UNIVERSITI PUTRA MALAYSIA

IMPLEMENTATION OF OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM IN REDUCING ERGONOMIC RISK AMONG CERTIFIED AND UNCERTIFIED AUTOMOTIVE INDUSTRY WORKERS.

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By

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Abstract of thesis presented to the Senate of University Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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June 2015

Chairman: Associate Professor Shamsul Bahri Bin Hj Mohd Tamrin, PhD
Faculty: Medicine and Health Sciences

Risk management in an integrated way, using organization's operations has become highly important in recent years, since it not only cuts accident rates but can also improve the firm's productivity, economic and financial results. Work-related injuries and occupational diseases have become an increasing concern to employees, employers, and governments because of its big impacts on workers' health and productivity. Occupational Safety and Health Management System (OSHMS) is a planned, documented and verifiable method of managing hazards and associated risks in work place. OSHMS provides a set of tools that enhance safety, risk management efficiency related to all organization's activity, it is a systematic means for employers to handle challenges and reduce haphazard attitudes to risk and problems in the work environment. In Malaysia, there is paucity of reports on risk factors among automotive factory workers because comprehensive studies in determining the risk factors have not been done in manufacturing industries. Therefore the aim of this research was to compare the implementation of occupational safety and health management system in reducing ergonomics risk among workers at a certified and uncertified automotive manufacturing industry. Data was collected by using a questionnaire survey, which was adopted from MSOSH and was integrated with the Nordic Questionnaire for MSD and the workers were also observed using the Quick Exposure Check (QEC) guidelines among 400 workers in both OSHMS certified and uncertified automotive industries located in Klang Valley, Malaysia. The data generated was statistically analyzed using SPSS version 21.0 and the finding revealed that workers in OSH certified company had a significant lower score for back posture of 14.07±1.584 compared to the workers in uncertified company 15.49±1.566, also mean values of shoulder/arm posture, wrist/hand postures and neck posture among the workers of the OSH certified company were 15.95±2.219, 15.48±1.190 and 7.13±1.053 respectively, which was significantly lower compared to the workers of the uncertified automotive company, who scored 18.94±1.943, 16.29±1.123 and 7.82±0.574, respectively. Also the ergonomics risk, occupational hazards, environmental management and OSH mean score value of workers in occupational safety and health certified company was significantly higher ($p < 0.05$)at 70.48±6.56, 55.77±8.72, 54.54±7.43 and 67.53±7.00 compared to the mean

value scored by workers in OSH uncertified company, which was 64.66±4.11, 50.26±9.26, 51.35±4.52, 55.11±3.98. Chi square ($\chi 2$) test also showed that the studied variables (ergonomics risk factors management, occupational hazard management, environmental management and occupational safety and health procedures) were significantly ($p < 0.05$) associated with workers working in OSHMS certified company. Logistic regression test indicated that there is significant negative relationship between the ergonomics risk factors with the workers working in OSH certified and uncertified automotive industry. Also linear regression test revealed that there is a significant relationship between ergonomics risk and demographic factors. Therefore certification fosters the implementation of OSHMS among workers.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PELAKSANAAN PENGURUSAN KESELAMATAN DAN KESIHATAN PEKERJAAN SISTEM DALAM MENGURANGKAN RISIKO ERGONOMIK ANTARA DISAHKAN DAN TIDAK DISAHKAN AUTOMOTIF INDUSTRI PEKERJA

