

EXAMINING THE IMPACTS OF FIRM'S SOCIO TECHNICAL SYSTEM AND
ORGANIZATION CULTURE ON SHIFT WORK PROBLEM IN
MANUFACTURING INDUSTRY

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“I declare that this project is the result of my own research except as cited in the references. The research project has not been for any degree and is not concurrently submitted in candidature of any other degree.”

Signature :

Name :

Date :

DEDICATION

I would like to dedicate the success of this project report especially to both of my parents, Jamalludin Bin Mohamad Rashid and Fazilah Binti Omar. The sacrifices that they had made for me to further studies would not be enough by just submitting the report, but it beyond that. Thus, I am honoured to have them as my parents. Secondly, dedication to all my siblings which have helped me a lot in term of spirit and finance support. Last but not least, to my lecturer whom also my supervisor for this Final Year Project Report, Puan Edna Binti Buyong and also my Projek Sarjana Muda (PSM) friends.

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ABSTRACT

This survey aims to identify the problems faced by employees working on shift, to determine the strategies that can overcome shift work-related problems and to examine the impacts of firm's socio technical system and organization culture in minimizing shift work problems. The data will be collected using a set of questionnaires among 120 respondents in the industrial zone, Penang to explore the main health problems among shift workers, its impact and recommended strategies on how to improve the health problems among the shift workers. The data was analyzed using the SPSS version 21 software through descriptive, correlation and regression analysis. The findings showed that there was significant relationship between firm's socio technical system and health problem. The findings also showed that there was significant relationship between organization culture and health problem. Regression result showed that the model of shift work related to health problems impacted by firm's socio technical system and organizational culture.

ABSTRACT

Kajian tinjauan ini bertujuan untuk mengenal pasti masalah-masalah yang dihadapi oleh pekerja-pekerja syif, mengenal pasti kaedah-kaedah yang boleh mngurangkan masalah kerja syif dan untuk mengukur kesan sistem sosio teknikal firma dan budaya kerja organisasi dalam mengurangkan masalah kerja syif. Kajian ini dijalankan di sekitar kawasan perindustrian bebas Pulau Pinang di mana seramai 120 orang telah dipilih untuk menjawab soalan kajian ini melalui satu set soal selidik untuk mengenalpasti masalah kesihatan, mencari punca utama masalah kesihatan dan kesannya serta mencadangkan kaedah yang terbaik untuk mengatasi masalah kesihatan dalam kalangan pekerja syif. Maklumat yang telah dikumpul dianalisis secara deskriptif, analisis korelasi dan regresi dengan menggunakan perisian SPSS versi 21. Dapatan kajian menunjukkan bahawa terdapat hubungan yang signifikan antara sistem sosio teknikal firma dan masalah kesihatan. Dapatan kajian juga menunjukkan bahawa terdapat hubungan yang signifikan antara budaya kerja organisasi dan masalah kesihatan. Hasil analisis regresi menunjukkan bahawa model kerja syif yang berkaitan dengan masalah kesihatan dipengaruhi oleh sistem sosio teknikal firma dan budaya kerja organisasi.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Shift work is an employment practice designed to make use of, or provide service across, all 24 hours of the clock each day of the week (abbreviated as 24/7). The practice typically sees the day divided into shifts, set periods of time during which different groups of workers perform their duties. The term "shift work" includes both long-term night shifts and work schedules in which employees change or rotate shifts (Sloan Work and Family Research, Boston College. "Shift work, Definition(s)").

Shift work is commonly known in production environments where the repetitive task are perform by workers. Conversely, Section 2 of the Employment Act 1955 Malaysia defines shift work which by reason of its nature requires to be carried on continuously or continually as they may be by two or more shifts. By virtue of the same Act, an employee who is engaged under this contract of service in shift work may be required by the employer to work more than eight hours in any one day or more than forty eight hours in any one week but the average number of hours worked over any period of three weeks shall not exceed forty-eight hours per week.

