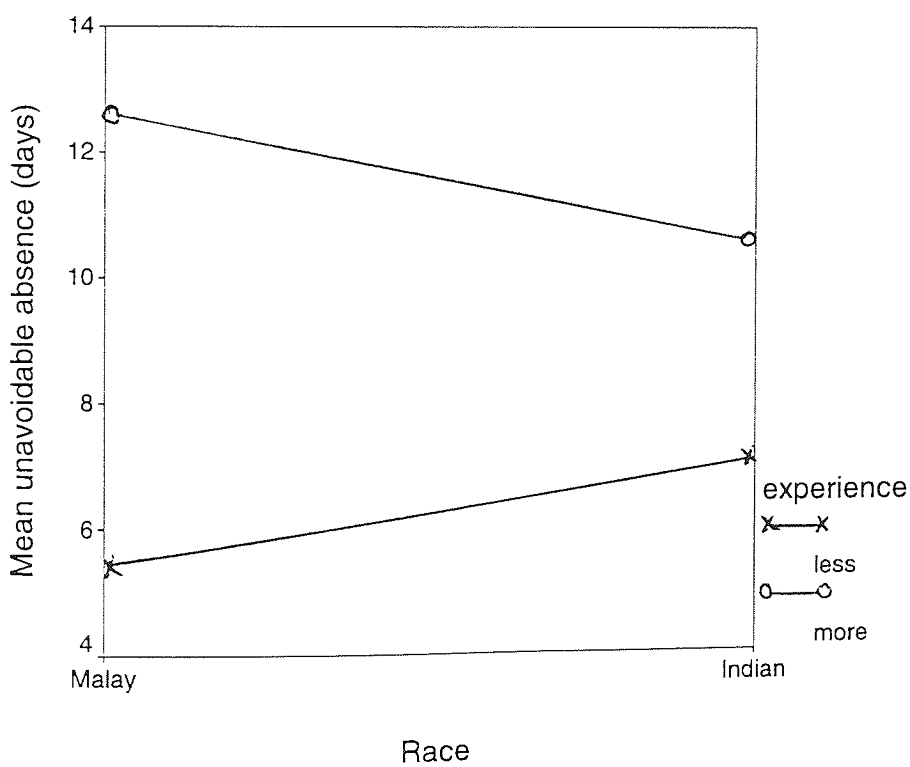
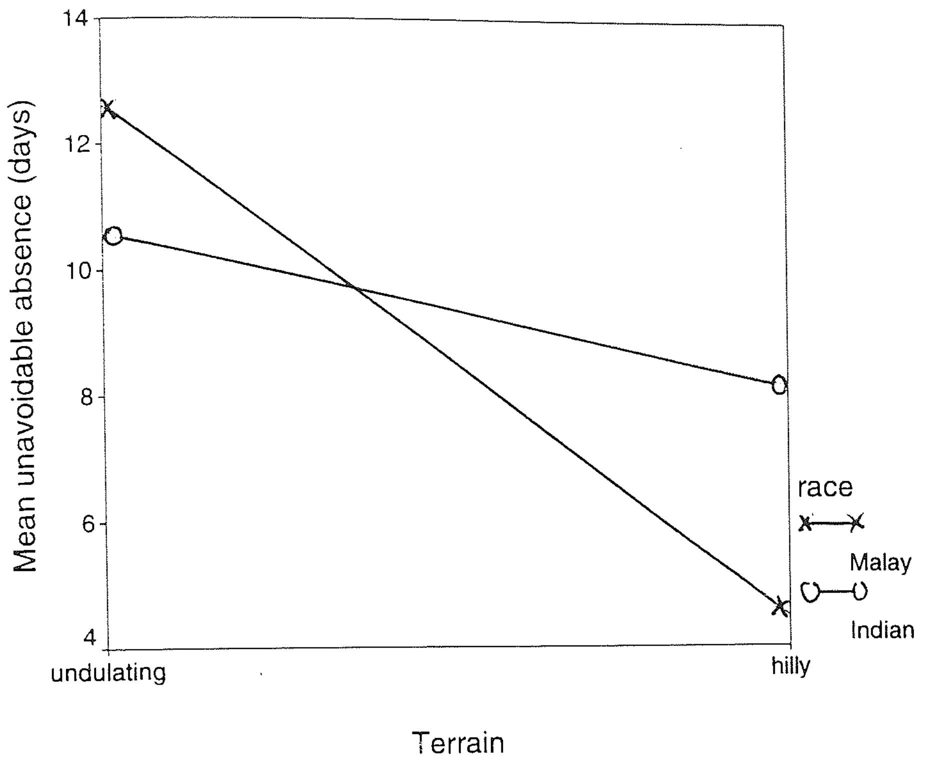


Figure 6.9 Race and Terrain Interaction for More Experienced Rubber Tappers



6.5.3 Results of Four-way ANOVA for Sex by Age by Race by Terrain for Avoidable Absence

The results of the sex by age by race by terrain interaction for avoidable absence are given in Appendix 53. The results indicated that sex [F(1, 1047) = 10.02, p = 0.002], age [F(2, 1047) = 8.25, p = 0.000] and race [F(1, 1047) = 5.02, p = 0.025] all have a significant main effects. There were also significant sex by race [F(1, 1047) = 7.03, p = 0.008] and race by terrain [F(1, 1047) = 6.41, p = 0.012] interactions. However these interactions accounted for only 0.55% and 0.49% of the total variance respectively. The mean avoidable absence rate for the sex by race and race by terrain interaction are shown in Table 6.16 and Table 6.17. The simple main effect analysis for the sex by race interaction indicated a significant difference in the mean avoidable absence rate between Malay female and Indian female rubber tappers [F(1, 592) = 10.74, p = 0.001]. Malay female rubber tappers had a significantly higher mean avoidable absence rate (32.01 days) than did Indian female rubber tappers (26.03 days). However there was no significant difference in the mean avoidable absence rate between Malay male and Indian male rubber tappers[F(1, 461) <1, p >.60]. This results suggest that for female rubber tappers, there were significant race differences in avoidable absence, while for male rubber tappers there were not.

Table 6.16 Mean Avoidable Absence for Interaction of Sex by Race

Sex	Malay		Indian	
	Mean	N	Mean	N
Male	34.41	232	33.54	229
Female	32.01	235	26.03	357
Total	33.20	467	28.96	586

When comparisons were made within the same racial grouping, significant differences in avoidable absence rate for Indian rubber tappers [F(1, 586) = 15.44, p = 0.000] but no significant differences for Malay rubber tappers [F(1, 467) = 1.35, p > .20] were obtained. Indian male rubber tappers were found to have a significantly higher mean avoidable absence rate (33.54 days) than did Indian female rubber tappers (26.03 days). On the other hand, mean avoidable absence rate for male and female Malay rubber tappers were much the same (male: 34.41 days; female 32.01 days). These findings suggest that Indian male rubber tappers have higher avoidable absence rates compared to Indian female rubber tappers, but that there is no sex difference in avoidable absence rates among Malay rubber tappers.

The simple main effect analysis for the race by terrain interaction found a significant difference in the mean avoidable absence rate between undulating and hilly terrain for Malay rubber tappers [F(1, 467) = 9.81, p = 0.002]. Malay rubber tappers working in hilly terrain had a significantly higher mean avoidable absence rate (35.66 days) than did those working in undulating terrain (29.02). However the mean avoidable absence rate between undulating and hilly terrain for Indian rubber tappers [F(1, 586) = 1.48, p > .20] was not significant. These results suggest that for Malay rubber tappers, there were significant differences in avoidable absence between undulating and hilly terrain, while for Indian rubber tappers there were not.

Table 6.17 Mean Avoidable Absence for Interaction of Race and Terrain

Terrain	Malay		Indian	
	Mean	N	Mean	N
Undulating	29.02	173	30.45	218
Hilly	35.66	294	28.08	368
Total	33.20	467	28.96	586

When a comparison was made between Malay and Indian rubber tappers working in undulating terrain, no significant difference was obtained [F(1, 391) < 1, p > .50]. Malay and Indian rubber tappers working in undulating terrain had relatively similar avoidable absence rates (Malay: 29.02; Indian: 30.45). However there was a significant difference in mean avoidable absence rates between Malay (35.66) and Indian (28.08) rubber tappers working in hilly terrain [F(1, 662) = 18.76, p = 0.000].

6.5.4 Results of Four-way ANOVA for Sex by Age by Race by Terrain for Unavoidable Absence

The results of the four-way ANOVA for sex by age by race by terrain for unavoidable absence are provided in Appendix 54. Sex [F(1, 1047) = 11.07, p = 0.001], race [F(1, 1047) = 7.90, p = 0.005] and terrain [F(1, 1047) = 58.90, p = 0.000] all exerted significant main effects on unavoidable absence. The results also indicated that there was a significant third-order interaction for sex, age, race and terrain [F(2, 1047) =

3.36, p = 0.035]. The amount of variance accounted for by this interaction was 0.38%. The interactions for sex, race, and terrain with age are displayed graphically in Appendices 55 and 56. Appendix 55 shows the sex by race by age interaction in undulating terrain . Appendix 56 shows the sex by race by age interaction in hilly terrain.

Simple main effects analyses using single-factorial analysis of variance (one-way ANOVA) were conducted for sex by race interactions for both types of terrain. Table 6.18 provides the summary of the simple main effects analysis. For each of the significant simple main effects, a multiple comparison of means using Scheffé test was conducted to determine between which age groups significant differences were obtained.

Table 6.18 Summary of Simple Main Effects Analysis for Sex by Race by Terrain by Age Interaction

Source	SS	df	MS	F	Sig.
Malay male x undulating terrain	45.08	2	22.54	0.425	0.655
Malay female x undulating terrain	194.26	2	247.13	2.603	0.080
Indian male x undulating terrain	220.61	2	110.30	1.923	0.153
Indian female x undulating terrain	438.26	2	219.13	3.635	0.029*
Malay male x hilly terrain	46.29	2	23.15	1.233	0.294
Malay female x hilly terrain	141.98	2	70.99	3.521	0.032*
Indian male x hilly terrain	261.08	2	130.54	3.536	0.032*
Indian female x hilly terrain	72.04	2	36.02	0.906	0.406

* significant at $p < 0.05$

The results of Table 6.18 indicated there were significant age differences among Indian female rubber tappers working in undulating terrain [$F(2, 134) = 3.64$, $p = 0.029$], Malay females working in hilly terrain [$F(2, 140) = 3.52$, $p = 0.032$] and Indian male rubber tappers working in hilly terrain [$F(2, 145) = 3.54$, $p = 0.032$]. A multiple comparison of means using Scheffé test was carried out to determine between which age groups the significant age differences occurred.

Table 6.19 shows the summary of Scheffé test results for Indian female rubber tappers working in undulating terrain. The results of the Scheffé test indicated that there were significant differences in unavoidable absence between younger and older Indian female rubber tappers. There was also a significant difference in unavoidable absence between middle-aged and older Indian female rubber tappers. However there was no significant difference in unavoidable absence between younger and middle-aged Indian female rubber tappers. These findings suggest that middle-aged and older Indian female rubber tappers working in undulating terrain have a significantly higher unavoidable absence compared to young Indian female rubber tappers. A comparison of the mean unavoidable absence rates shown in Table 6.19 indicates that older rubber tappers have the highest mean unavoidable absence (14.68 days) followed by middle-aged rubber tappers (8.39 days) with younger rubber tappers having marginally the lowest mean unavoidable absence (8.27 days).

Table 6.19 Summary of Scheffé Test for Indian Female Rubber Tappers in Undulating Terrain

Age Group	Mean	Young	Middle-aged	Older
Young	8.27	-	0.997	0.040*
Middle-aged	8.39	0.997	-	0.038*
Older	14.68	0.040*	0.038*	-

* significant at $p < 0.05$

Table 6.20 shows the summary of Scheffé test results for Malay female rubber tappers working in hilly terrain. The results of the Scheffé test indicated that there were significant differences in unavoidable absence between young and middle-aged Malay female rubber tappers. There was no significant difference in unavoidable absence between young and older Malay female rubber tappers, or between middle-aged and older Malay female rubber tappers. These findings suggest that young Malay female rubber tappers working in hilly terrain have a significantly higher unavoidable absence rates compared to middle-aged and older Malay female rubber tappers. A comparison of the mean unavoidable absence in Table 6.20 indicated that young rubber tappers have the highest mean unavoidable absence (6.00 days) followed by older rubber tappers (3.88 days) with middle-aged rubber tappers having marginally the lowest mean unavoidable absence (3.66 days).

Table 6.20 Summary of Scheffe's Test for Malay Female Rubber Tappers in Hilly Terrain

Age Group	Mean	Young	Middle-aged	Older
Young	6.00	-	0.044*	0.114
Middle-aged	3.66	0.044*	-	0.970
Older	3.88	0.114	0.970	-

* significant at $p < 0.05$

Table 6.21 shows the summary of Scheffé test results for Indian male rubber tappers working in hilly terrain. The results of the Scheffé test indicated that there were significant differences in unavoidable absence between middle-aged and young Indian male rubber tappers. There was no significant difference in unavoidable absence between young and older Indian male rubber tappers, or between middle-aged and older Indian male rubber tappers. These findings suggest that middle-aged Indian male rubber tappers working in hilly terrain have significantly higher unavoidable absence rates compared to young and older Indian male rubber tappers. A comparison of the mean unavoidable absence rates shown in Table 6.21 indicated that middle-aged rubber tappers have the highest mean unavoidable absence (8.03 days) followed by older rubber tappers (7.59 days) with young rubber tappers having the lowest mean unavoidable absence (5.10 days).

Table 6.21 Summary of Scheffé Test for Indian Male Rubber Tappers in Hilly Terrain

Age Group	Mean	Young	Middle-aged	Older
Young	5.10	-	0.042*	0.181
Middle-aged	8.03	0.042*	-	0.944
Older	7.59	0.181	0.944	-

* significant at $p < 0.05$

In summary, the results of the sex by race by terrain by age interaction indicated that unavoidable absence was significantly high among middle-aged and older Indian female rubber tappers working in undulating terrain, young Malay female rubber tappers working in hilly terrain and middle-aged Indian male rubber tappers working in hilly terrain.

6.6 SUMMARY OF FINDINGS ON ABSENTEEISM

The results of the individual differences in absenteeism indicated that there were significant sex differences in both avoidable and unavoidable absence. Male rubber tappers had a significantly higher avoidable absence rate than did female rubber tappers. On the other hand, female rubber tappers had a significantly higher unavoidable absence rate compared to male rubber tappers.

Significant age differences in avoidable absence were obtained but there were no significant age differences in unavoidable absence. Young rubber tappers were found to have a significantly higher avoidable absence rate compared to middle-aged and older rubber tappers. The relationship between age and avoidable absence was found to be negative, suggesting that as age increases, avoidable absence decreases. The relationship between age and unavoidable absence was found to take the form of an inverted U, suggesting that unavoidable absence increases until the mid-forties and thereafter declines.

Significant differences were also found in avoidable and unavoidable absence in both less and more experienced rubber tappers. Less experienced rubber tappers were found to have significantly higher avoidable absence rates than more experienced rubber tappers. On the other hand, more experienced rubber tappers had a significantly higher unavoidable absence rate than did less experienced rubber tappers. The results of the partial correlation between age, experience and absenteeism indicated that experience more than age influences avoidable and unavoidable absence.

The results of race differences in absenteeism indicated significant race differences in avoidable and unavoidable absence. Malay rubber tappers were found to have a significantly higher avoidable absence rate compared to Indian rubber tappers. In contrast, Indian rubber tappers were found to have significantly higher unavoidable absence rates compared to Malay rubber tappers.

A univariate analysis of variance examined the combined interactions of sex, experience, race and terrain for avoidable and unavoidable absence. The results for avoidable absence indicated a significant second-order interaction for sex by experience by race. A simple interaction effect analysis produced three significant simple interactions: sex and race for low experience; sex and experience for Indian rubber tappers; and experience and race for male rubber tappers. The results of the simple-simple main effects analysis indicated that among less experienced rubber tappers, avoidable absence rates were significantly higher among Indian male and Malay female rubber tappers. Among the more experienced rubber tappers, Malay male rubber tappers had significantly higher avoidable absence rates compared to Indian male rubber tappers.

The results for unavoidable absence indicated two significant second-order interactions: sex by experience by terrain and experience by race by terrain. The results of the simple interaction effect for sex by experience by terrain produced three significant simple interaction effect: sex and experience for undulating terrain, sex and terrain for more experienced rubber tappers, and experience and terrain for female rubber tappers. The result of the simple-simple effects analysis indicated that more experienced male and female rubber tappers working in undulating terrain had significantly higher unavoidable absence compared to less experienced male and females working in similar terrain. Also, more experienced male and female rubber tappers working in undulating terrain had significantly higher unavoidable absence rate compared to those working in hilly terrain.

The simple interaction effect for experience by race by terrain produced four significant simple interaction effects: experience and race for undulating terrain; experience and terrain for Malay rubber tappers; experience and terrain for Indian rubber tappers; and race and terrain for more experienced rubber tappers. The results of the simple-simple main effects analysis indicated that more experienced Malay and Indian rubber tappers working in undulating terrain, had significantly higher unavoidable absence rates compared to less experienced rubber tappers working in similar terrain. Also more experienced Malay and Indian rubber tappers working in undulating terrain had significantly higher unavoidable absence rates compared to Malay and Indian rubber tappers working in hilly terrain. Lastly, more experienced Indian rubber tappers working in hilly terrain, had significantly higher unavoidable absence rates compared to more experienced Malay rubber tappers working in similar terrain.

The interaction for sex by age by race by terrain for avoidable and unavoidable absence was also examined. The results for avoidable absence indicated significant first-order interactions for sex by race and race by terrain. The simple main effects analysis for sex by race interaction indicated that avoidable absence was significantly higher among

Malay female rubber tappers and Indian male rubber tappers. The simple main effect analysis for race by terrain indicated avoidable absence was significantly higher among Malay rubber tappers working in hilly terrain. Finally, the four-way ANOVA for unavoidable absence produced a significant third-order interaction. The results of simple main effects for the sex by race by terrain interactions with age indicated that middle-aged and older Indian female rubber tappers working in undulating terrain, and young Malay female and middle-aged Indian male rubber tappers working in hilly terrain, all had higher levels of unavoidable absence.