Oleh

MAVIS AMARACHI IKPEGBU

Jun 2015

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Pengurusan risiko secara bersepadu menggunakan operasi organisasi telah menjadi sangat penting kebelakangan ini, hal ini adalah kerana ia bukan sahaja mengurangkan kadar kemalangan tetapi juga dapat meningkatkan tahap produktiviti, ekonomi dan status kewangan bagi sesebuah syarikat. Kecederaan yang disebabkan oleh pekerjaan dan juga penyakit pekerjaan telah menjadi satu kebimbangan bagimajikan, pekerja, dan juga pihak kerajaan kerana ia member impak yang besar ke atas kesihatan dan produktiviti pekerja. Sistem Pengurusan Keselamatan dan Kesihatan Pekerjaan (OSHMS) adalah satu kaedah yang dirancang, didokumenkan dan disahkan dapat menguruskan bahaya dan risiko di tempat kerja.OSHMS menyediakan satu set alat yang meningkatkan keselamatan, keberkesanan pengurusan risiko yang berkaitan dengan aktiviti semua organisasi, ia adalah satu cara yang sistematik bagi majikan untuk menangani cabaran dan mengurangkan sikap yang tidak teratur kepada risiko dan masalah dalam persekitaran kerja. Di Malaysia, terdapat kekurangan laporan kepada faktor-faktor risiko di kalangan pekerja kilang automotif kerana kajian komprehensif dalam menentukan faktor-faktor risiko tidak dilakukan dalam industri pembuatan. Oleh itu, tujuan kajian ini adalah untuk membandingkan pelaksanaan pengurusan keselamatan dan kesihatan pekerjaan sistem dalam mengurangkan risiko ergonomik di kalangan pekerja di industri pembuatan automotif yang bertauliah dan yang belum lagi disahkan.

Data dikumpulkan dengan menggunakan kaedah soal selidik yang telah diterima pakai dari MSOSH dan disepadukan dengan kaedah Soal Selidik Nordic untuk MSD dan para pekerja juga dinilai menggunakan garis panduan Cepat Pendedahan Semak (QEC) seramai 400 pekerja di kedua-dua automotif yang sudah atau belum diiktiraf penggunaan sistem pengurusan OSHMS sekitar Lembah Klang, Malaysia. Data yang diambil telah dianalisis menggunakan perisian SPSS versi 21.0 dan hasil dapatan itu telah mendedahkan bahawa para pekerja dalam syarikat yang sudah diperakui keselamatan dan kesihatan pekerjaan mempunyai nilai signifikan yang lebih rendah untuk postur belakang 14.07±1.584 berbanding dengan pekerja di syarikat yang belum lagi diiktiraf 15.49±1.566, juga nilai purata bagi postur bahu / lengan, pergelangan tangan / tangan dan leher di kalangan pekerja syarikat keselamatan dan kesihatan pekerjaan yang diperakui adalah 15.95±2.219, 15.48±1.190dan 7.13±1.053 masing-

masing, dimana jauh lebih rendah berbanding dengan pekerja syarikat automotif yang belum lagi diiktiraf, yang mencatatkan sebanyak 18.94±1.943, 16.29±1.123 dan 7.82±0.574, masing-masing. Bagi risiko ergonomik, bahaya, pengurusan alam sekitar serta keselamatan dan kesihatan pekerjaan mencatatkan bacaan nilai skor purata pekerja dalam keselamatan pekerjaan dan syarikat yang diiktiraf jauh lebih tinggi ($p < 0.05$) pada 70.48±6.56, 55.77±8.72, 54.54±7.43 dan 67.53±7.00 berbanding dengan nilai purata yang diperolehi oleh pekerja di syarikat yang belum lagi diiktiraf OSH, iaitu 64.66±4.11, 50.26±9.26, 51.35±4.52, 55.11±3.98. Ujian $\chi 2$ kuasa dua juga menunjukkan bahawa pemboleh ubah yang dikaji (pengurusan faktor-faktor risiko ergonomik, pengurusan bahaya pekerjaan, pengurusan alam sekitar dan keselamatan dan pengurusan kesihatan) adalah signifikan ($p < 0.05$) bagi yang berkaitan dengan pekerja-pekerja yang bekerja di syarikat yang telah diiktiraf mengunakan pengurusan OSHMS.Ujian regresi logik menunjukkan bahawa terdapat hubungan yang signifikan antara faktor-faktor risiko ergonomik dan pekerja-pekerja yang bekerja di OSH industri automotif yang telah disahkan dengan industri yang belum lagi disahkan.Juga ujian regresi linear mendedahkan bahawa terdapat hubungan yang signifikan antara faktor-faktor risiko ergonomik dan faktor-faktor demografi. Oleh itu pensijilan menggalakkan pelaksanaan OSHMS di kalangan pekerja