On the contrary, shift work in the United States refers to a job schedule in which employees work hours other than the standard hours of 8 a.m. to 5 p.m. or a schedule other than the standard workweek - Monday through Friday (Gross Wald, 2004, p. 414).The shift workers are considered as nonstandard workers because their operating hours are different from the normal hours of work. Under these definitions, shift workers include all people working evening shift, night shift, rotating shifts,

split shifts, or irregular or on-call schedules both during the week and on weekends” (Institute for Work & Health, n.d.).

Malaysian manufacturers commonly operate in 3 rotating systems, 12 hours shift, or alternatively 4 shifts. A typical work shift is eight hours of consecutive work with breaks and periods of rest between shifts. Businesses use different types of work shifts depending on their type of work, needs and human resource philosophies. Some companies have employees work consistent shifts while others use rotating shifts. Four common work shifts include morning, mid-day, evening and overnight. Each has pros and cons for your business and employees (Neil Kokemuller, Demand Media).

On the other hand the socio technical systems (STS) approach is devoted to the effective blending of both the technical and social systems of an organization. These two aspects must be considered interdependently, because arrangements that are optimal for one may not be optimal for the other and trade-offs are often required. Thus, for effective organization design, there is need for both dual focus and joint optimization. This article traces the development of STS from the presentation of its first principles by Eric Trist, its leading founder, who was guided by earlier systems thinking, research on participation, and the action research work of Kurt Lewin, to the present, including discussion of adaptations and refinements that have enhanced its applicability to nonmanufacturing organizations. The approach has more relevance today than ever before, as organizational personnel seek more fruitful means of empowerment and as their organizations strive for greater productivity and viability in increasingly turbulent environments.

1.2 Problem Statement

Frequently, service industry workers, such as healthcare workers, must work non-traditional shifts. The negative impacts of continued work in these non-traditional shifts on work outcomes have been well-documented and include higher frequency of accidents and absenteeism, among others (cf. Costa, 1996). Relative to on-shift outcomes such as those mentioned, however, relatively less attention has

been paid to the study of off-shift consequences of shift work such as work-family conflict (WFC), physical well-being and psychological distress. In addition, studies that have examined off-work (as well as traditional on-work) outcomes have typically conceptualized shift work in a way that lacks consideration for its multi-faceted nature. Adverse effects can manifest themselves in the short term as sleep disturbances, shift-lag syndrome, psychosomatic troubles, errors, and accidents; in the long term, there is an increased risk for gastrointestinal, psychoneurotic, and cardiovascular diseases, and women shift workers can be more vulnerable in relation to their reproductive function and family duties. A high inter individual variability is recorded in both short-term adjustment and long-term tolerance, being connected to individual factors as well as to work organization (shift schedules in particular) and social conditions (Chronobiology International, 14(2), 89–98, 1997). In addition, the companies should have a solution for this type of shift work problems.

Shift work associated with various health problems and there is concern that shift workers are at higher risk to develop hypertension. A cross-sectional study was conducted from December 2003 to May 2004 to compare the prevalence of hypertension and to examine the relationship between shift work and hypertension among 148 randomly selected male workers from one of the factories in Kota Bharu, Kelantan. Information on psychosocial and life-style factors, anthropometric and blood pressure measurements, and fasting blood sugar and lipid profiles analyses were obtained. The prevalence of hypertension was significantly higher among shift workers (22.4%) compared to day workers (4.2%), with p-value of 0.001. Shift work was significantly associated with hypertension (Nazri SM, Tengku MA, Winn T. The association of shift work and hypertension among male factory workers in Kota Bharu, Kelantan, Malaysia. *The Southeast Asian Journal of Tropical Medicine and Public Health*. 2008 Jan; 39(1): 176-83)

The statistics in portal of Department of Occupational Safety and Health (DOSH) shows the highest accidents happen is in the manufacturing sectors among the other sectors in industry. About 1,246 cases reported until August 2015 at the DOSH. Below is the graph's report of the statistics Figure 1:

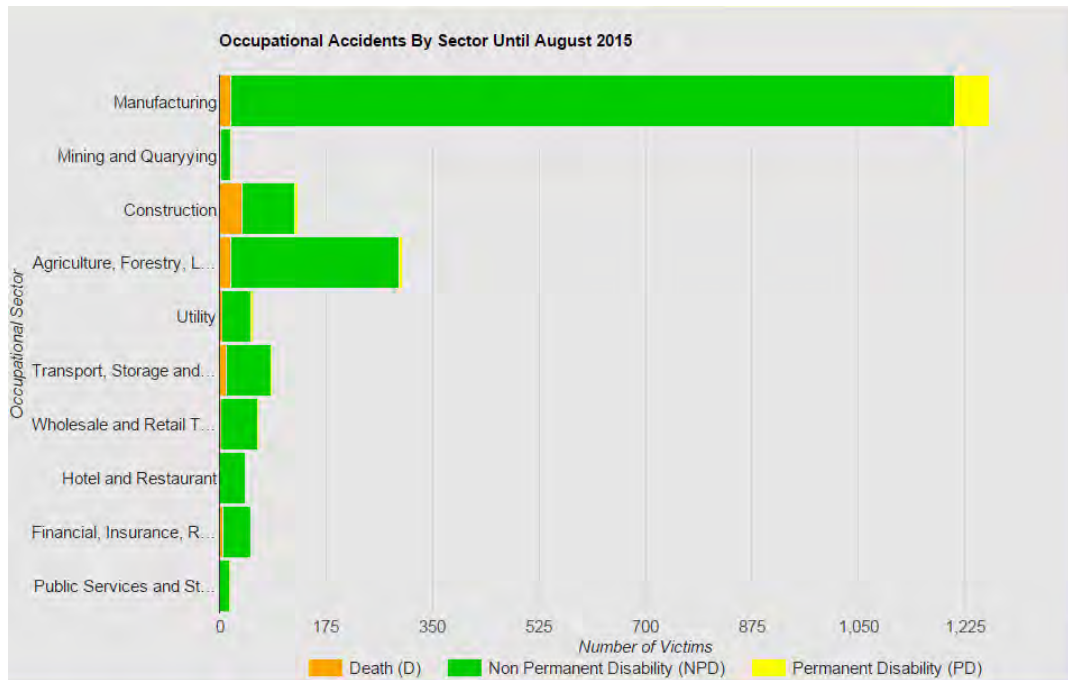


Figure 1: DOSH Accidents Statistic 2015

1.3 Background Project

This research seeks to determine the impacts of shift work on the socio technical system in organizations. The motivations of the research arise from various problems encountered by the implementation of shift work systems in the organization. The designs of effective socio technical systems in are deemed to have minimized the negative impacts of the shift work problems in the future.

Though shift work itself remains necessary in many occupations, employers can alleviate some of the negative health consequences of shift work. The United States National Institute of Occupational Safety and Health recommends employers avoid quick shift changes and any rotating shift schedules should rotate forward. Employers should also attempt to minimize the number of consecutive night shifts, long work shifts and overtime work. A poor work environment can exacerbate the strain of shift work. Adequate lighting, clean air, proper heat and air conditioning, and reduced noise can all make shift work more bearable for workers (Roger R. Rosa, Michael J. Colligan, July 1997).

Socio-technical systems design (STSD) methods are approaches to design that consider human, social and organisational factors, as well as technical factors in the design of organisational systems. They have a long history and are intended to ensure that the technical and organisational aspects of a system are considered together. The outcome of applying these methods is a better understanding of how human, social and organisational factors affect the ways that work is done and technical systems are used. This understanding can contribute to the design of organisational structures, business processes and technical systems. Even though many managers realise that socio-technical issues are important, socio-technical design methods are rarely used. We suspect that the reasons for their lack of use are, primarily, difficulties in using the methods and disconnect between these methods and both technical engineering issues, and issues of individual interaction with technical systems.

The underlying premise of socio-technical thinking is that systems design should be a process that takes into account both social and technical factors that influence the functionality and usage of computer-based systems. The rationale for adopting socio-technical approaches to systems design is that failure to do so can increase the risks that systems will not make their expected contribution to the goals of the organisation. Systems often meet their technical 'requirements' but are considered to be a 'failure' because they do not deliver the expected support for the real work in the organisation. The source of the problem is that techno-centric approaches to systems design do not properly consider the complex relationships between the organisation, the people enacting business processes and the system that supports these processes (Norman, 1993; Goguen, 1999).