CHAPTER 7 : INDIVIDUAL DIFFERENCES IN JOB SATISFACTION

7.1 INTRODUCTION

This chapter provides the results of the analysis on sex, age, experience and race differences in job satisfaction. The analysis was carried out on the sub-sample of rubber tappers. The chapter begins with the descriptive statistics of the sub-sample and next reports findings on individual differences in job satisfaction. The results of correlations for the relationship between job satisfaction and job performance and job satisfaction and absenteeism are then presented.

7.2 DESCRIPTIVE STATISTICS OF SUB-SAMPLE

The total number of rubber tappers in the sub-sample was 166. The number of male rubber tappers was 70 (42.2%) and the number of female rubber tappers was 96 (57.8%). The age range was from 23 - 56 years. The mean age was 40.91 years (SD = 6.39). There were 33 (19.8%) rubber tappers in the 23 - 35 years age group (young); 85 (51.2%) rubber tappers in the 35 - 45 year age group (middle-aged); and 48 (30.0%) rubber tappers in the 45 - 56 year age group (older). The length of service of the rubber tappers ranged from 1 - 23 years and the mean was 7.57 years (SD = 4.69). When self-reported experience was included, the total experience of the rubber tappers ranged from 1 - 40 years, with a mean experience of 14.35 years (SD = 8.16). Using median experience, rubber tappers were grouped into two groups: less and more experienced. The median for truncated experience was 7.75 years. For truncated experience, the number of rubber tappers in the less experienced group was 85 (51.2%) and in the more experienced group 81 (48.8%). The median for total experience was

13.50 years. For total experience, the number of the number of rubber tappers in the less experienced group was 83 (50.0%) and in the more experienced group 83 (50%).

The rubber tappers in the sub-sample were all married and 130 (78.3%) of the rubber tappers indicated that their spouse was also working as a rubber tapper. Therefore, there were 65 pairs of husband and wives working as rubber tappers. The majority of rubber tappers, 117 (70.5%) live on the estate while 36 (29.5 %) lived outside. They had very little, formal education or none at all. Thirty three (19.8%) had no formal education, 110 (66.3%) had less than 6 years, and 23 (13.9%) had between 7 - 11 years.

The descriptive statistics of the items in the job satisfaction scale are given in Table 7.1. The mean overall job satisfaction of the rubber tappers was 2.93 (SD = 0.47) indicating that the rubber tappers agree they are satisfied with their job.

Table 7.1 Descriptive Statistics of Job Satisfaction Scale Items

Items	Mean	SD
Satisfaction with Job	3.03	0.49
Decide to take job again	2.89	0.56
Recommend job to friend	2.84	0.53
Thinking of looking for another job	2.04	0.78
Overall Job Satisfaction	**2.93**	**0.47**

Scale: 1 = strongly disagree
2 = disagree
3 = agree
4 = strongly agree

Finally, Table 7.2 provides a comparison of the descriptive statistics of job performance and absenteeism measures of the main and sub-sample of rubber tappers. As seen in Table 7.2, the mean total crop, out-turn and unavoidable absence was higher in the sub-sample compared to the main sample. On the other hand, the mean avoidable absence was higher in the main sample than the sub-sample. However, the standard deviation was relatively similar for the main and sub-sample for all four measures.

Table 7.2 Comparison of Job Performance and Absenteeism Measures Between Main and Sub-sample

Measures	Main Sample (N = 1053)		Sub-sample (N = 166)	
	Mean	SD	Mean	SD
Total Crop	10638.23	2820.18	10936.73	2874.08
Out-turn	0.79	0.096	0.81	0.089
Avoidable Absence	30.84	22.70	28.70	21.47
Unavoidable Absence	7.10	7.01	10.17	8.26

7.3 RESULTS OF INDIVIDUAL DIFFERENCES IN JOB SATISFACTION

Sex, experience, and race differences in job satisfaction were examined using independent t-tests. Age differences in job satisfaction were examined using a one-way ANOVA. The results of the analyses are reported below.

7.3.1 Results of Sex Differences in Job Satisfaction

Table 7.3 provides the results of the t - test analysis for sex differences in job satisfaction. The results of the analysis is given in Appendix 57. There were no significant differences in job satisfaction between male and female rubber tappers ($t = 0.002$, $df = 164$, $p = 0.998$). As Table7.3 shows, the mean job satisfaction scores of male and female rubber tappers was exactly the same, 2.93, though the standard deviation was marginally higher for females (SD = 0.48) than for males (SD = 0.47).

Table 7.3 Sex Differences in Job Satisfaction

	Male		Female		t	Sig.
	Mean	SD	Mean	SD		
Job Satisfaction	2.93	0.47	2.93	0.48	0.002	0.998

7.3.2 Results of Age Differences in Job Satisfaction

Appendix 58 provides the results of the one-way ANOVA for age differences in job satisfaction. There were no significant age differences in job satisfaction [F(2, 166) = 2.10, p = 0.126]. Middle-aged rubber tappers had the highest mean job satisfaction score of 2.99 (SD = 0.47), followed by the older rubber tappers (mean = 2.94, SD = 0.44). Young rubber tappers had the lowest mean job satisfaction score of 2.79 (SD = 0.50).

7.3.3 Results of Experience Differences in Job Satisfaction

Table 7.4 provides the results of the t - test analysis for differences in job satisfaction based on truncated and total experience. The results are given in Appendix 59. The results for truncated experience indicated significant differences in job satisfaction between less experienced and more experienced rubber tappers (t = 3.21, df = 164, p = 0.002). As Table 7.4 shows, less experienced rubber tappers had a significantly higher job satisfaction score than did more experienced rubber tappers. The results thus indicate that less experienced rubber tappers had a higher job satisfaction level compared to more experienced rubber tappers.

The results for total experience also indicated a significant difference in job satisfaction scores between less and more experienced rubber tappers (t = 2.48, df = 164, p = 0.014). As Table 7.4 shows, the less experienced rubber tappers had significantly higher levels of job satisfaction than did more experienced rubber tappers. This results also suggests that less experienced rubber tappers had higher job satisfaction levels compared to more experienced rubber tappers.

Table 7.4 Results of t - test for Differences in Job Satisfaction based on Experience

	Less Experience		More Experience		t	Sig.
	Mean (JS)	SD	Mean (JS)	SD		
Truncated Experience	3.04	0.43	2.81	0.49	3.21	0.002**
Total Experience	3.02	0.45	2.84	0.48	2.46	0.015*

* significant at $p < 0.05$
** significant at $p < 0.01$

Note: JS = Job Satisfaction score

7.3.4 Correlations Between Age, Experience and Job Satisfaction

Table 7.5 shows the results of the correlation between age, truncated experience, total experience and job satisfaction. Table 7.6 provides the results of the partial correlation for job satisfaction when age, truncated experience, and total experience were controlled. The results of the analyses are given in Appendix 60.

Table 7.5 Correlation between Age, Experience and Job Satisfaction

	Age	Truncated Experience	Total Experience	Job Satisfaction
Age	-			
Truncated Experience	0.16*	-		
Total Experience	0.37**	0.45**	-	
Job Satisfaction	0.18*	-0.19*	-0.007	-

* significant at $p < 0.05$
** significant at $p < 0.01$

Table 7.6 Partial Correlation of Age, Experience and Job Satisfaction

Variable	Control for	Job Satisfaction
Age	Truncated Experience	0.21**
Age	Total Experience	0.19*
Truncated Experience	Age	-0.22**
Total Experience	Age	-0.08

* significant at $p < 0.05$
** significant at $p < 0.01$

The results of the correlation indicated that the relationship between age and job satisfaction was positive and significant ($r = 0.18$, $p = 0.024$). However the magnitude of the relationship was weak. The relationship between truncated experience and job satisfaction was negative and significant ($r = -0.19$, $p = 0.014$). Again, the magnitude of this relationship was weak. The correlation coefficient between total experience and job satisfaction was almost zero ($r = -0.007$, $p = 0.929$) indicating that total experience and job satisfaction was almost unrelated.

The results of the partial correlation indicated that when truncated experience was controlled, the correlation between age and job satisfaction remained positive and significant ($r = 0.21$, $p = 0.006$). Similarly, when total experience was controlled, the correlation between age and job satisfaction remained positive and significant ($r = 0.19$, $p = 0.014$). However, the magnitude of the correlation declined marginally. When age was controlled, the correlation between truncated experience and job satisfaction remain negative and significant ($r = -0.22$, $p = 0.004$). The correlation between total experience and job satisfaction remained close to zero ($r = -0.08$, $p = 0.321$) when age was controlled.

These findings indicated that job satisfaction increases with age over all experience levels and decreases with experience over all age levels. The findings also indicated that length of service working in an estate relates to job satisfaction. However, the total experience (which includes previous experience working elsewhere) was found to have no relationship with job satisfaction of rubber tappers.

7.3.5 Results of Race Differences in Job Satisfaction

Table 7.7 provides the results of race differences in job satisfaction. The results are given in Appendix 61. There were significant race differences in job satisfaction ($t = 4.220$, $df = 164$, $p = 0.000$). Indian rubber tappers had a significantly higher mean job satisfaction score of 3.09 (SD = 0.48) compared to Malay rubber tappers whose mean job satisfaction score was 2.79 (SD = 0.42). Indian rubber tappers thus have higher job satisfaction levels than do Malays.

Table 7.7 Results of t-test for Race Differences in Job Satisfaction

	Malay		Indian			
	Mean	SD	Mean	SD	t	Sig.
Job Satisfaction	2.79	0.42	3.09	0.48	4.22	0.000*

* significant at $p < 0.01$

7.4 RELATIONSHIP BETWEEN JOB SATISFACTION AND JOB PERFORMANCE

Table 7.8 provides the results of the correlation between job satisfaction and job performance measures. The results are given in Appendix 62. The results indicated that the correlation between job satisfaction and total crop production was positive and not significant ($r = 0.07$, $p > .30$). The magnitude of this relationship is weak. The correlation between job satisfaction and out-turn was also positive and not significant ($r = 0.013$, $p > 080$). The magnitude of this relationship was also weak. The near zero correlation between job satisfaction and the job performance measures suggests that job performance was unrelated to job satisfaction.

Table 7.8 Correlation between Job Satisfaction and Job Performance

	Job Satisfaction	Total Crop	Out-turn
Job Satisfaction	-		
Total Crop	0.074	-	
Out-turn	0.013	0.705**	-

** significant at $p < 0.01$

7.5 RELATIONSHIP BETWEEN JOB SATISFACTION AND ABSENTEEISM

Table 7.9 shows the results of the correlation between job satisfaction and absenteeism measures. The results are given in Appendix 62. The results indicated that the correlation between job satisfaction and avoidable absence was positive and close to significance ($r = 0.14$, $p = 0.051$). However the magnitude of this relationship was weak. The correlation between job satisfaction and unavoidable absence was negative and significant ($r = -0.19$, $p = 0.017$). The magnitude of this relationship was, however, also weak. The positive correlation between job satisfaction and avoidable absence suggests that as job satisfaction increases, avoidable absence also increases, albeit moderately. The negative correlation between job satisfaction and unavoidable absence suggests that as job satisfaction increases, unavoidable absence decreases, again moderately.

Table 7.9 Correlation between Job Satisfaction and Absenteeism

	Job Satisfaction	Avoidable absence	Unavoidable absence
Job Satisfaction	-		
Avoidable absence	0.142	-	
Unavoidable absence	-0.185*	-0.151	-

* significant at $p < 0.05$

7.6 SUMMARY OF FINDINGS ON JOB SATISFACTION

The results of the analyses of individual differences in job satisfaction indicated that there were significant experience (truncated and total) differences in job satisfaction. The study found less experienced rubber tappers had significantly higher job satisfaction levels than did more experienced rubber tappers. The results of the correlation between age, experience and job satisfaction indicated that age was positively related to job satisfaction while truncated experience was negatively related to job satisfaction. Total experience was found to be unrelated to job satisfaction. There were significant race differences in job satisfaction. Indian rubber tappers were found to have significantly higher job satisfaction levels compared to Malay rubber tappers. There were no significant sex or age differences in job satisfaction. The study found no relationship between job satisfaction and job performance. There was a positive but weak relationship between job satisfaction and avoidable absence. For unavoidable absence, the relationship with job satisfaction was negative and weak.

CHAPTER 8: DISCUSSION AND CONCLUSION

8.1 DISCUSSION

As noted in chapter 4, the main aims of the study were to investigate sex, age, experience, and race differences in job performance, absenteeism and job satisfaction in a sample of rubber tappers. The study also examined possible interactions among sex, age, experience, race and terrain with respect to job performance, absenteeism and job satisfaction. The results obtained are discussed separately for job performance, absenteeism and job satisfaction.

8.1.1 Job Performance

Significant sex differences in job performance were observed, with female rubber tappers consistently performing better than male rubber tappers. Women had higher total crop production and attendance compared to men. Sex did not interact with age, experience, race or terrain for total crop. But there was a significant sex by race interaction for out-turn, with Indian female rubber tappers having higher attendance rates than Malay female rubber tappers. No such difference was observed for male rubber tappers.

Laboratory studies on task performance have generally found women to perform better in tasks requiring manual dexterity (Maccoby & Jacklin, 1974; Riley & Cochran. 1984). Although rubber tapping is an unskilled job, nevertheless the use of a tapping knife requires considerable manual dexterity. The rubber tappers' task also requires speed and stamina to complete the assigned number of trees within a certain time to ensure the maximum harvest of latex. A plausible explanation for the superior job performance of female over male rubber tappers in total crop production is that women may be better able to handle a tapping knife because of their superior manual dexterity. Female rubber tappers may be able to tap rubber trees faster and therefore complete their tapping task in less time compared to male rubber tappers. Thus, women may be able to produce more latex because there is more time for the latex to flow from the cuts made on the rubber trees before it is collected.

A possible explanation for the higher attendance found among female rubber tappers compared to males may be due to higher levels of motivation (Waldman & Spangler, 1989). Rubber tappers are required to complete their work around mid-day and this leaves them plenty of free time in the afternoon. This provides an opportunity for them to take a second job. However, unlike men, women are generally engaged in domestic and family responsibilities after work. Therefore, rubber tapping for females is a full-time employment. Men in contrast, are able to take a second job as casual labourers to supplement family income. For men, rubber tapping could thus be a 'part-time employment' as they may well have a second job. There may be a stronger motivation to attend work among females because rubber tapping is their only source of livelihood. Male rubber tappers on the other hand may feel they could absent themselves from work on normal days and 'make-up' for these days on rest days, when the rates paid are twice that of normal days.

Significant age differences in job performance were also observed. Middle-aged rubber tappers performed better than young and older rubber tappers with respect to total crop. There were no significant differences between young and older rubber tappers on this measure. Similar results were obtained for out-turn. Middle-aged rubber tappers had higher attendance rates than did young rubber tappers, and attendance rates of middle-aged and older rubber tappers were found to be much the same. The relationship between age and job performance with respect to total crop took the form of an inverted U. Total crop production increased with age, peaked in the mid-forties and thereafter declined with age. This finding is consistent with those reported for blue-collar manufacturing workers (Clay, 1956) and other non-professional groups (Waldman & Avolio, 1986). Clay (1956) found the job performance of blue-collar workers peaked in the mid-forties and declined thereafter. Waldman and Avolio (1986) in their review found a positive correlation between age and job performance for non-professionals. The inverted-U relationship between age and job performance with respect to total crop found in this study was consistent with the review by Rhodes(1983) and also confirms findings for service engineers (Sparrow & Davies, 1988).

The relationship between age, experience and job performance was examined using partial correlation. The study found that experience rather than age determined the job performance of rubber tappers. This finding was consistent with those of Avolio, Waldman & McDaniel, (1990), Giniger et al. (1983), Rhodes (1983), Schwab and Heneman (1977) and Sparrow and Davies (1988). The partial correlation obtained in this study nevertheless was weak (0.15). Further, the correlation was the same (0.15) when either truncated or total experience was used, suggesting that the influence of experience on job performance was more important during the early years of service. However, the effect of experience on job performance of rubber tappers levels off as experience increases. Rubber tapping is essentially an unskilled job, and tapping skills are acquired relatively quickly. Once the skill is acquired, there are no new skills to be learned or upgraded through training. Thus the influence of experience on job performance starts to diminish.

The study found no interactions between age, sex and race in relation to either total crop or out-turn. However, the interaction between age and terrain for total crop was found to be close to significance ($p = 0.08$). There were significant age differences in total crop production in hilly terrain but not in undulating terrain. Middle-aged rubber tappers working in hilly terrain produced significantly more rubber than did young or older rubber tappers working in similar terrain. The difference between young and older rubber tappers working in hilly terrain was not significant, although older rubber tappers had a higher mean total crop (10862.95 kg) compared to younger rubber tappers (10,359.83 kg). Middle-aged rubber tappers working in hilly terrain also had significantly higher attendance rates compared to young rubber tappers. The attendance rates of middle-aged and older rubber tappers were similar. These findings suggest that there is greater variability in job performance among different age groups in hilly terrain than in undulating terrain. A probable reason for this is that working in hilly terrain is more difficult, more strenuous and physically more challenging than is working in undulating terrain. Rubber tappers have to walk along narrow terraces which are cut into steep terrain and also to climb up and down them. They need considerable strength to do this. Older rubber tappers may not be as physically strong as the middle-aged and younger rubber tappers (Stones & Kozma, 1985). However, although they may lack strength in comparison to young rubber tappers, older rubber tappers are likely to be more familiar with the problems of working in hilly terrain. This may have contributed to the higher total crop out-put and higher attendance rates. Young rubber tappers' lower job performance on the other hand may be due to lack of familiarity with the problems encountered in working in hilly terrain.