1.4 Research Objectives

The research objectives are as follows:

- a) To identify the problems faced by employees working on shift.
- b) To determine the strategies that can overcome shift work-related problems.
- c) To examine the impacts of organizational culture and firm's socio technical system in minimizing shift work problems.

1.5 Research Questions

The research questions are as follows:

- a) What problems are encountered by employees working in shift work?
- b) What are the strategies that can overcome shift work problems?
- d) What are the impacts of organizational culture and firm's socio technical system in minimizing shift work problems?

1.6 Theoretical Framework

A theoretical framework is a type of intermediate concept which has the ability to connect all aspects of inquiries. A framework can help decide and explain the route, which should be taken to a certain point. The study framework comprises the dependent variable (Firm's Socio Technical System) and two types of independent variable (Health Problems and Organizational Culture).

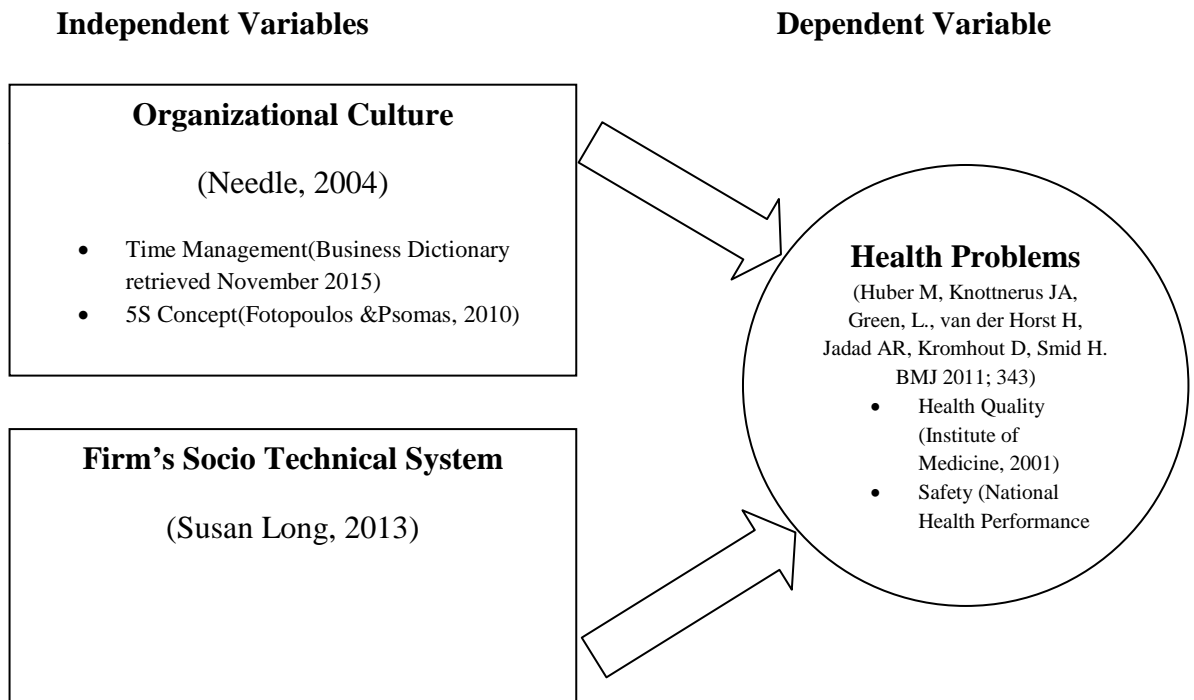


Figure 2: Theoretical Framework

1.7 Hypothesis Development

It is important to build up the relationship among the identified and respective variables by developing the hypothesis and examine then. The research project will be based on following hypothesis. So, based on the literature review and theoretical framework the following are developed.

Hypothesis 1

H₀: There is no significant relationship between health problems and organizational culture in manufacturing industry

H₁: There is a significant relationship between health problems and organizational culture in manufacturing industry

Hypothesis 2

H₀: There is no significant relationship between health problems and firm's socio technical system in manufacturing industry

H₁: There is a significant relationship between health problems and firm's socio technical system in manufacturing industry

1.8 Scope

The scope of the research covers the employees who currently working with organizations that implement the shift work systems including the employees who are already employed but actively looking for the other jobs to avoid the health and emotional consequences as well as their welfare. The respondents involve the production staff, line leader, technical operator, technicians, assistant engineer and other who are actively employed in organizations in Free Industrial Zone Penang, Malaysia.

1.9 Research Limitation

Throughout this study, researcher has several limitations that can become challenges in the focus area. First, researcher cannot conduct the study throughout Malaysia due to geographical and location factors that hard for the researcher to cover whole Malaysia. Hence, researcher decides to only cover the issues in Penang which would allow the processes of getting the data more facilitate.

Other than that, researcher also found the constraints of this study only carried out for the production environment in the industry. This is due to shift work had giving the impact on socio technical system in organization. Therefore, by focusing at one industry would help the researcher to narrow down the negative impact in the shift work on socio technical system among the employee in the organization.

1.10 Importance of the study

Productivity is very important issue for an industry or organization. There are several factors on which productivity of an organization mostly depends upon. Employee's health problem is one of them which is considered to be one of the challenging issues in production line nowadays. In relation, the importance of study is revealing the factors that contribute to employee's health problem. It is also importance that this study would establish the links between employee's shift work and socio technical system in the organization. Moreover, this study seeks to help and guide for those who involve working in organization that applied the shift work system.

1.11 Summary

The best rotating shift pattern is still undecided. For the most people, rotating forward through day, afternoon and night shift is better than backwards (night, afternoon then day). The frequency of rotation is also controversial. Some people advocate prolonged rotation, such as two to three weeks. Others advocate short rotations of two to three days. Both have advantages and disadvantages.

The organizations need to find the way to solve the health problem issues that regarding to the shift work hours. There are several approaches the organization can take to help reduce the effects of shift work. There are also several important considerations for organizations. Optimizing the design of the shift schedule is the most effective way of reducing the health and safety problems. Satisfaction with a particular shift system is the result of a complicated balancing act that is the best compromise for personal, psychological, social and medical concerns.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, reviews of the previous researches project that are related with this project will be discussed. The information will be become additional source for the project in becoming more successful. To have a brief understanding of the researches related to the project, a few literature reviews had been done. This chapter will describe the related literature reviews. To facilitate the important contents rigged, researcher started writing the definition of the shift work which is the key to this research. This is followed by an overview of the problem in the shift work system. Additionally, this chapter will also examine explicitly independent variables of culture of work, health impact and the productivity performance with its relation with dependent variable, firm's socio technical system. In addition, the theoretical frameworks for this study were also reviewed to spur the research parallel its objectives.

2.2 Definition of Shift Work

The term "rotational shiftwork" covers a wide variety of work schedules and implies that shifts rotate or change according to a set schedule. These shifts can be either continuous, running 24 hours per day, 7 days per week, or semi-continuous, running 2 or 3 shifts per day with or without weekends. Workers take turns working on all shifts that are part of a particular system. The definition of rotational shift

work in this document does not include fixed shifts like straight nights, straight afternoons or straight days and, generally, fixed shifts are not discussed here. However, workers on fixed night shifts and workers on rotational shift work schedules have much in common due to the constantly changing schedules, night work and potential disruption to family and social lives. The length of a shift can vary between 8 and 12 hours. Specific concerns about the extended workdays (10-12 hour shifts) is discussed in the Extended Workday OSH Answers document.

Shift work is a reality for about 25 percent of the North American working population. Interest in the effects of shift work on people has developed because many experts have blamed rotating shifts for the "human error" connected with nuclear power plant incidents, air crashes, and other catastrophic accidents. Alternating day, night and afternoon shifts are common in industrial work, customs & immigration, mines, hospitals, protective services like police, fire, and ambulance. Other than that is hospitality like hotels and food services and the other is transportation services such as trucking and airlines. Shift work is also common in workplaces where technical processes cannot be interrupted without affecting the product and/or where expensive equipment is used more profitably when in constant operation. The overall prevalence of shift work is similar for women and men.