Finally, significant race differences in job performance were found. Indian rubber tappers consistently performed better than Malay rubber tappers, with respect to both total crop and out-turn. There was also a significant race by terrain interaction for total crop. Indian rubber tappers working in hilly terrain had higher total crop levels than did Malay rubber tappers. No race differences in total crop were found in undulating terrain. There was also a significant sex by race interaction for out-turn. Female Indian rubber tappers had a higher out-turn compared to female Malay rubber tappers. There were no out-turn differences between Indian and Malay male rubber tappers. There are two plausible explanations for the race difference in job performance. First, Indian rubber tappers may have a stronger motivation to their job compared to Malay rubber tappers. The results of the job satisfaction study demonstrated that Indian rubber tappers had a significantly higher level of job satisfaction compared to Malay rubber tappers. Indian rubber tappers may have a stronger motivation to do their job because that is the only means of livelihood that they have. Malay rubber tappers on the other hand have various other job opportunities available to them provided by the government. For instance government land schemes undertaken by the Federal Land Development Authority is targeted primarily at Malays. Many Malay rubber tappers working in private plantations have been successful in being selected to participate in these land schemes. Therefore, the prospects of such opportunities being available to Malay rubber tappers, though not widely available to Indian rubber tappers, may influence work motivation. Second, there may be a subtle rivalry between the races in job performance. Rubber tappers are paid on a piece-rate system. The more days they work and the more rubber produced, the higher the earnings. This rivalry may be stronger among female than among male rubber tappers. As discussed earlier, male rubber tappers may have a second employment. Therefore the level of rivalry may be less among men since they can supplement their earnings through a second employment. However, among female rubber tappers, their source of earnings is primarily derived from tapping rubber trees. Therefore the Indian and Malay female rubber tappers may be competing against each other to achieve higher earnings.

8.1.2 Absenteeism

Two types of absence were examined in this study: avoidable and unavoidable absence. Most of the studies examining sex differences in absenteeism do not distinguish between avoidable and unavoidable absence (Johns, 1978; Markham, Dansereau, & Alutto, 1982; VandenHeuvel, 1997; VandenHeuvel & Wood, 1995). VandenHeuvel (1997) for instance, in her study of the determinants of absence caused by family responsibilities used self-reported absence collected through a questionnaire. However, one study that did make a distinction in the type of absence found women had more absence that was sanctioned than did men (Fitzgibbons & Moch, 1980). This study found that men had a significantly higher avoidable absence rate compared to women, while women had a significantly higher unavoidable absence rate compared to men. The most plausible explanation for these sex differences in absenteeism is that male rubber tappers have higher avoidable absence because they may have a second employment. They therefore resort to unsanctioned absence when they are unable to tap rubber trees because of tiredness or fatigue. Female rubber tappers have lower avoidable absence compared to men because they do not have a second employment. They therefore minimise unsanctioned absence because they will forego earnings if they are absent from work. However female rubber tappers were found to have higher unavoidable absence than male rubber tappers. There are two possible explanations for the higher unavoidable absence among women. First, the women may be more likely to have health problems compared to men. Mastekaasa and Olsen (1998) found among Norwegian public sector employees who have identical job titles and work in the same work place, females had more absence than men. They found that women had longer absence requiring certification by a physician than short absence not requiring such certification. It was suggested that the differences in absenteeism was more likely to reflect general health differences between men and women. The second possible reason is that women take unavoidable absence primarily to care for sick family members (VandenHeuvel, 1997). They resort to taking paid sick leave in order to care for their sick children because they will not forfeit their daily wages as a result of being absent from work. This finding is consistent with evidence reviewed by Steers and Rhodes (1978), who suggested that women have higher absenteeism than men because of the primary role they play in family responsibility.

The study also found significant age differences in avoidable absence but none for unavoidable absence. The relationship between age and avoidable absence of rubber tappers was negative. These findings is consistent with those of Chadwick-Jones, Nicholson, and Brown, (1982), Nicholson, Brown, and Chadwick-Jones (1977), and Steers and Rhodes, (1978). Young rubber tappers had significantly higher avoidable absence rates compared to middle-aged and older rubber tappers. The lower avoidable absence rates found among older rubber tappers is possibly because they are generally more stable and secure in their job (Davies, Matthews, & Wong, 1991) . Young rubber tappers on the other hand are less stable in their job because they may be looking for alternative employment that has better career prospects, for example in manufacturing. The relationship between age and unavoidable absence was found to take the form of an inverted U. This suggests that unavoidable absence increases with age, peaks in the mid-forties and then declines with age. This finding is again consistent with those of Nicholson, Brown, and Chadwick-Jones (1977). Unavoidable absence increases with advancing age possibly could be due to older rubber tappers becoming more susceptible to illnesses that are longer in duration (Charatan, 1984). Barrett (1972) suggested that health tends to deteriorate and tolerance for stress diminishes with age. Experience was also found to be inversely related to avoidable absence and positively related to unavoidable absence. Less experienced rubber tappers were found to have a significantly higher avoidable absence than more experienced rubber tappers. This finding is consistent with Nicholson, Brown, and Chadwick-Jones (1977). Less experienced rubber tappers may have higher avoidable absence possibly because they may find it difficult to adjust to an unfamiliar and difficult work environment (Gibson, 1966; Hill & Trist, 1953). The unfamiliar terrain in which the rubber tapper works and the strenuous and physically demanding work activity involved may induce withdrawal behaviour among less experienced rubber tappers. However as the process of adjustment to work (Gibson, 1966; Hill & Trist, 1953) takes place and the rubber tapper gains more experience, avoidable absence rates may tend to decrease.

The findings on unavoidable absence are interesting. More experienced rubber tappers were found to have higher unavoidable absence compared to less experienced rubber tappers. This suggest that more experienced rubber tappers take more sick leave (non-hospitalised and hospitalised) than did less experienced rubber tappers. There is only one plausible explanation for this. The number of days of non-hospitalised paid sick leave entitlement increases as the length of service increases. Therefore the higher unavoidable absence rate among the more experienced rubber tappers is a result of the sick leave policy of the company and may not be due to some inherent psychological characteristics of the rubber tapper. This finding is consistent with Atkin and Goodman (1984) suggestion that company absence policies may influence patterns of unavoidable absence behaviour. They noted that in their review of studies on absenteeism, very little consideration has been given to formal absentee policies of companies. No indication was also made regarding the number of allowable sick days an individual is entitled.

The rates of avoidable and unavoidable absence are also influenced by race. Malay rubber tappers were found to have higher avoidable absence rates than Indian rubber tappers, while Indian rubber tappers were found to have higher unavoidable absence rates than Malay rubber tappers. These findings suggest that Indian rubber tappers are more prone to sickness induced absence than Malays and Malay rubber tappers are more prone to be voluntarily absent from work than Indians. A probable explanation for this may be the different attendance motivation (Steers & Rhodes, 1978) of Malay and Indian rubber tappers. Indian rubber tappers were found to have higher job satisfaction levels than Malay rubber tappers. According to Steers and Rhodes (1978), job satisfaction influences attendance motivation of an employee. Therefore the higher job satisfaction level of the Indian rubber tappers may promote a higher level of attendance motivation, and thus lower avoidable absence levels. Malay rubber tappers in contrast have lower job satisfaction levels. Therefore their attendance motivation may be low thus leading to higher avoidable absence levels. The higher unavoidable absence among Indian rubber tappers could indicate that they are more prone to sickness. However, in the absence of medical data, this explanation remains tentative.

There were significant sex by race interactions for avoidable absence. Indian male and Malay female rubber tappers had higher avoidable absence rates compared to Indian females and Malay males. These findings suggest that among Indians, women are less likely to take unsanctioned absence compared to men. However, among Malays the men are less likely to take unsanctioned absence compared to women. These findings may be viewed in terms of work role centrality or work as a central life interest (Mannheim, 1983). Mannheim (1983) had found strong gender-linked differences in work role centrality among Israeli workers of Middle Eastern origin and none among Israelis of European and Russian origin. Women of middle-eastern origin were found to have low work role centrality compared to men of similar origin. Among some Asians, men are regarded as the breadwinner whereas women are regarded as housekeepers. Women have greater responsibility for family and domestic duties (Steers & Rhodes, 1978) and, perhaps as a result are more likely to have higher absence compared to men (VandenHeuvel & Wood, 1995; Johns, 1978; Johns, 1997). In the case of Malay women it is possible that this female sex role socialisation, that stresses nonwork roles (Ritzer, 1972), is the cause of the higher unavoidable absence. As for Malay men, being the breadwinner, rubber tapping becomes their central life interest. It is also possible that Indian women may have higher work role centrality compared to Indian men. As mentioned earlier, women regard rubber tapping as their only source of livelihood, whereas men may well have a second employment. Among Indian women rubber tapping may be a central life interest whereas for Indian men it is not. Therefore Indian women have lower avoidable absence rates than do Indian men.

There were significant differences in unavoidable absence among rubber tappers working in undulating and hilly terrain. More experienced male and female rubber tappers working in undulating terrain had higher unavoidable absence rates compared to less experienced male and female rubber tappers working in a similar terrain. Also, more experienced Indian and Malay rubber tappers working in undulating terrain had higher unavoidable absence rates compared to more experienced Indian and Malay rubber tappers working in hilly terrain. Finally, more experienced female rubber tappers working in undulating terrain had higher unavoidable absence rates compared to more experienced females working in hilly terrain. These findings suggest that more experienced rubber tappers working in undulating terrain have higher unavoidable absence rates compared to less experienced rubber tappers working in similar terrain. Also, the more experienced rubber tappers working in undulating terrain have higher unavoidable absence rates than more experienced rubber tappers working in hilly terrain. As mentioned earlier, the higher levels of unavoidable absence among the more experienced rubber tappers may be due to the absenteeism policy of the company (Atkin & Goodman, 1984). A possible reason for the higher unavoidable absence rate among more experienced rubber tappers in undulating terrain may be because there is a larger proportion of more experienced rubber tappers (55%) in undulating terrain compared to less experienced rubber tappers (45%). A possible reason for the higher unavoidable absence rates in undulating terrain compared to hilly terrain may be because estates categorised as undulating terrain are also estates that have dry conditions. It may be possible that rubber tappers working in dry conditions are more prone to sickness. However, as there are no relevant medical data, this explanation remains tentative.

8.1.3 Job Satisfaction

The study found no sex differences in job satisfaction, with male and female rubber tappers having identical job satisfaction levels. This finding is consistent with those reported by Mannheim (1983), Mottaz (1986), Quinn et.al (1974), Smith et.al. (1998) and Weeks and Nantel (1995). Two cautions should be made concerning this finding. First, the sub-sample of rubber tappers were all married and 78% of rubber tappers have their spouse working as a rubber tapper in the same estate. Therefore the identical results for male and females could be due to husbands and wives sharing similar attitudes towards work. Second, the average age of rubber tappers in the sub-sample was 40 years (male = 42.7 years; female = 39.5 years). Previous research has shown that job satisfaction is higher among older workers (Bourne, 1982; Davies and Sparrow, 1985; Rhodes, 1983), as the present study also found. The job satisfaction levels of middle-aged (mean = 2.99) and older (mean = 2.94) rubber tappers were much the same, while the job satisfaction level for young rubber tappers was lower (mean = 2.79).

The study also found significant differences in job satisfaction between less and more experienced rubber tappers. Less experienced rubber tappers had higher job satisfaction than more experienced rubber tappers. This finding were the same whether truncated or total experience was used. It is possible that the lower job satisfaction level of more experienced rubber tappers could be due to boredom. The work rubber tappers do is routine. There is no prospect for career advancement. No new skills can be learned. All these factors may produce low morale among more experienced rubber tappers. The less experienced rubber tappers on the other hand have higher job satisfaction levels perhaps because they find the job interesting and challenging. Also life in the estate may be more congenial with the availability of free housing, electricity and water, which they may never have experienced before working in the estate.

The study also found the relationship between truncated experience and job satisfaction was negative even when age was controlled. However, total experience and job satisfaction was found to be unrelated. In contrast, the relationship between age and job satisfaction was found to be positive and remained positive when experience (both truncated and total) was controlled (O'Brien & Dowling, 1981). These findings are consistent with those of Gibson and Klein (1970), who found an increase in job satisfaction with age over all experience levels and a decrease in job satisfaction with experience at all age levels. It is interesting to note that truncated experience rather than total experience was found to be related to job satisfaction. This finding suggest that rubber tappers with a shorter length of service have higher job satisfaction, compared to those with longer tenure. A possible explanation for this is that the short-tenured rubber tappers may be young (Gibson & Klein, 1970) or middle-aged people who have recently joined the estates as new rubber tappers. Therefore these new rubber tappers may find, as mentioned earlier, that the job may be interesting and also rewarding to them. It was noted during the interview with the sub-sample of rubber tappers that some of the middle-aged rubber tappers were previously paddy farmers and fishermen. They took to rubber tapping because the income they earn tapping rubber trees was more than they earned in their previous employment. Therefore these new rubber tappers may find the new job as rubber tappers to be more satisfying than their previous work. Total experience may be unrelated to job satisfaction because rubber tappers may be relating their job satisfaction to working in their present job. Therefore their previous experience, working in smallholdings or other estates, does not seem to influence their job satisfaction levels.

Finally, there were clear race differences in job satisfaction. Indian rubber tappers had higher levels of job satisfaction compared to Malays. The higher job satisfaction among Indians could be due to better motivation. Indian rubber tappers, like Malay tappers have very low educational attainment. Therefore the prospect for better employment is not very promising for them. However, as mentioned earlier, Malay rubber tappers have other opportunities open to them, such as participation in land schemes that are not widely available to Indian rubber tappers. Therefore the availability of other job opportunities for Malays, apart from employment in estates, could influence work motivation and therefore job satisfaction. As for Indian rubber tappers, their prospects are linked solely to the plantation.

8.2 CONCLUSION

This study has shown that there are strong sex, age, experience and race differences in job performance and absenteeism among rubber tappers. The study also found job performance and absenteeism is mediated by the type of terrain in which rubber tappers work. There are also marked experience and race differences in job satisfaction.

Rubber tapping is an unskilled job. Rubber tappers irrespective of sex, age, experience and race, are paid the same rate of pay and do essentially the same job. This study has shown that female rubber tappers have superior job performance compared to male rubber tappers. The study also found the type of terrain affects the job performance of rubber tappers. Indian rubber tappers perform better than Malays in hilly terrain, although no race differences were observed for undulating terrain. There are two major implications of these findings for estate management. First, female rubber tappers are highly productive workers. Therefore, management need to select and retain more female rubber tappers in their work force. As estates compete with the manufacturing sector, especially electronics, for unskilled female labour, suitable human resource policies need to be formulated to attract more females to work in rubber estates and to retain them. The second implication is that rubber tappers do not all perform equally well in hilly terrain. Therefore estate managers need to select rubber tappers who perform well in hilly terrain and provide them with incentives. However, in rubber estates that are wholly hilly terrain, management need to ensure that the racial composition of the rubber tappers favour Indians rather than Malays.

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APPENDICES

APPENDIX 1

Global Consumption of Rubber (Natural and Synthetic) in 1990

Country	per capita consumption (kg)	annual consumption ('000 t)
Western Europe	7.4	3182.9
West Germany	11.6	720.2
France	9.4	529.2
Italy	7.6	439.5
United Kingdom	6.8	387.0
Eastern Europe	7.7	3016.5
USSR	8.7	2495.0
Czechoslovakia	11.2	174.0
Poland	4.3	162.0
Romania	5.2	120.0
North America	10.5	2892.3
United States	10.6	2628.3
Canada	10.1	264.0
Asia-Oceania	1.8	4955.4
Japan	14.7	1810.0
China	0.9	947.0
Korea	11.7	498.0
India	0.5	447.9
Latin America	2.0	835.0
Brazil	2.7	402.0
Mexico	2.1	174.0
Middle East	0.3	60.9
Egypt	0.4	21.0
Africa	0.5	241.0
Nigeria	0.2	22.0
South Africa	3.2	112.0
World	2.9	15111.0

Source: Barlow, Jayasuriya, Tan (1994). p. 2

APPENDIX 2

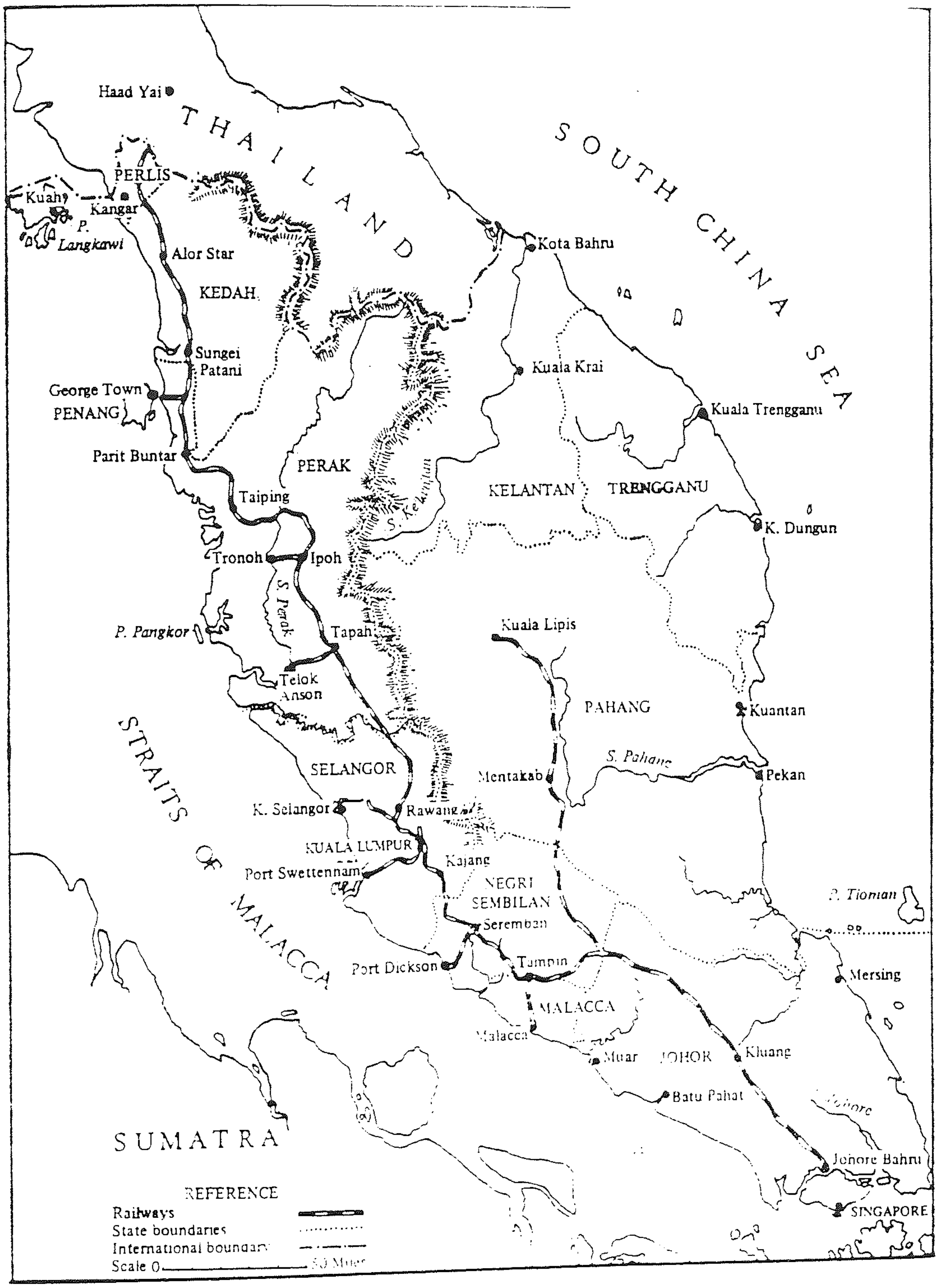
Area Planted with Rubber in Peninsular Malaysia from 1898-1921
('000 ha)

Year	Hectare
1898	0.8
1899	1.6
1900	2.4
1901	4.6
1902	6.1
1903	8.1
1904	11.3
1905	18.6
1906	39.3
1907	68.8
1908	103.2
1909	135.2
1910	218.9
1911	303.5
1912	381.2
1913	436.6
1914	472.7
1915	522.0
1916	578.7
1917	671.0
1918	763.2
1919	834.1
1920	882.7
1921	906.5

Source: Barlow (1978). p. 26

APPENDIX 3

Map of Malaya *circa* 1922



Source: Drabble, (1973)

APPENDIX 4

Tapping System Notation

Notation	Indication
S/2, d/2, 100%	Half spiral, tapped alternate daily.
S/2, d/3, 67%	Half spiral, tapped third daily.
S/1, d/4, 100%	Full spiral, tapped fourth daily.
S/R, d/4, 75%	Reduced spiral, tapped fourth daily. A 15 cm column of bark is left untapped.
2S/2, d/4, 100%	Two half spirals cuts, tapped fourth daily.
3C/2, d/4, 150%	Three half circumference cuts (form unspecified), tapped fourth daily.
S/2, d/2, 9m/12, 75%	Half spiral, tapped alternate daily for nine months and rested for three months.
2S/2, d/2, (2 x 2d/4), 100%	Effectively two half spirals cuts, tapped alternate daily, but with alternate tappings in two pairs of cuts (each pair of which is only tapped one every four days). This is known as a 'panel changing' or changeover system.
S/4, d/4, (2 x 4d/8), 25%	Effectively quarter spiral, tapped fourth daily, but with alternate tappings on two cuts (each cut being tapped once in eight days). This is also a changeover system, and is only used in conjunction with stimulant, two 'halves' of a half spiral cut being tapped alternately.
S/2, d/2, (2 x 6m/12), 100%	Effectively half spiral, tapped alternate daily, but with tapping on each of two alternate panels (each panel being tapped for six months out of twelve).

Source: Barlow, (1978). p. 140

APPENDIX 5

Maximum Task Size

Terrain	Level of Cut	Length of cut	Year of Tapping					
			up to 5	5-10	10-15	15-20	20-25	> 25
Flat and undulating	Low	1/2S	600	575	530	510	465	450
		S/R	552	529	488	469	428	414
		S	480	460	424	408	372	360
	High	1/2S	390	374	345	332	302	293
	High and low	1/2S or 1/2V and 1/2S	-	-	225	217	198	191
		1/2S or 1/2V and S	-	-	201	194	177	171
Contour terrace	Low	1/2S	564	541	498	479	437	423
		S/R	519	497	459	441	402	389
		S	451	432	399	384	350	338
	High	1/2S	371	355	328	315	187	278
	High and low	1/2S or 1/2V and 1/2S	-	-	218	210	192	185
		1/2S or 1/2S andS	-	-	195	188	172	166

Source: Arope, Nor and Hua, (1983) p. 144

APPENDIX 6

Job Analysis of Rubber Tapper

1. Estab. Job Title: Rubber Tapper

2. Job Summary

uses special knife to shave off thin layer of bark from an assigned number of rubber trees to obtain latex.

3. Work Performed Ratings

Worker Function:	Data	5	(Copying)
	People	8	(Taking Instructions)
	Things	7	(Handling)

4. Machine, Tools, Equipment and Work Aids

tapping knife, bucket, churn

5. Materials and Products

latex, scrap rubber

6. Description of Tasks:

    1. Clean Latex Collection Cups and Spouts: Removes cup lumps from cups formed as a result of previous tapping and place in a plastic bag. Cleans spouts from any debris and scrap rubber to ensure clean flow of latex into cup. (10%)

    2. Clean Tapping Panel: Removes scrap rubber from tapping groove formed as a result of previous tapping to ensure latex flows from latex vessels smoothly. (10%)

    3. Tap Trees: Shaves a thin layer of bark on a cut using tapping knife on all rubber trees in tapping task. (50%)

4. Collect Latex: Collect latex from filled cups and pour into bucket. When bucket is full, latex is poured into churn. (20%)

5. Transport Latex and Scrap Rubber: Transports churn filled with latex and scrap rubber placed in plastic bag to reception station for weighing. Cleans bucket, churn and tapping knife thoroughly after weighing latex and scrap rubber. (8%)

6. Micellaneous Duties: At the end of each month, places a spot on the tapping panel to determine bark consumption. Apply grease whenever wounding to bark occurs. Inform supervisor of any damage to rubber trees. (2%)

7. Defination of Term

bucket	- an open cylindrical vessel used for collecting latex
churn	- a vessel similar to that used for storing dairy milk
latex	- milky liquid that flows from vessel of a rubber tree
scrap rubber	- latex that coagulated due to late dripping
reception station	- a collection point for weighing and storing latex and scrap rubber
tapping panel	- area of bark actively tapped for latex

8. General Comments

None

Note:

The above job description of rubber tapper follows the job analysis schedule of the USES (United States Employment Service). A number of items such as worker traits ratings were ommited from the analysis. The above analysis follows the conventional job analysis procedure in McCormick (1979).

APPENDIX 7: Reliability Analysis for Total Crop

Month	Mean	SD	Cases
January	1252.10	437.79	1053
February	766.85	303.12	1053
March	706.13	268.50	1053
April	523.21	197.49	1053
May	803.78	269.54	1053
June	810.36	264.58	1053
July	953.66	312.65	1053
August	882.45	297.90	1053
September	1061.89	330.24	1053
October	1006.86	293.78	1053
November	924.60	302.94	1053
December	946.32	347.72	1053

Statistics for Scale

Mean	Variance	SD	N of Variables
10638.23	7953425.31	2820.18	12

Item-total Statistics

Month	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
January	9386.13	6170039.76	.7319	.9324
February	9871.38	6773975.08	.6893	.9311
March	9932.10	6958314.23	.6516	.9325
April	10115.02	7162741.73	.7111	.9322
May	9834.45	6787951.60	.7781	.9284
June	9827.87	6814835.45	.7736	.9286
July	9684.57	6602862.79	.7797	.9277
August	9755.78	6723602.99	.7386	.9293
September	9576.34	6476245.34	.8139	.9263
October	9631.37	6656833.03	.7984	.9272
November	9713.64	6827702.21	.6531	.9324
December	9691.91	6710988.78	.6225	.9343

Reliability Coefficients

N of Cases = 1053 N of Items = 12 **Alpha = .9357**

APPENDIX 8

Case No:_______

QUESTIONNAIRE

SECTION 1 : PERSONAL PARTICULARS

1. Name : ________________________ 2. Worker No. __________

3. Gender : Male / Female 4. Race : Malay / Indian / Chinese / Other _____

5. Nationality : Malaysian / Other __________ 6. Date of Birth : __________

7. Date of employment : __________ 8. Employment status: Permanent / Contract

9. Experience as rubber tapper in previous plantations. ________ yr.

SECTION 2 : DOMESTIC CIRCUMSTANCES

1. Marital status 1. single 2. married *Go to Q2*

2. Is your husband or wife working as a rubber tapper in this estate?

   1. No
   2. Yes (Details : Name/No________________________)

3. Length of time spent in formal schooling : ________ yr.

4. Any educational qualification ? No / Yes (specify) __________

5. Information on children

	Gender	Age	Schooling: No / Yes (Level)
Child No. 1 (eldest)			
Child No. 2			
Child No. 3			
Child No. 4			
Child No. 5			
Child No. 6			
Child No. 7			
Child No. 8			
Child No. 9			
Child No. 10 (youngest)			

6. Is any of your children employed as rubber tapper in this estate?
   1. No
   2. Yes Give details of name / employee no. ________________________

   ____

   ____

7. How do you travel to work.
   1. walk
   2. bicycle
   3. motorcycle
   4. company tractor
   5. other (specify) __________

8. Where do you live?
    1. on the estate
    2. outside the estate *Please answer Q10*

9. What type of accommodation do you live in?
    1. estate quarters
    2. own house
    3. rented accommodation
    4. other (specify) ________________

10. How far do you live from the estate? _________ miles

SECTION 3 : JOB SATISFACTION

Each of the statement below is something that a person might say about his or her job. Please indicate your own personal *feelings* about your job by stating how much you agree with each of the following statements.

How much do you agree with the statements?

1. strongly disagree 2. disagree 3. agree 4. strongly agree

1. Generally speaking you are very satisfied with your job. _____
2. If you had to decide all over again whether to take the job you have now, you will take it. _____
3. You would recommend this job to a friend. _____
4. The job you do measures up to your initial expectations. _____
5. You frequently think of looking for another job. _____

SECTION 4 : REASON FOR ABSENT FROM WORK

1. Please specify the main reasons you are usually give for being absent from work. If there is more than one reason, put them in rank order with 1 for the most frequent. Specify no more than 3 reasons.

1. I have never been absent from work _____
2. I am sick _____
3. My child is sick _____
4. I need to attend to personal matters _____
5. I have no transport to go to for work _____
6. I undertake part-time work _____
7. I don't feel the urge to go to work _____
8. I couldn't wake up for work _____
9. other reason (specify) ______________________

APPENDIX 9

Reliability Analysis for Job Satisfaction Scale

Variable	Mean	SD	Cases
General Satisfaction	3.03	.4852	166
Take Job Again	2.89	.5616	166
Reccomend Job	2.84	.5276	166
Look for New Job	2.96	.7777	166

Statistics for Scale

Mean	Variance	SD	N of Variables
11.73	3.58	1.89	4

Item-total Statistics

Variable	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
General Satisfaction	8.70	2.39	.6338	.7489
Take Job Again	8.84	2.04	.7636	.6776
Reccomend Job	8.89	2.21	.6955	.7160
Look for New Job	8.77	1.95	.4720	.8623

Reliability Coefficients

N of Cases = 166 N of Items = 4 **Alpha = .7994**

APPENDIX 10: CHECKROLL REPORT

06/ [illegible]

ESPEK PALONG II [illegible] ESTATE
CHECKROLL REPORT
FOR [illegible]

PAGE [illegible]

: PALONG PROLL II
: RUBBER
: RAMASOMY A/L VEERAH

EMPLOYEE NUMBER	EMPLOYEE NAME		COLLECTIONS		TOTAL EARNINGS	TOTAL DEDUCTIONS	NET SALARY	INITIAL
40011	[illegible]AKALAMARY A/P ABRAHAM		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	(signed)

EARNINGS: (01) 487.07, 487.07 (03) 273.46, 273.46
ALLOWANCES: (13) 30.00, 30.00 (34) 15.00, 15.00
EMPLOYER'S CTB: (47) 65.00, 65.00 (48) 14.85, 14.85
DEDUCTIONS: (51) 60.00, 60.00 (52) 4.25, 1.25 (55) [illegible]
ATTENDANCES: (HP) [illegible] 22.0 (RP) 4.0, 4.0 (HP) 0.0, [illegible] 0 OTTIME
[illegible] 4.0 HRS: 0.[illegible]

EMPLOYEE NUMBER	EMPLOYEE NAME	NET SALARY	INITIAL
40215	[illegible] A/P SINNAKOANDI	[illegible]	(signed)

EARNINGS: (01) [illegible].81, [illegible].81 (03) 202.40, [illegible].40
ALLOWANCES: (13) [illegible], 30.00 (34) 15.00, [illegible]
EMPLOYER'S CTB: (47) [illegible] (48) [illegible] [illegible].15
DEDUCTIONS: (51) [illegible] (52) [illegible]
ATTENDANCES: (HP) [illegible] (RP) 4.0, 4.0 (HP) 0.0, [illegible] 0 OTTIME
[illegible] 4.0 HRS: 0.0

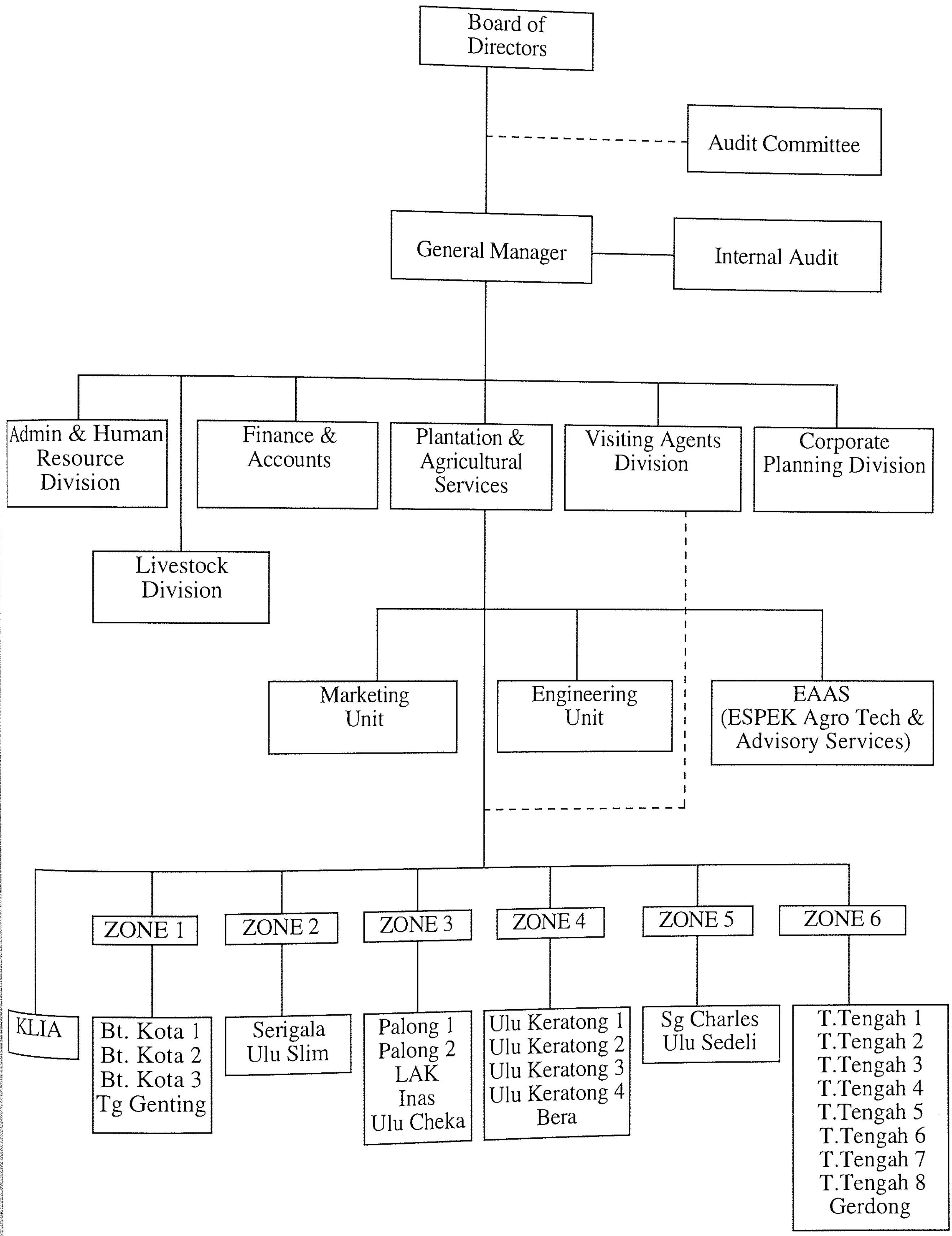
EMPLOYEE NUMBER	EMPLOYEE NAME	NET SALARY	INITIAL
[illegible]	[illegible] A/P [illegible]	[illegible]	(signed)

EARNINGS: (01) [illegible].18, [illegible].18 (03) [illegible]
ALLOWANCES: (34) [illegible], 15.00
EMPLOYER'S CTB: (47) [illegible] (48) [illegible]
DEDUCTIONS: [illegible]
ATTENDANCES: [illegible] 0 OTTIME
[illegible] 4.0 HRS: [illegible]

EMPLOYEE NUMBER	EMPLOYEE NAME	NET SALARY	INITIAL
40269	[illegible] A/P ANDI	[illegible]	(signed)