However, there are gender differences in shift work patterns by sector of employment. Many more women than men work in the health care sector, while many more men than women work in manufacturing. Many workers find that shift work disrupts their family and personal life and leads to health problems including chronic fatigue and gastrointestinal disorders. On the other hand, some workers prefer shift work because it usually allows for more free time.

2.3 Health Problems in Shift Work

The International Agency for Research on Cancer (IARC) has concluded that "shift work that involves circadian disruption" is considered a Group 2A carcinogen and "probably carcinogenic to humans." Group 2A means that this conclusion was based on "limited evidence of carcinogenicity in humans and sufficient evidence of

carcinogenicity in experimental animals". IARC based their conclusion on studies on long-term night workers who have shown a higher risk of breast cancer than women who do not work at night. These studies have involved mainly nurses and flight attendants. These results are consistent with animal studies that have shown that constant light, dim light at night, or simulated chronic jet lag can increase tumour development. The exact causes of this association are still not known. These results may be explained by the disruption of the circadian system that is caused by exposure to light at night. This exposure can alter sleep-activity patterns, suppress melatonin production, and deregulated genes involved in tumour development. Among the many different patterns of shift work, those that include night work are most disruptive to the circadian system (From: IARC 2007. Press Release N°180. IARC Monographs Programme finds cancer hazards associated with shift work, painting and fire fighting).

Many human physical functions follow a daily rhythm or a 24-hour cycle. These cycles are called circadian rhythms. The word circadian comes from the Latin "circa dies" which means "about a day." Sleeping, waking, digestion, secretion of adrenalin, body temperature, blood pressure, pulse and many other important aspects of body functions and human behaviour are regulated by this 24-hour cycle. These rhythmical processes are coordinated to allow for high activity during the day and low activity at night.

Normally, the body uses cues from its processes and from the environment such as clock time, social activities, the light/dark cycle, and meal times to keep the various rhythms on track. For example, body temperature is highest during the afternoon and early evening (6:00 p.m.) and lowest in the early morning (4:00 a.m. or just before sunrise). However, if the person is working at night, the body temperature does not have as much variation during a 24-hour period as it would normally. The temperature rhythm and other body rhythms get out of sync: these rhythms also get out of phase with the person's activity pattern. This disorientation can lead to feelings of fatigue and disorientation. "Jet lag" is a term often used to describe these feelings.

Some rhythms adapt in two to three days while others change only after longer periods. People adapt to new schedules at different rates as do the different rhythms. Total reversal of circadian rhythms may never occur because on days off most people go back to a "normal" day schedule. Frequent changes in schedule and disruption to circadian rhythms can lead to chronic fatigue and other health problems.

Disruption of both the quality and quantity of the normal sleep is inevitable in shift work particularly where night work is involved. The daytime sleep is seldom as deep or as refreshing as sleep at night. The problem is greater if there is not a quiet, dark, comfortable place to sleep. Even when disturbances are removed, a worker who returns home in the morning may still find sleep impossible or less refreshing. This difficulty occurs because the circadian rhythms are no longer synchronized. Being constantly tired is a typical complaint of shift workers.

Gastrointestinal and digestive problems such as indigestion, heartburn, stomach ache and loss of appetite are more common among rotating shift workers and night workers than among day workers. It is less clear if more serious conditions such as peptic ulcers are more common in shift workers. The irregular work, sleep and eating schedules are not helpful for the proper care of ulcers.

Given the irregularity in type and timing of meals, it is not surprising that the night worker is more likely to have a poorer diet. At night, the loss of appetite often leads to increased snacking on "junk" food rather than eating a full, well-balanced meal. Feelings of fatigue may encourage the consumption of beverages with caffeine (coffee, cola) to help the worker stay awake.

Shift work is not absolutely associated with cardiovascular disease. However, heart rate and blood pressure have been shown to follow a circadian rhythm. Lifestyle can directly affect an individual's health. Therefore, it is very important that a shift worker follows exercise programs to maintain an adequate level of fitness. It is also very important not to smoke, to have good dietary habits and to participate in leisure activities. A study of Swedish men with a history of heart attack showed they were significantly more likely to have been shift workers than those men without a history of heart attack. Another study showed that the modification of shift rotation schedules by changing the direction of rotation of shifts to a forward direction (for