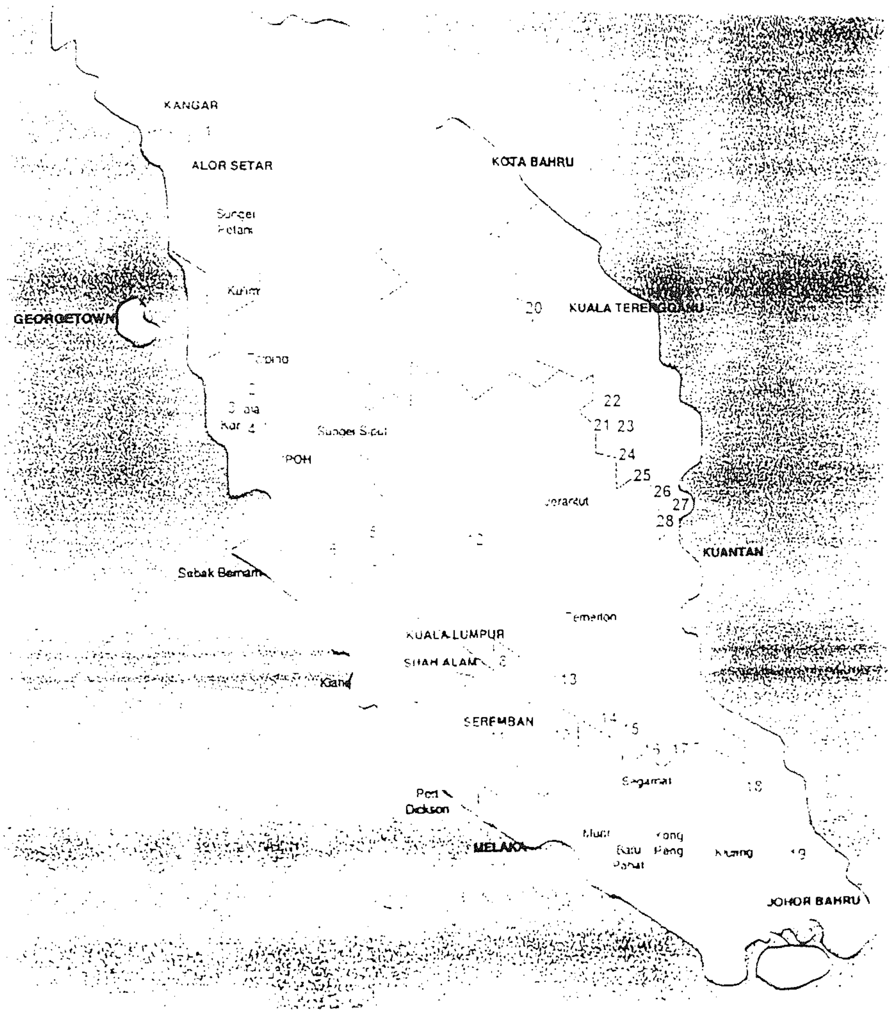
EARNINGS: (01) [illegible].16 (03) [illegible]
ALLOWANCES: (13) [illegible], 30.00
EMPLOYER'S CTB: [illegible] (48) [illegible]
DEDUCTIONS: [illegible] (52) [illegible]
ATTENDANCES: (HP) [illegible], 19.0 (RP) 3.0, 3.0 (HP) 0.0, [illegible] 0 OTTIME
[illegible] 0, 0 (WL) 0, [illegible] 4.0 HRS: 0.0

APPENDIX 11: **Organisational Structure of ESPEK**



APPENDIX 12

Location of Estates Managed by ESPEK



1 Tg Genting
2 Bukit Kota 1
3 Bukit Kota 2
4 Bukit Kota 3
5 Ulu Slim
6 Sengala
7 KLIA
8 Ldg Abd Kadir
9 Palong 1
10 Palong 2
11 [illegible]nas
12 Ulu Cheka
13 Bera
14 U Keratong 1
15 U Keratong 2
16 U Keratong 3
17 U Keratong 4
18 Sg Chales
19 Ulu Sedili
20 Gerdong
21 T Tengah 5
22 T Tengah 1
23 T Tengah 2
24 T Tengah 3
25 T Tengah 4
26 T Tengah 6
27 T Tengah 7
28 T Tengah 8

APPENDIX 13

Type of Crops Planted in Estates Managed by ESPEK

Name of Estate	Type of Crop
Bt. Kota 1	Rubber/Oil Palm
Bt. Kota 2	Rubber
Bt. Kota 3	Rubber
Tg. Genting	Rubber
Serigala	Rubber
Ulu Slim	Rubber
Palong 1	Rubber/Oil Palm
Palong 2	Rubber/Oil Palm
Ladang Abdullah Kadir	Rubber/Oil Palm
Inas	Rubber
Ulu Cheka	Rubber/Oil Palm
Ulu Keratong 1	Oil Palm
Ulu Keratong 2	Oil Palm
Ulu Keratong 3	Oil Palm
Ulu Keratong 4	Oil Palm
Bera	Oil Palm
Sg. Charles	Oil Palm
Ulu Sedili	Oil Palm
Trengganu Tengah 1	Oil Palm
Trengganu Tengah 2	Oil Palm
Trengganu Tengah 3	Oil Palm
Trengganu Tengah 4	Oil Palm
Trengganu Tengah 5	Oil Palm
Trengganu Tengah 6	Oil Palm
Trengganu Tengah 7	Oil Palm
Trengganu Tengah 8	Oil Palm
Gerdong	Oil Palm

APPENDIX 14: Rubber Crop Statement

ESPEK 13/01/97

ESTET RISDA INAS ESTATE PAGE:

RUBBER CROP STATEMENT 2

MONTH : DECEMBER 1996

DIVISION : A LADANG INAS

FLD NO	SOIL TYPE	TER	AVE DAILY YLD/TAPPER THIS MTH L	THIS MTH S	TODATE L	TODATE S	% LG	DRC	PAYMENT RATE	COST/KG MTH	COST/KG TODATE	AVERAGE DAILY EARNINGS	MTH IN TAP	PANEL POSITION AND HEIGHT	TAPPING SYSTEM	WASHOUT MTH	WASHOUT TD	ETHREL TD
R01	UNCLAS	H	44.4	16.3	25.7	8.2	24	40.9	HY	72.0	78.7	43.75	114		S/2 d/3 57%	5	30	0
R02	UNCLAS	H	44.5	14.2	20.5	8.6	30	92.7	HY	94.8	97.1	55.70	111		S/2 d/3 57%	0	4	0
R03	UNCLAS	H	23.9	9.0	42.3	11.0	21	39.3	HY	83.4	74.4	27.48	116		S/2 d/3 57%	2	12	0
R04	UNCLAS	H	28.9	8.8	24.3	7.5	24	51.6	HY	101.5	97.6	38.23	105		S/2 d/3 57%	0	33	0
R05	BUNGOR	H	24.2	8.5	19.1	7.2	27	69.7	HY	90.7	92.6	29.66	89		S/2 d/3 57%	1	65	0
R06	BUNGOR	H	45.5	13.8	29.8	9.7	25	31.0	HY	99.3	104.0	58.90	103		S/2 d/3 57%	0	4	0
R07	UNCLAS	H	26.2	7.4	23.9	6.3	21	68.5	HY	92.6	90.0	31.14	103		S/2 d/3 57%	0	30	0
R08	BUNGOR	H	31.5	11.1	38.6	14.1	27	49.1	HY	77.6	74.7	33.08	104		S/2 d/3 57%	0	38	0
R09	BUNGOR	H	53.4	11.7	39.8	9.6	19	30.8	HY	71.9	76.5	46.78	103		S/2 d/3 57%	0	2	0
R10	BUNGOR	H	32.9	9.1	29.7	11.1	22	60.8	HY	94.2	78.9	39.84	103		S/2 d/3 57%	0	0	0
R11	BUNGOR	H	[illegible]	11.3	24.4	9.4	28	70.4	HY	86.9	87.0	11.62	104		S/2 d/3 57%	0	7	0
R12	BUNGOR	H	11.1	10.5	31.8	10.7	25	84.1	HY	87.5	79.3	42.87	96		S/2 d/3 57%	0	0	0
R13	BUNGOR	H	20.9	6.1	22.3	6.6	23	31.5	HY	84.8	82.1	22.93	96		S/2 d/3 57%	0	5	0
R14	UNCLAS	H	32.1	12.4	30.2	11.0	27	33.4	HY	71.0	74.1	32.90	92		S/2 d/3 57%	0	8	0
R15	UNCLAS	H	21.2	9.6	20.8	7.6	27	52.0	HY	87.3	87.6	26.92	91		S/2 d/3 57%	0	11	0
R16	UNCLAS	H	46.5	13.7	31.7	10.0	24	0.0	HY	100.9	96.4	60.71	91		S/2 d/3 57%	0	7	0
R17	BUNGOR	H	37.1	13.2	33.3	11.5	26	0.0	HY	137.0	133.8	68.94	91		S/2 d/3 57%	0	0	0
R18	BUNGOR	H	39.8	8.1	33.9	8.9	21	16.1	HY	97.6	96.8	46.73	77		S/2 d/3 57%	0	10	0
TOTAL			33.8	10.5	27.6	8.8	24			87.1	86.4	38.66				8	269	

APPENDIX 15

Daily Pocket Checkroll

BATCH NO.

DIVISION

.... ESTATE

DAILY POCKET CHECKROLL

FOR .... 19 ....

PAGE NO.

MONTH

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL DAYS / O-T HRS	CASH ADVANCE	EMPLOYEE NAME / EMP. NO.
1																																	
2																																	
3																																	
4																																	
5																																	
6																																	
																																	TOTAL

NP NORMAL DAY PRESENT
RP REST DAY PRESENT
HP HOLIDAY PRESENT
DT DOUBLE TAPPING
AB ABSENT

AL APPROVED LEAVE
ML MATERNITY LEAVE
DAYS NOT OFFERED
SH SICK HOSPITALISATION
SN SICK NON-HOSPITALISATION

VACATION LEAVE
SOCSO CLAIM
PAID HOLIDAY
UNPAID HOLIDAY
T TRANSFER TO OTHER CHECKROLL

INDUSTRIAL ACTION

PREPARED BY	DATE

APPROVED BY	DATE

APPENDIX 16

Pocket Checkroll Summary

FORM NO. 04G

REF TO FRM-03G PAGE NO. [ ]

.... ESTATE

POCKET CHECKROLL SUMMARY
FOR .... 19 ....

BATCH NO. [ ]

DIVISION [ ]

MONTH [ ]

EMP NO / EMPLOYEE NAME	CASH ADVANCE	HOURS				ABSENT DAYS											TOTAL DAYS	O.T HOURS	WAGES $	
		NP	RP	HP	DT	AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA			NORMAL	RESTDAY
						AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA		O/T HRS		
						AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA		O/T HRS		
						AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA		O/T HRS		
						AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA		O/T HRS		
						AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA		O/T HRS		
						AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA		O/T HRS		
						AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA		O/T HRS		
																		O/T HRS		
																		O/T HRS		
																		O/T HRS		
																		O/T HRS		
																		O/T HRS		
																		O/T HRS		
																		O/T HRS		
																		O/T HRS		
TOTAL						AB	AL	ML	SH	SN	VL	SO	PH	UH	DU	IA		O/T HRS		

NP NORMAL DAY PRESENT
RP REST DAY PRESENT
HP HOLIDAY PRESENT
DT DOUBLE TAPPING
AB ABSENT

AL ANNUAL LEAVE
ML MATERNITY LEAVE
SH DAYS NOT OFFERED
SN SICK NON-HOSPITAL SOCSO

VL VACATION LEAVE
SO SOCSO CLAIM
PH PAID HOLIDAY
UH UNPAID HOLIDAY
IA INDUSTRIAL ACTION

PREPARED BY	DATE

APPROVED BY	DATE

Serial No. ____

APPENDIX 17: RUBBER TAPPER INFORMATION SHEET

ESTATE______________________________

No	Worker No	Name	G	R	N	S	date of birth	date of employ.	rk

G = Gender — 1 = Male; 2 = Female

R = Race — 1 = Malay; 2 = Indian; 3 = Chinese; 4 = Others

N = Nationality — 1 = Local; 2 = Foreign

S = Employment Status — 1 = Permenant; 2 = Contract

Serial No. ______

PPENDIX 18: RUBBER TAPPER MONTHLY SUMMARY INFORMATION

ESTATE : ______________________________

wk. no	Name	J	F	M	A	M	J	J	A	S	O	N	D	rk

APPENDIX 19: CHECKROLL REPORT FOR 1996

Serial No. ______

Case No. ________ Estate: __________________ Estate Code: _____ Worker No. ___________ Gender: ____ Race: ____ Status: ___

Nationality: ___ Date of Birth: _________ (Age:______ yr) Date of Employment: __________ (Exp: ______ yr) Comp. Months: ____ Remark: ____

	Jan	Feb	Mac	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total
Normal day (NP)													
Rest day (RP)													
Holiday present (HP)													
Double tapping (DT)													
Absent (AB)													
Approved leave (AL)													
Maternity leave (ML)													
Sick hosp (SH)													
Sick non hosp (SN)													
Vacation leave (VL)													
Socso claim (SO)													
Paid holiday (PH)													
Unpaid holiday (UH)													
Days not offered (DU)													
Basic earned wages (01)													
Rest day wage (03)													
Holiday pay (06)													
Out-turn incentive (13)													
Vacation leave pay (05)													
Housing allowance (08)													
Transport allowance(24													
Latex collection													
Scrap collection													

APPENDIX 20: Reliability Analysis for Yield Per Hectare

Year	Mean	SD	Cases
1987	1212.22	423.14	8
1988	1326.43	467.34	8
1989	1434.55	464.63	8
1990	1418.44	404.76	8
1991	1539.14	326.32	8
1992	1558.19	269.30	8
1993	1484.22	178.07	8
1994	1346.63	141.75	8
1995	1520.57	229.72	8
1996	1559.13	224.18	8
1997	1228.77	197.81	8
1998	1116.71	263.75	8

Statistic for Scale

Mean	Variance	SD	N of Variables
16744.98	4206069.47	2050.87	12

Item-total Statistics

Year	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Alpha if Item Deleted
1987	15532.76	3497571.13	.3345	.7727
1988	15418.54	2821526.46	.7428	.7096
1989	15310.44	2888458.58	.6976	.7177
1990	15326.53	2982101.16	.7584	.7105
1991	15205.84	3029533.15	.9420	.6958
1992	15186.79	3395751.68	.7434	.7284
1993	15260.76	3841122.85	.4774	.7598
1994	15398.35	3817612.60	.6650	.7544
1995	15224.40	4070967.76	.0888	.7847
1996	15185.85	3927334.24	.2571	.7725
1997	15516.21	4249017.32	-.1006	.7944
1998	15628.27	4759384.55	-.5413	.8342

Reliability Coefficients

N of Cases = 8 N of Items = 12 **Alpha = .7746**

APPENDIX 21

Descriptive Statistics for Sex of Rubber Tappers

Estate	Male		Female		Total	
	N	%	N	%	N	%
Tg. Genting	70	38.5	112	61.5	182	100
Bt. Kota 1	69	46.9	78	53.1	147	100
Bt. Kota 2	50	43.5	65	56.5	115	100
Bt. Kota 3	36	40.5	53	59.5	89	100
Serigala	43	38.4	69	61.6	112	100
Ulu Slim	46	48.4	49	51.6	95	100
Inas	45	52.3	41	47.7	86	100
Palong 1	56	46.7	64	53.3	120	100
Palong 2	46	43.0	61	57.0	107	100
Total	**461**	**43.8**	**592**	**56.2**	**1053**	**100**

APPENDIX 22

Chi-square Analysis for Sex of Rubber Tappers According to Terrain and Rain Saturation

Terrain		Gender		
		Male	Female	Total
Undulating	Count	162	229	391
	Expected Count	171.2	219.8	391
	% within terrain	41.4%	58.6%	100%
	% within gender	35.1%	38.7%	37.1%
	% of total	15.4%	21.7%	37.1%
Hilly	Count	299	363	662
	Expected Count	289.8	372.2	662
	% within terrain	45.2%	54.8%	100%
	% within gender	64.9%	61.3%	62.9%
	% of total	28.4%	34.5%	62.9%
Total	Count	461	592	1053
	Expected Count	461	592	1053
	% within terrain	43.8%	56.2%	100%
	% within gender	100%	100%	100%
	% within total	43.8%	56.2%	100%

Chi-square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-square	1.392[b]	1	.238		
Continuity Correction[a]	1.245	1	.265		
Likelihood Ratio	1.395	1	.238		
Fisher's Exact Test				.248	.132
Linear-by-Linear Association	1.391	1	.238		
N of Valid Cases	1053				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 171.18

APPENDIX 22 - continue

Rain Saturation		Gender		
		Male	Female	Total
Dry	Count	286	356	642
	Expected Count	281.1	360.9	642
	% within rain saturation	44.5%	55.5%	100%
	% within gender	62.0%	60.1%	61.0%
	% of total	27.2%	33.8%	61.0%
Wet	Count	175	236	411
	Expected Count	179.9	231.1	411
	% within rain saturation	42.6%	57.4%	100%
	% within gender	38.0%	39.9%	39.0%
	% of total	16.6%	22.4%	39.0%
Total	Count	461	592	1053
	Expected Count	461	592	1053
	% within rain saturation	43.8%	56.2%	100%
	% within gender	100%	100%	100%
	% within total	43.8%	56.2%	100%

Chi-square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-square	.395[b]	1	.530		
Continuity Correction[a]	.319	1	.572		
Likelihood Ratio	.395	1	.530		
Fisher's Exact Test				.567	.286
Linear-by-Linear Association	.394	1	.530		
N of Valid Cases	1053				

a. Computed only for a 2x2 table
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 179.93

APPENDIX 23

Descriptive Statistics for Age of Rubber Tappers

Breakdown of Rubber Tappers According to Estates

Estate	Young		Middle-age		Older		Total	
	N	%	N	%	N	%	N	%
Tg. Genting	40	22.0	87	47.8	55	30.2	182	100
Bt. Kota 1	37	25.3	66	45.2	43	29.5	146	100
Bt. Kota 2	34	29.6	61	53.0	20	17.4	115	100
Bt. Kota 3	24	27.0	44	49.4	21	23.6	89	100
Serigala	28	25.0	51	45.5	33	29.5	112	100
Ulu Slim	19	20.7	36	39.1	37	40.2	92	100
Inas	45	52.3	25	29.1	16	18.6	86	100
Palong 1	42	35.6	49	41.5	27	22.9	118	100
Palong 2	48	44.9	42	39.3	17	15.8	107	100
Total	**317**	**30.3**	**461**	**44.0**	**269**	**25.7**	**1047**	**100**

Descriptive Statistics

Estate	N	Mean	SD	Min	Max
Tg. Genting	182	40.7071	6.6565	24.91	56.58
Bt. Kota 1	146	39.9476	7.9191	18.83	56.66
Bt. Kota 2	115	38.7209	7.4872	20.33	58.00
Bt. Kota 3	89	39.3069	9.2560	17.16	60.58
Serigala	112	39.7629	10.1709	17.33	64.00
Ulu Slim	92	42.3179	8.7540	16.66	62.00
Inas	86	36.3900	8.0565	20.91	55.25
Palong 1	118	38.2934	9.8957	17.16	62.00
Palong 2	107	36.0511	9.1263	16.50	63.00
Total	**1047**	**39.2021**	**8.6681**	**16.50**	**64.00**

APPENDIX 24

Chi-square Analysis for Age of Rubber Tappers According to Terrain and Rain Saturation

Terrain		Age			
		Young	Middle-age	Older	Total
Undulating	Count	106	180	103	389
	Expected Count	117.8	171.3	99.9	389
	% within terrain	27.2%	46.3%	26.5%	100%
	% within age	33.4%	39.0%	38.3%	37.2%
	% of total	10.1%	17.2%	9.8%	37.2%
Hilly	Count	211	281	166	658
	Expected Count	199.2	289.7	169.1	658
	% within terrain	32.1%	42.7%	25.2%	100%
	% within age	66.6%	61.0%	61.7%	62.8%
	% of total	20.2%	26.8%	15.9%	62.8%
Total	Count	317	461	269	1047
	Expected Count	317	461	269	1047
	% within terrain	30.3%	44.0%	25.7%	100%
	% within age	100%	100%	100%	100%
	% within total	30.3%	44.0%	25.7%	100%

Chi-square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-square	2.729[a]	2	.255
Likelihood Ratio	2.752	2	.253
Linear-by-Linear Association	1.613	1	.204
N of Valid Cases	1047		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 99.94

APPENDIX 24 - continue

Rain Saturation		Age			
		Young	Middle-age	Older	Total
dry	Count	212	269	158	639
	Expected Count	193.5	281.4	164.2	639
	% within rain saturation	33.2%	42.1%	24.7%	100%
	% within age	66.9%	58.4%	58.7%	61.0%
	% of total	20.2%	25.7%	15.1%	61.0%
Wet	Count	105	192	111	408
	Expected Count	123.5	179.6	104.8	408
	% within rain saturation	25.7%	47.1%	27.2%	100%
	% within age	33.1%	41.6%	41.3%	39.0%
	% of total	10.0%	18.3%	10.6%	39.0%
Total	Count	317	461	269	1047
	Expected Count	317	461	269	1047
	% within rain saturation	30.3%	44.0%	25.7%	100%
	% within age	100%	100%	100%	100%
	% within total	30.3%	44.0%	25.7%	100%

Chi-square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-square	6.543[a]	2	0.038
Likelihood Ratio	6.624	2	0.036
Linear-by-Linear Association	4.392	1	0.036
N of Valid Cases	1047		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 104.83

APPENDIX 25

Descriptive Statistics for Truncated Experience of Rubber Tappers in Main Sample

Breakdown of Rubber Tappers According to Estates

Estate	Less Experience		More Experience		Total	
	N	%	N	%	N	%
Tg. Genting	48	26.4	134	73.6	182	100
Bt. Kota 1	75	51.4	71	48.6	146	100
Bt. Kota 2	46	40.0	69	60.0	115	100
Bt. Kota 3	44	49.4	45	50.6	89	100
Serigala	52	46.4	60	53.6	112	100
Ulu Slim	43	45.3	52	54.7	95	100
Palong 1	92	76.7	28	23.3	120	100
Palong 2	81	78.6	22	21.4	103	100
Total	**481**	**50.0**	**481**	**50.0**	**962**	**100**

Descriptive Statistics

Estate	N	Mean	SD	Min	Max
Tg. Genting	182	8.8762	4.3879	1.33	15.00
Bt. Kota 1	146	6.1736	5.1937	1.00	23.00
Bt. Kota 2	115	7.2786	4.9933	0.91	14.91
Bt. Kota 3	89	6.9170	4.5534	1.08	13.33
Serigala	112	6.0579	3.5927	1.08	14.16
Ulu Slim	95	5.9483	3.3477	1.00	10.66
Palong 1	120	3.6964	2.4248	1.00	10.66
Palong 2	103	3.3457	1.8055	1.00	7.00
Total	**962**	**6.2383**	**4.4068**	**0.91**	**23.00**

APPENDIX 26

Chi-square Analysis for Truncated Experience of Rubber Tappers According to Terrain and Rain Saturation

Terrain		Experience		
		Less	More	Total
Undulating	Count	184	207	391
	Expected Count	195.5	195.5	391
	% within terrain	47.1%	52.9%	100%
	% within experience	38.3%	43.0%	40.6%
	% of total	19.1%	21.5%	40.6%
Hilly	Count	297	274	571
	Expected Count	285.5	285.5	571
	% within terrain	52.0%	48.0%	100%
	% within experience	61.7%	57.0%	59.4%
	% of total	30.9%	28.5%	59.4%
Total	Count	481	481	962
	Expected Count	481	481	962
	% within terrain	50%	50%	100%
	% within experience	100%	100%	100%
	% within total	50%	50%	100%

Chi-square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-square	2.279[b]	1	.131		
Continuity Correction[a]	2.085	1	.149		
Likelihood Ratio	2.280	1	.131		
Fisher's Exact Test				.149	.074
Linear-by-Linear Association	2.277	1	.131		
N of Valid Cases	962				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 195.5

APPENDIX 26 - continue

Rain Saturation		Experience		
		Less	More	Total
Dry	Count	296	255	551
	Expected Count	275.5	275.5	551
	% within rain saturation	53.7%	46.3%	100%
	% within experience	61.5%	53.0%	57.3%
	% of total	30.8%	26.5%	57.3%
Wet	Count	185	226	411
	Expected Count	205.5	205.5	411
	% within rain saturation	45.0%	55.0%	100%
	% within experience	38.5%	47.0%	42.7%
	% of total	19.2%	23.5%	42.7%
Total	Count	481	481	962
	Expected Count	481	481	962
	% within rain saturation	50%	50%	100%
	% within experience	100%	100%	100%
	% within total	50%	50%	100%

Chi-square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-square	7.141[b]	1	.008		
Continuity Correction[a]	6.797	1	.009		
Likelihood Ratio	7.150	1	.007		
Fisher's Exact Test				.009	.005
Linear-by-Linear Association	7.133	1	.008		
N of Valid Cases	962				

a. Computed only for a 2x2 table
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 205.5

APPENDIX 27

Descriptive Statistics for Total Experience of Rubber Tappers in Sub-Sample

Descriptive Statistics

Experience	N	Mean	SD	Min	Max
Less	83	8.1292	4.0681	1.00	13.50
More	83	20.5741	6.2712	13.50	40.75
Total	**166**	**14.3511**	**8.1684**	**1.00**	**40.75**

Breakdown of Rubber Tappers According to Estates

Estate	Less Experience		More Experience		Total	
	N	%	N	%	N	%
Tg. Genting	34	39.1	53	60.9	87	100
Bt. Kota 1	49	62.0	30	38.0	79	100
Total	**83**	**50.0**	**83**	**50.0**	**166**	**100**

APPENDIX 28

Descriptive Statistics for Race of Rubber Tappers

Estate	Malay		Indian		Total	
	N	%	N	%	N	%
Tg. Genting	118	64.8	64	35.2	182	100
Bt. Kota 1	87	59.2	60	40.8	147	100
Bt. Kota 2	58	50.4	57	49.6	115	100
Bt. Kota 3	10	11.2	79	88.8	89	100
Serigala	40	35.7	72	64.3	112	100
Ulu Slim	54	56.8	41	43.2	95	100
Inas	24	27.9	62	72.1	86	100
Palong 1	45	37.5	75	62.5	120	100
Palong 2	31	29.0	76	71.0	107	100
Total	**467**	**44.3**	**586**	**55.7**	**1053**	**100**

APPENDIX 29

Chi-square Analysis for Race of Rubber Tappers According to Terrain and Rain Saturation

Terrain		Race Malay	Indian	Total
Undulating	Count	173	218	391
	Expected Count	173.4	217.6	391
	% within terrain	44.2%	55.8%	100%
	% within race	37.0%	37.2%	37.1%
	% of total	16.4%	20.7%	37.1%
Hilly	Count	294	368	662
	Expected Count	293.6	368.4	662
	% within terrain	44.4%	55.6%	100%
	% within race	63.0%	62.8%	62.9%
	% of total	27.9%	34.9%	62.9%
Total	Count	467	586	1053
	Expected Count	467	586	1053
	% within terrain	44.3%	55.7%	100%
	% within race	100%	100%	100%
	% within total	44.3%	55.7%	100%

Chi-square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-square	.003[b]	1	.958		
Continuity Correction[a]	.000	1	1.00		
Likelihood Ratio	.003	1	.958		
Fisher's Exact Test				1.00	.505
Linear-by-Linear Association	.003	1	.958		
N of Valid Cases	1053				

a. Computed only for a 2x2 table

b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 173.41

APPENDIX 29 - continue

Rain Saturation		Race		
		Malay	Indian	Total
Dry	Count	305	337	642
	Expected Count	284.7	357.3	642
	% within rain saturation	47.5%	52.5%	100%
	% within race	65.3%	57.5%	61.0%
	% of total	29.0%	32.0%	61.0%
Wet	Count	162	249	411
	Expected Count	182.3	228.7	411
	% within rain saturation	39.4%	60.6%	100%
	% within race	34.7%	42.5%	39.0%
	% of total	15.4%	23.6%	39.0%
Total	Count	467	586	1053
	Expected Count	467	586	1053
	% within rain saturation	44.3%	55.7%	100%
	% within race	100%	100%	100%
	% within total	44.3%	55.7%	100%

Chi-square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-square	6.648[b]	1	.010		
Continuity Correction[a]	6.324	1	.012		
Likelihood Ratio	6.675	1	.010		
Fisher's Exact Test				.011	.006
Linear-by-Linear Association	6.641	1	.010		
N of Valid Cases	1053				

a. Computed only for a 2x2 table
b. 0 cells (.0%) have expected count less than 5. The minimum expected count is 182.28

APPENDIX 30

Descriptive Statistics for Job Performance

Measure	N	Mean	SD	Min	Max
Total crop	1053	10638.231	2820.1818	3701.00	21586.00
Total Earnings	1053	6659.1993	1549.5177	2924.94	13472.17
Out-turn	1053	0.7918	0.09626	0.44	0.98
Output/man-day	1053	42.3541	8.9732	20.71	74.95

APPENDIX 31

Intercorrelations Among the Job Performance Measures

		Total Crop	Total Earnings	Out-turn	Output/ man-day
Pearson Correlation	Total Crop	1.00	.947**	.613**	.845**
	Total Earnings	.947**	1.00	.700**	.673**
	Out-turn	.613**	.700**	1.00	.277**
	Output/man-day	.845**	.673**	.277**	1.00
Sig. (2-tailed)	Total Crop	-	.000	.000	.000
	Total Earnings	.000	-	.000	.000
	Out-turn	.000	.000	-	.000
	Output/man-day	.000	.000	.000	-
N	Total Crop	1053	1053	1053	1053
	Total Earnings	1053	1053	1053	1053
	Out-turn	1053	1053	1053	1053
	Output/man-day	1053	1053	1053	1053

** Correlation is significant at the 0.01 level (2-tailed)

APPENDIX 32

T - test Analysis for Sex Differences in Job Performance

Group Statistics

		N	Mean	SD	Std. Error Mean
Total Crop	Male	461	10274.069	2837.1468	132.1391
	Female	592	10921.809	2776.3618	114.1078
Out-turn	Male	461	.7790	9.746E-02	4.539E-03
	Female	592	.8018	9.419E-02	3.871E-03

Independent Samples Test

		Levene's Test for Equality of Variances	
		F	Sig.
Total Crop	Equal Variances Assumed	.014	.905
Out-turn	Equal Variances Assumed	1.698	.193

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Total Crop	-3.72	1051	.000	-647.7397	174.1189	-989.39	-306.07
Out-turn	-3.842	1051	.000	-2.282E-02	5.940E-03	-3.45E-02	-1.12E-02

APPENDIX 33

One-way ANOVA for Age Differences in Job Performance

Results of One-Way ANOVA for Age Differences in Total Crop

Descriptive

					95% Confidence Interval for Mean	
Age Group	N	Mean	SD	Std. Error	Lower Bound	Upper Bound
Young	317	10218.438	2907.067	163.2772	9897.1907	10539.686
Middle- age	461	11052.289	2867.3374	133.5452	10789.854	11314.723
Older	269	10471.253	2542.5789	155.0238	10166.033	10776.472
Total	1047	10650.542	2821.5333	87.1991	10479.437	10821.647

	Minimum	Maximum
Young	3701.00	20861.00
Middle-age	4289.00	21586.00
Older	5314.00	20546.00
Total	3701.00	21586.00

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Total Crop	3.307	2	1044	.037

ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.42E+08	2	71120291.2	9.071	0.000
Within Groups	8.19E+09	1044	7840055.51		
Total	8.33E+09	1046			

Multiple Comparison (Scheffé)

Total Crop					95% Confidence Interval	
I	J	Mean Difference (I-J)	Std.Error	Sig	Lower Bound	Upper Bound
Young	Middle-age	-833.8500*	204.300	.000	-1334.644	-333.0560
	Older	-252.8143	232.115	.553	-821.7884	316.1598
Middle-age	Young	833.8500*	204.300	.000	333.0560	1334.644
	Older	581.0357*	214.830	.026	54.4316	1107.639
Older	Young	252.8143	232.115	.553	-316.1598	821.7884
	Older	-581.0357*	214.830	.026	-1107.639	-54.4316

* The mean difference is significant at the 0.05 level

APPENDIX 33 - continue

Results of One-Way ANOVA for Age Differences in Out-turn

Descriptive

					95% Confidence Interval for Mean	
Age Group	N	Mean	SD	Std. Error	Lower Bound	Upper Bound
Young	317	0.7791	9.582E-02	5.382E-03	.7685	.7897
Middle Age	461	0.8003	9.870E-02	4.597E-03	.7913	.8094
Old	269	0.7940	9.042E-02	5.513E-03	.7831	.8048
Total	1047	0.7923	9.610E-02	2.970E-03	.7865	.7981

	Minimum	Maximum
Young	.48	.97
Middle-Age	.44	.97
Older	.55	.98
Total	.44	.98

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Out-turn	1.320	2	1044	.268

ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.572E-02	2	4.286E-02	4.674	0.010
Within Groups	9.574	1044	9.170E-03		
Total	9.659	1046			

Multiple Comparison (Scheffé)

Out-turn					95% Confidence Interval	
I	J	Mean Difference (I-J)	Std.Error	Sig	Lower Bound	Upper Bound
Young	Middle-age	-2.123E-02*	.007	.010	-3.84E-02	-4.10E-03
	Older	-1.487E-02	.008	.173	-3.43E-02	4.584E-03
Middle-age	Young	2.123E-02*	.007	.010	4.103E-03	3.836E-02
	Older	6.356E-03	.007	.688	-1.17E-02	2.437E-02
Older	Young	1.487E-02	.008	.173	-4.58E-02	3.433E-02
	Older	-6.356E-03	.007	.688	-2.44E-02	1.165E-02

* The mean difference is significant at the 0.05 level

APPENDIX 34

T - test Analysis for Differences in Job Performance Based on Truncated Experience

Group Statistics

		N	Mean	SD	Std. Error Mean
Total Crop	Less	481	10124.988	2596.2187	118.3774
	More	481	11175.123	2842.1978	129.5931
Out-turn	Less	481	.7752	9.777E-02	4.458E-03
	More	481	.8072	9.425E-02	4.298E-03

Independent Samples Test

		Levene's Test for Equality of Variances	
		F	Sig.
Total Crop	Equal Variances Assumed	1.205	.273
Out-turn	Equal Variances Assumed	.826	.364

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Total Crop	-5.983	960	.000	-1050.1351	175.5208	-1394.58	-705.68
Out-turn	-5.164	960	.000	-3.198E-02	6.192E-03	-4.41E-02	-1.98E-02

APPENDIX 35

T - test Analysis for Differences in Job Performance Based on Total Experience

Group Statistics

		N	Mean	SD	Std. Error Mean
Total Crop	Less	83	10388.639	2373.3981	260.5143
	More	83	11484.831	3221.8382	353.6427
Out-turn	Less	83	.7994	9.097E-02	9.986E-03
	More	83	.8252	8.470E-02	9.297E-03

Independent Samples Test

		Levene's Test for Equality of Variances	
		F	Sig.
Total Crop	Equal Variances Assumed	3.473	.064
Out-turn	Equal Variances Assumed	.455	.501

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Total Crop	-2.496	164	.014	-1096.1928	439.2389	-1963.48	-228.900
Out-turn	-1.892	164	.060	-2.581E-02	1.364E-02	-5.28E-02	1.127E-03

APPENDIX 36

Bivariate and Partial Correlations Between Age, Truncated Experience and Job Performance

Bivariate Correlation

		Age	Experience	Total Crop	Out-turn
Pearson Correlation	Age	1.00	.307**	.086**	.085**
	Experience	.307**	1.00	.175**	.228**
	Total Crop	.086**	.175**	1.00	.625**
	Out-turn	.085**	.228**	.625**	1.00
Sig. (2-tailed)	Age	-	.000	.007	.008
	Experience	.000	-	.000	.000
	Total Crop	.007	.000	-	.000
	Out-turn	.008	.000	.000	-
N	Age	961	957	961	961
	Experience	957	962	962	962
	Total Crop	961	962	967	967
	Out-turn	961	962	967	967

** Correlation is significant at the 0.01 level (2-tailed)

Partial Correlation - controlling for Experience

		Age	Total Crop	Out-turn
Age	r	1.00	.0325	.0149
	N	0	954	954
	p	-	.315	.645
Total Crop	r	.0325	1.00	.6079
	N	954	0	954
	p	.315	-	.000
Out-turn	r	.0149	.6079	1.00
	N	954	954	0
	p	.645	.000	-

Partial Correlation - controlling for Age

		Experience	Total Crop	Out-turn
Experience	r	1.00	.1544	.2096
	N	0	954	954
	p	-	.000	.000
Total Crop	r	.1544	1.00	.6195
	N	954	0	954
	p	.000	-	.000
Out-turn	r	.2096	.6195	1.00
	N	954	954	0
	p	.000	.000	-

APPENDIX 37

Bivariate and Partial Correlations Between Age, Total Experience and Job Performance

Bivariate Correlation

		Age	Experience	Total Crop	Out-turn
Pearson Correlation	Age	1.00	.366**	.014	.084
	Experience	.366**	1.00	.145	.067
	Total Crop	.014	.145	1.00	.705**
	Out-turn	.084	.067	.705**	1.00
Sig. (2-tailed)	Age	-	.000	.855	.285
	Experience	.000	-	.062	.390
	Total Crop	.855	.062	-	.000
	Out-turn	.285	.390	.000	-
N	Age	166	166	166	166
	Experience	166	166	166	166
	Total Crop	166	166	166	166
	Out-turn	166	166	166	166

** Correlation is significant at the 0.01 level (2-tailed)

Partial Correlation - controlling for Experience

		Age	Total Crop	Out-turn
Age	r	1.00	-.0422	.0635
	N	0	163	163
	p	-	.591	.418
Total Crop	r	-.0422	1.00	.7044
	N	163	0	163
	p	.591	-	.000
Out-turn	r	.0635	.7044	1.00
	N	163	163	0
	p	.418	.000	-

Partial Correlation - controlling for Age

		Experience	Total Crop	Out-turn
Experience	r	1.00	.1506	.0396
	N	0	163	163
	p	-	.054	.614
Total Crop	r	.1506	1.00	.7065
	N	163	0	163
	p	.054	-	.000
Out-turn	r	.0396	.7065	1.00
	N	163	163	0
	p	.614	.000	-

APPENDIX 38

T - test Analysis for Race Differences in Job Performance

Group Statistics

		N	Mean	SD	Std. Error Mean
Total Crop	Malay	467	10078.625	2423.2695	112.1355
	Indian	586	11084.196	3029.1321	125.1323
Out-turn	Malay	467	.7825	9.225E-02	4.269E-03
	Indian	586	.7993	9.878E-02	4.081E-03

Independent Samples Test

		Levene's Test for Equality of Variances	
		F	Sig.
Total Crop	Equal Variances Assumed	23.680	.000
Out-turn	Equal Variances Assumed	3.645	.056

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Out-turn	-2.817	1051	.005	-1.677E-02	5.951E-03	-2.84E-02	-5.09E-03

APPENDIX 39

Mann-Whitney U-test for Race Differences in Total Crop

Ranks

Total Crop	N	Mean Rank	Sum of Ranks
Malay	467	464.58	216957.00
Indian	586	576.75	337974.00

Test Statistics

Mann-Whitney U	107679.00
Wilcoxon W	216957.00
Z	-5.946
Asymp. Sig. (2-tailed)	.000

APPENDIX 40

Analysis of Variance of Sex by Age by Race by Terrain for Total Crop

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	ε^2 (%)
Main Effect	3.02E+08	5	60390255	8.36	.000**	3.14
Sex	35845504	1	35845504	4.962	.026*	0.31
Age	68565945	2	34282973	4.746	.009**	0.64
Race	78337739	1	78337739	10.844	.001**	0.85
Terrain	1.53E+08	1	1.53E+08	21.111	.000**	1.75
2-way Interaction	1.65E+08	9	18297119	2.533	.007**	1.13
Sex x Age	152655.14	2	76327.573	0.011	.989	
Sex x Race	13688569	1	13688569	1.895	.169	
Sex x Terrain	683815.09	1	683815.09	0.095	.758	
Age x Race	32575059	2	16287530	2.255	.105	
Age x Terrain	36206958	2	18103479	2.506	.082	
Race x Terrain	1.13E+08	1	1.13E+08	15.631	.000**	1.63
3-way Interaction	31328246	7	4475463.6	0.620	.740	
Sex x Age x Race	20673077	2	10336539	1.431	.240	
Sex x Age x Terrain	4509611.0	2	2254805.5	0.312	.732	
Sex x Race x Terrain	3577437.4	1	3577437.4	0.495	.482	
Age x Race x Terrain	2766495.7	2	1383247.8	0.191	.826	
Sex x Age x Race Terrain	925875.98	2	462937.99	0.064	.938	
Model	9.37E+08	23	40741825	5.640	.000**	9.25
Residual	7.39E+09	1023	7224043.5			
Total	8.33E+09	1046	7961050.2			

* significant at $p < 0.05$
** significant at $p < 0.01$

APPENDIX 41

Analysis of Variance of Sex by Experience by Race by Terrain for Total Crop

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	ε^2 (%)
Main Effect	6.65E+08	4	1.66E+08	24.625	.000**	8.62
Sex	29281808	1	29281808	4.337	.038*	0.29
Experience	3.03E+08	1	3.03E+08	44.813	.000**	4.01
Race	1.83E+08	1	1.83E+08	27.130	.000**	2.38
Terrain	2.51E+08	1	2.51E+08	37.169	.000**	3.30
2-way Interaction	1.12E+08	6	18639947	2.761	.012*	0.90
Sex x Experience	763947.38	1	763947.38	.113	.737	
Sex x Race	16223736	1	16223736	2.403	.121	
Sex x Terrain	617.445	1	617.445	.000	.992	
Experience x Race	11837252	1	11837252	1.753	.186	
Experience x Terrain	3686937.0	1	3686937.0	.546	.460	
Race x Terrain	75450372	1	75450372	11.175	.001**	0.92
3-way Interaction	13354637	4	3338659.3	.495	.740	
Sex x Experience x Race	7029970.5	1	7029970.5	1.041	.308	
Sex x Experience x Terrain	228550.72	1	228550.72	.034	.854	
Sex x Race x Terrain	7403244.0	1	7403244.0	1.097	.295	
Experience x Race x Terrain	342245.78	1	342245.78	.051	.822	
Sex x Experience x Race Terrain	2749116.0	1	2749116.0	.407	.524	
Model	9.91E+08	15	66079985	9.78	.000**	12.1
Residual	6.39E+09	946	6751449.1			
Total	7.38E+09	961	7677492.9			

* significant at $p < 0.05$
** significant at $p < 0.01$

APPENDIX 42

Analysis of Variance of Sex by Age by Race by Terrain for Out-turn

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	ε^2 (%)
Main Effect	0.173	5	3.461E-02	3.859	.002**	1.32
Sex	7.123E-02	1	7.123E-02	7.942	.005**	0.68
Age	9.770E-02	2	4.885E-02	5.446	.004**	0.82
Race	2.907E-02	1	2.907E-02	3.241	.072	
Terrain	6.692E-03	1	6.692E-03	0.746	.388	
2-way Interaction	0.142	9	1.578E-02	1.759	.072	
Sex x Age	8.001E-03	2	4.000E-03	0.446	.640	
Sex x Race	9.756E-02	1	9.756E-02	10.877	.001**	0.92
Sex x Terrain	7.699E-03	1	7.699E-03	0.858	.354	
Age x Race	1.496E-04	2	7.482E-05	0.008	.992	
Age x Terrain	8.388E-03	2	4.194E-03	0.468	.627	
Race x Terrain	2.044E-02	1	2.044E-02	2.279	.131	
3-way Interaction	6.631E-02	7	9.473E-03	1.056	.390	
Sex x Age x Race	4.450E-02	2	2.225E-02	2.480	.084	
Sex x Age x Terrain	1.353E-02	2	6.765E-03	0.754	.471	
Sex x Race x Terrain	1.760E-02	1	1.760E-02	1.962	.162	
Age x Race x Terrain	1.979E-03	2	9.897E-04	0.110	.896	
Sex x Age x Race Terrain	5.304E-03	2	2.652E-03	0.296	.744	
Model	0.483	23	0.02101	2.343	.000**	2.86
Residual	9.176	1023	0.008970			
Total	9.659	1046	0.009235			

* significant at $p < 0.05$
** significant at $p < 0.01$

APPENDIX 43

Analysis of Variance of Sex by Experience by Race by Terrain for Out-turn

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	ε^2 (%)
Main Effect	.527	4	.132	15.102	.000**	5.40
Sex	9.371E-02	1	9.371E-02	10.736	.001**	0.93
Experience	.344	1	.344	39.408	.000**	3.68
Race	7.756E-02	1	7.756E-02	8.885	.003**	0.75
Terrain	1.692E-02	1	1.692E-02	1.938	.164	
2-way Interaction	.307	6	5.111E-02	5.855	.000**	2.77
Sex x Experience	4.756E-10	1	4.756E-10	.000	1.00	
Sex x Race	8.918E-02	1	8.918E-02	10.216	.001**	0.88
Sex x Terrain	5.778E-04	1	5.778E-04	.066	.797	
Experience x Race	1.224E-02	1	1.224E-02	1.403	.237	
Experience x Terrain	.173	1	.173	19.856	.000**	1.80
Race x Terrain	9.778E.03	1	9.778E.03	1.120	2.90	
3-way Interaction	4.561E-02	4	1.140E-02	1.306	.266	
Sex x Experience x Race	1.916E-02	1	1.916E-02	2.195	.139	
Sex x Experience x Terrain	2.184E-03	1	2.184E-03	.250	.617	
Sex x Race x Terrain	2.169E-02	1	2.169E-02	2.485	.115	
Experience x Race x Terrain	1.019E-02	1	1.019E-02	1.168	.280	
Sex x Experience x Race Terrain	9.366E-03	1	9.366E-03	1.073	.301	
Model	.841	15	5.608E-02	6.425	.000**	7.80
Residual	8.258	946	8.729E-03			
Total	9.099	961	9.468E-03			

** significant at $p < 0.01$

APPENDIX 44

Mann-Whitney U-test Analysis for Sex Differences in Absenteeism

Group Statistics

		N	Mean	SD	Std. Error Mean
Avoidable	Male	461	33.97	23.33	1.09
	Female	592	28.40	21.91	.90
Unavoidable	Male	461	6.3883	6.3608	.2963
	Female	592	7.6622	7.4314	.3054

Independent Samples Test

	Levene's Test for Equality of Variances	
	F	Sig.
Avoidable Equal Variances Assumed	5.962	.015
Unavoidable Equal Variances Assumed	9.321	.002

Mann-Whitney Test

Ranks

		N	Mean Rank	Sum of Ranks
Avoidable	Male	461	570.65	263069.00
	Female	592	493.01	291862.00
Unavoidable	Male	461	499.53	230281.50
	Female	592	548.39	324649.50

Test Statistics

	Avoidable	Unavoidable
Mann-Whitney U	116334.00	123790.50
Wilcoxon W	291862.00	230281.50
Z	-4.111	-2.595
Asymp. Sig. (2-tailed)	.000	.009

APPENDIX 45

One-way ANOVA for Age Differences in Avoidable Absence

Descriptive

					95% Confidence Interval for Mean	
Age Group	N	Mean	SD	Std. Error	Lower Bound	Upper Bound
Young	317	34.98	23.71	1.33	33.26	37.60
Middle- age	461	29.04	22.64	1.05	26.97	31.12
Older	269	28.87	21.08	1.29	26.34	31.40
Total	1047	30.80	22.73	.70	29.42	32.18

	Minimum	Maximum
Young	1	117
Middle-age	0	116
Older	0	95
Total	0	117

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Avoidable	2.194	2	1044	.112

ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7962.352	2	3981.176	7.804	0.000
Within Groups	532582.72	1044	510.137		
Total	540545.07	1046			

Multiple Comparison (Scheffé)

Avoidable Absence					95% Confidence Interval	
I	J	Mean Difference (I-J)	Std.Error	Sig	Lower Bound	Upper Bound
Young	Middle-age	5.94*	1.648	.002	1.90	9.98
	Older	6.11*	1.872	.005	1.52	10.70
Middle-age	Young	-5.94*	1.648	.002	-9.98	-1.90
	Older	.17	1.733	.995	-4.08	4.42
Older	Young	-6.11*	1.872	.005	-10.70	-1.52
	Older	-.17	1.733	.995	-4.42	4.08

* The mean difference is significant at the 0.05 level

APPENDIX 46

One-way ANOVA for Age Differences in Unavoidable Absence

Descriptive

					95% Confidence Interval for Mean	
Age Group	N	Mean	SD	Std. Error	Lower Bound	Upper Bound
Young	317	6.4511	6.4515	1.33	32.36	37.60
Middle- age	461	7.6790	7.2879	1.05	26.97	31.12
Older	269	6.9851	7.1173	1.29	26.34	31.40
Total	1047	7.1289	7.0135	.70	29.42	32.18

	Minimum	Maximum
Young	0	31
Middle-age	0	48
Older	0	41
Total	0	48

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Unavoidable	1.684	2	1044	.186

ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	290.675	2	145.337	2.966	0.052
Within Groups	51160.919	1044	49.005		
Total	51451.593	1046			

Multiple Comparison (Scheffé)

Unavoidable Absence					95% Confidence Interval	
I	J	Mean Difference (I-J)	Std.Error	Sig	Lower Bound	Upper Bound
Young	Middle-age	-1.2279	.511	.056	-2.4799	2.419E-02
	Older	-.5340	.580	.655	-1.9565	.8885
Middle-age	Young	1.2279	.511	.056	-2.42E-02	2.4799
	Older	.6938	.537	.434	-.6227	2.0104
Older	Young	.5340	.580	.655	-.8885	1.9565
	Older	-.6938	.537	.434	-2.0104	.6227

* The mean difference is significant at the 0.05 level

APPENDIX 47

Mann-Whitney U-test Analysis for Avoidable and Unavoidable Absence Using Truncated Experience

Group Statistics

		N	Mean	SD	Std. Error Mean
Avoidable	Less	481	35.81	23.35	1.06
	More	481	25.90	21.60	.98
Unavoidable	Less	481	6.139	6.027	.275
	More	481	8.674	7.803	.356

Independent Samples Test

	Levene's Test for Equality of Variances	
	F	Sig.
Avoidable Equal Variances Assumed	5.003	.026
Unavoidable Equal Variances Assumed	27.302	.000

Mann-Whitney Test

Ranks

		N	Mean Rank	Sum of Ranks
Avoidable	Less	481	547.40	263299.50
	More	481	415.60	199903.50
Unavoidable	Less	481	436.25	209837.00
	More	481	526.75	253365.98

Test Statistics

	Avoidable	Unavoidable
Mann-Whitney U	83982.50	93916.00
Wilcoxon W	199903.50	209837.00
Z	-7.358	-5.066
Asymp. Sig. (2-tailed)	.000	.000

APPENDIX 48

T - test and Mann-Whitney U-test Analysis for Avoidable and Unavoidable Absence Using Total Experience

T - test for Avoidable Absence

Group Statistics

		N	Mean	SD	Std. Error Mean
Avoidable	Less	83	33.88	21.91	2.40
	More	83	23.53	19.84	2.18
Unavoidable	Less	83	8.4096	7.1210	.7816
	More	83	11.9398	8.9516	.9826

Independent Samples Test

	Levene's Test for Equality of Variances	
	F	Sig.
Avoidable Equal Variances Assumed	1.954	.164
Unavoidable Equal Variances Assumed	7.111	.008

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Avoidable	3.190	164	.002	10.35	3.24	3.94	16.76

Mann-Whitney U-test for Unavoidable Absence

Ranks

Unavoidable	N	Mean Rank	Sum of Ranks
Less	83	74.22	6160.50
More	83	92.78	7700.50

Test Statistics

Mann-Whitney U	2674.50
Wilcoxon W	6160.50
Z	-2.491
Asymp. Sig. (2-tailed)	.013

APPENDIX 49

T - test Analysis for Race Differences in Absenteeism

Group Statistics

		N	Mean	SD	Std. Error Mean
Avoidable	Malay	467	33.20	22.31	1.03
	Indian	586	28.96	22.86	.94
Unavoidable	Malay	467	6.4176	7.0898	.3281
	Indian	586	7.6519	6.8999	.2850

Independent Samples Test

	Levene's Test for Equality of Variances	
	F	Sig.
Avoidable Equal Variances Assumed	.019	.889
Unavoidable Equal Variances Assumed	.276	.599

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Avoidable	3.021	1051	.003	4.24	1.40	1.49	6.99
Unavoidable	-2.849	1051	.004	-1.2343	.4333	-2.0845	-.3841

APPENDIX 50

Bivariate and Partial Correlations Between Age, Experience and Absenteeism

Bivariate Correlation

		Age	Experience	Avoidable	Unavoidable
Pearson Correlation	Age	1.00	.307**	-.139**	.052
	Experience	.307**	1.00	-.272**	.197**
	Avoidable	-.139**	-.272**	1.00	-.142**
	Unavoidable	.052	.197**	-.142**	1.00
Sig. (2-tailed)	Age	-	.000	.000	.110
	Experience	.000	-	.000	.000
	Avoidable	.000	.000	-	.000
	Unavoidable	.110	.000	.000	-
N	Age	961	957	961	961
	Experience	957	962	962	962
	Avoidable	961	962	967	967
	Unavoidable	961	962	967	967

** Correlation is significant at the 0.01 level (2-tailed)

Partial Correlation - controlling for Experience

		Age	Avoidable	Unavoidable
Age	r	1.00	-.0586	-.0084
	N	0	954	954
	p	-	.070	.794
Avoidable	r	-.0586	1.00	-.0944
	N	954	0	954
	p	.070	-	.003
Unavoidable	r	-.0084	-.0944	1.00
	N	954	954	0
	p	.794	.003	-

Partial Correlation - controlling for Age

		Experience	Avoidable	Unavoidable
Experience	r	1.00	-.2423	.1897
	N	0	954	954
	p	-	.000	.000
Avoidable	r	-.2423	1.00	-.1365
	N	954	0	954
	p	.000	-	.000
Unavoidable	r	.1897	-.1365	1.00
	N	954	954	0
	p	.000	.000	-

APPENDIX 51

Analysis of Variance of Sex by Experience by Race by Terrain for Avoidable Absence

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	ε^2 (%)
Main Effect	38396.994	4	9599.249	20.101	.000**	7.15
Sex	4248.220	1	4248.220	8.896	.003**	0.73
Experience	28234.169	1	28234.169	59.124	.000**	5.44
Race	4647.059	1	4647.059	9.731	.002**	0.81
Terrain	136.081	1	136.081	.285	.594	
2-way Interaction	16091.798	6	2681.966	5.616	.000**	2.55
Sex x Experience	.198	1	.198	.000	.984	
Sex x Race	3168.375	1	3168.375	6.635	.010**	0.52
Sex x Terrain	112.758	1	112.758	.236	.627	
Experience x Race	1699.499	1	1699.499	3.559	.060	
Experience x Terrain	7323.141	1	7323.141	15.335	.000**	1.34
Race x Terrain	2062.551	1	2062.551	4.319	.038*	0.30
3-way Interaction	4244.658	4	1061.164	2.222	.065	
Sex x Experience x Race	2963.899	1	2963.899	6.207	.013*	0.48
Sex x Experience x Terrain	363.291	1	363.291	.761	.383	
Sex x Race x Terrain	530.973	1	530.973	1.112	.292	
Experience x Race x Terrain	911.139	1	911.139	1.908	.168	
Sex x Experience x Race Terrain	406.923	1	406.923	.852	.356	
Model	57468.778	15	3831.252	8.023	.000**	9.88
Residual	451752.14	946	477.539			
Total	509220.92	961	529.886			

* significant at $p < 0.05$
** significant at $p < 0.01$

APPENDIX 52

Analysis of Variance of Sex by Experience by Race by Terrain for Unavoidable Absence

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	ε^2 (%)
Main Effect	4336.780	4	1084.195	25.193	.000**	8.62
Sex	118.558	1	118.558	2.755	.097	
Experience	1707.683	1	1707.683	39.681	.000**	3.44
Race	585.284	1	585.284	13.600	.000**	1.10
Terrain	1540.318	1	1540.318	35.792	.000**	3.10
2-way Interaction	2488.717	6	414.786	9.638	.000**	4.56
Sex x Experience	130.826	1	130.826	3.040	.082	
Sex x Race	15.046	1	15.046	.350	.554	
Sex x Terrain	162.576	1	162.576	3.778	.052	
Experience x Race	97.935	1	97.935	2.276	.132	
Experience x Terrain	978.312	1	978.312	22.733	.000**	1.93
Race x Terrain	670.024	1	670.024	15.569	.000**	1.29
3-way Interaction	485.743	4	121.436	2.822	.024*	0.59
Sex x Experience x Race	22.316	1	22.316	.519	.472	
Sex x Experience x Terrain	213.187	1	213.187	4.954	.026*	0.34
Sex x Race x Terrain	2.839	1	2.839	.066	.797	
Experience x Race x Terrain	273.748	1	273.748	6.361	.012*	0.46
Sex x Experience x Race Terrain	9.665	1	9.665	.225	.636	
Model	7496.817	15	499.788	11.613	.000**	14.2
Residual	40711.263	946	43.035			
Total	48208.080	961	50.164			

* significant at $p < 0.05$
** significant at $p < 0.01$

APPENDIX 53

Analysis of Variance of Sex by Age by Race by Terrain for Avoidable Absence

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	ε^2 (%)
Main Effect	14271.853	5	2854.371	5.755	.000**	2.17
Sex	4967.385	1	4967.385	10.015	.002**	0.83
Age	8184.161	2	4092.081	8.250	.000**	1.33
Race	2491.127	1	2491.127	5.023	.025*	0.37
Terrain	737.132	1	737.132	1.486	.223	
2-way Interaction	8049.976	9	894.442	1.803	.064	
Sex x Age	598.513	2	299.257	.603	.547	
Sex x Race	3484.777	1	3484.777	7.026	.008**	0.55
Sex x Terrain	349.280	1	349.280	.704	.402	
Age x Race	243.367	2	121.684	.245	.782	
Age x Terrain	475.471	2	237.736	.479	.619	
Race x Terrain	3176.678	1	3176.678	6.405	.012*	0.49
3-way Interaction	2984.373	7	426.339	.860	.538	
Sex x Age x Race	1402.710	2	701.355	1.414	.244	
Sex x Age x Terrain	1187.552	2	593.776	1.197	.302	
Sex x Race x Terrain	554.423	1	554.423	1.118	.291	
Age x Race x Terrain	531.954	2	265.977	.536	.585	
Sex x Age x Race Terrain	340.473	2	170.236	.343	.710	
Model	33147.806	23	1441.209	2.906	.000**	4.02
Residual	507397.27	1023	495.990			
Total	540545.07	1046	516.773			

* significant at $p < 0.05$
** significant at $p < 0.01$

APPENDIX 54

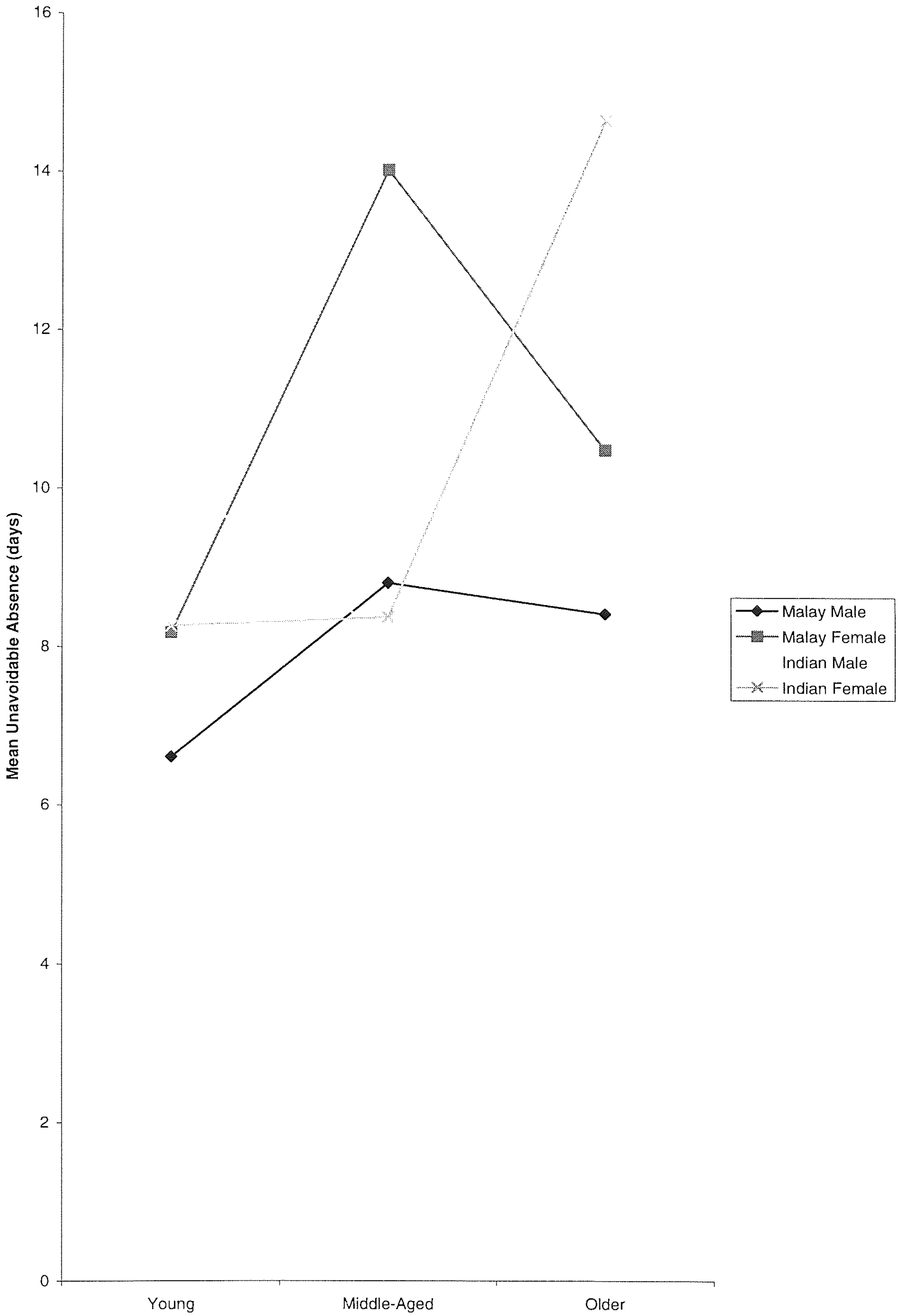
Analysis of Variance of Sex by Age by Race by Terrain for Unavoidable Absence

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	ε^2 (%)
Main Effect	3857.121	5	771.424	17.698	.000**	7.06
Sex	482.400	1	482.400	11.067	.001**	0.84
Age	212.814	2	106.407	2.441	.088	
Race	344.244	1	344.244	7.898	.005**	0.57
Terrain	2567.400	1	2567.400	58.901	.000**	4.89
2-way Interaction	1218.983	9	135.443	3.107	.001**	1.52
Sex x Age	140.357	2	70.179	1.610	.200	
Sex x Race	2.799	1	2.799	.064	.800	
Sex x Terrain	246.372	1	246.372	5.652	.018*	0.38
Age x Race	173.828	2	86.914	1.994	.137	
Age x Terrain	27.856	2	13.928	.320	.727	
Race x Terrain	455.259	1	455.259	10.445	.001**	0.79
3-way Interaction	1341.302	7	191.615	4.396	.000**	1.95
Sex x Age x Race	375.167	2	187.583	4.304	.014*	0.54
Sex x Age x Terrain	454.178	2	227.089	5.210	.006**	0.69
Sex x Race x Terrain	4.579	1	4.579	.105	.746	
Age x Race x Terrain	504.626	2	252.313	5.789	.003**	0.79
Sex x Age x Race Terrain	292.799	2	146.399	3.359	.035*	0.38
Model	6860.812	23	298.296	6.843	.000**	11.4
Residual	44590.781	1023	43.588			
Total	51451.593	1046	49.189			

* significant at $p < 0.05$
** significant at $p < 0.01$

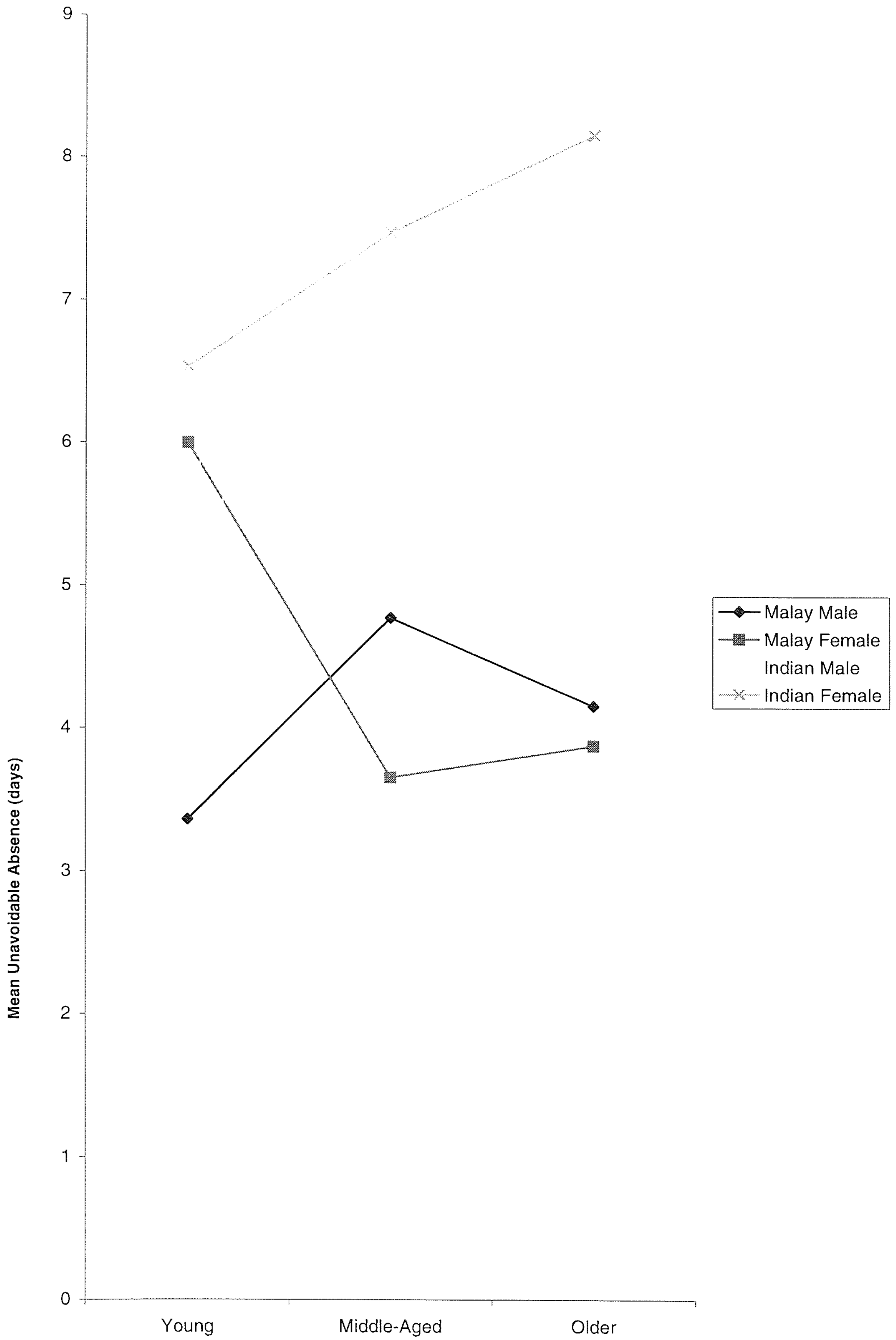
APPENDIX 55

Sex by Race by Age Interaction for Unavoidable Absence in Undulating Terrain



APPENDIX 56

Sex by Race by Age Interaction for Unavoidable Absence in Hilly Terrain



APPENDIX 57

T - test Analysis for Sex Differences in Job Satisfaction

Group Statistics

	N	Mean	SD	Std. Error Mean
Job Satisfaction Male	70	2.9321	.4661	5.571E-02
Female	96	2.9323	.4805	4.904E-02

Independent Samples Test

	Levene's Test for Equality of Variances	
	F	Sig.
Job Satisfaction Equal Variances Assumed	.134	.714

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Job Satisfaction	-.002	164	.998	-1.488E-04	7.458E-02	-.1474	.1471

APPENDIX 58

One-way ANOVA for Age Differences in Job Satisfaction

Descriptive

					95% Confidence Interval for Mean	
Age Group	N	Mean	SD	Std. Error	Lower Bound	Upper Bound
Young	33	2.7879	.5005	8.712E-02	2.6104	2.9653
Middle- age	85	2.9853	.4730	5.131E-02	2.8833	3.0873
Older	48	2.9375	.4421	6.382E-02	2.8091	3.0659
Total	166	2.9322	.4731	3.672E-02	2.8597	3.0047

	Minimum	Maximum
Young	1.25	4.00
Middle-age	1.75	4.00
Older	2.00	4.00
Total	1.25	4.00

Test of Homogeneity of Variances

	Levene Statistic	df1	df2	Sig.
Job Satisfaction	.355	2	163	.702

ANOVA

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.928	2	.464	2.102	.126
Within Groups	35.997	163	.221		
Total	36.925	165			

APPENDIX 59

T - test Analysis for Differences in Job Satisfaction Based on Experience

Group Statistics

Experience		N	Mean	SD	Std. Error Mean
Truncated	Less	85	3.0441	.4333	4.700E-02
	More	81	2.8148	.4870	5.411E-02
Total	Less	83	3.0211	.4523	4.965E-02
	More	83	2.8434	.4793	5.261E-02

Independent Samples Test

Experience		Levene's Test for Equality of Variances	
		F	Sig.
Truncated	Equal Variances Assumed	2.463	.119
Total	Equal Variances Assumed	1.767	.186

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Truncated	3.208	164	.002	.2293	7.147E-02	8.818E-02	.3704
Total	2.457	164	.015	.1777	7.234E-02	3.488E-02	.3205

APPENDIX 60

Bivariate and Partial Correlations Between Age, Truncated Experience and Job Performance

Bivariate Correlation

		Age	Truncated Experience	Total Experience	JS
Pearson Correlation	Age	1.00	.156*	.366**	.176*
	Truncated Experience	.156*	1.00	.450**	-.191*
	Total Experience	.366**	.450**	1.00	-.007
	Job Satisfaction (JS)	.176*	-.191*	-.007	1.00
Sig. (2-tailed)	Age	-	.044	.000	.024
	Truncated Experience	.044	-	.000	.014
	Total Experience	.000	.000	-	.929
	Job Satisfaction (JS)	.024	.014	.929	-
N	Age	166	166	166	166
	Truncated Experience	166	166	166	166
	Total Experience	166	166	166	166
	Job Satisfaction (JS)	166	166	166	166

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

Partial Correlation

	Control for	Job Satisfaction
Age	Truncated Experience	0.2121 (N = 163) p = .006
Age	Total Experience	0.1915 (N = 163) p = .014
Truncated Experience	Age	-0.2248 (N = 163) p = 0.004
Total Experience	Age	-0.0777 (N = 163) p = 0.321

APPENDIX 61

T - test Analysis for Sex Differences in Job Satisfaction

Group Statistics

	N	Mean	SD	Std. Error Mean
Job Satisfaction Malay	89	2.7949	.4223	4.477E-02
Indian	77	3.0909	.4814	5.486E-02

Independent Samples Test

	Levene's Test for Equality of Variances	
	F	Sig.
Job Satisfaction Equal Variances Assumed	.420	.518

						95% Confidence Interval of the Mean	
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Job Satisfaction	-4.220	164	.000	-.2960	7.014E-02	-.4345	-.1575

APPENDIX 62

Bivariate Correlation Between Job Satisfaction, Job Performance and Absenteeism

		TC	O	A	UA	JS
Pearson Correlation	TC	1.00	.705**	-.615**	-.145	.074
	O	.705**	1.00	-.843**	-.276**	.013
	A	-.615**	-.843**	1.00	-.151	.142
	U A	-.145	-.276**	-.151	1.00	-.185*
	J S	.074	.013	.142	-.185*	1.00
Sig. (2-tailed)	TC	-	.000	.000	.062	.344
	O	.000	-	.000	.000	.864
	A	.000	.000	-	.051	.069
	U A	.062	.000	.051	-	.017
	J S	.344	.864	.069	.017	-
N	TC	166	166	166	166	166
	O	166	166	166	166	166
	A	166	166	166	166	166
	U A	166	166	166	166	166
	J S	166	166	166	166	166

Key: TC = Total Crop
O = Out-turn
A = Avoidable Absence
UA = Unavoidable Absence
JS = Job Satisfaction