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I certify that a Thesis Examination Committee has met on 10 June 2015 to conduct the final examination of Ikpegbu Mavis Amarachi on his thesis entitled "Implementation of Occupational Safety and Health Management System in Reducing Ergonomic Risk among Certified and Uncertified Automotive Industry Workers" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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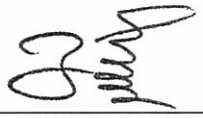

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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This is to confirm that:

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LIST OF ABBREVIATIONS

BSI	British Standard Institution
CV	Confounding Variable
DOSH	Department of Occupational Safety and Health
DV	Dependent Variable
HSE	Health Safety & Environment
IDEA	Institute of Design and Ergonomics Application
ILO	International Labor Organization
ISO	International Standards Organization
IV	Independent Variable
KOSHA	Korea Occupational Safety & Health Agency
LEC	Local Ergonomics Committees
MS	Malaysia Standard
NIOSH	National Institute of Occupational Safety and Health
NOHSC	National Occupational Health and Safety Commission
MMH	Manual Materials Handling
MSD	Musculoskeletal Disorder
OD	Occupational Diseases
OHD	Occupational Health Division
OSH	Occupational Health and Safety
OSHA	Occupational Safety and Health Act
OSHMS	Occupational Safety and Health Management System
OHSAS	Occupational Health & Safety Assessment Series
QEC	Quick Exposure Check
SME	Small, Medium Enterprise
SOCSO	Malaysia Social Security Organization

SPSS	Statistical Package of Social Science
SIRIM	Standards & Industrial Research Institute of Malaysia
UK	United Kingdom
USA	United States of America
UPM	Universiti Putra Malaysia
WHO	World Health Organization
WRMSDs	Work-related musculoskeletal disorders
WRP	Work Related Problem

CHAPTER 1

INTRODUCTION

1.1 Introduction

Risk management in an integrated way, using organization's operations has become highly important in recent years, since it not only cuts accident rates but can also improve the firm's productivity, economic and financial results (O'Toole, 2002). However, researchers have paid little attention in defining exactly what constitutes an effective occupational health and safety management system (Santos-Reyes and Beard, 2002).

Safety management systems are integrated mechanisms in organizations designed to control the risks that can affect workers' health and safety, and at the same time ensures that the company can easily comply with the relevant legislation. A good safety management system should be fully integrated into a company and should be a cohesive system consisting of policies, strategies and procedures that provide internal consistency and harmonization (Linda et al., 2008).

Guastello (1993) has explored the efficiency of different interventions for occupational safety, and has found that behavior-based processes are the most effective in risk control. Thus, developing the safety management system should be regarded as a way of creating awareness, understanding, motivation and commitment among all the organization's employees. However, the success will depend on the management's commitment in implementing the program.

Improving worker's productivity and occupational health and safety are the major concerns of the manufacturing industry. Some of the common problems are improper workplace design, ill-structured jobs, mismatch between worker abilities and job demands, adverse environment, poor human–machine system design and inappropriate management programs (Adler et al., 1997; Bernard 1997). This leads to workplace hazards including ergonomics hazards, poor workers' health, mechanical equipment injuries, disabilities, and in turn reduces worker's productivity and product, work quality, and increases cost. Globally, an estimated 100 million occupational injuries occur each year (Leigh et al., 1999) and such injuries account for an estimated 350,000 deaths (Concha-Barrientos et al., 2005). Thus, having a safety management system will reduce not only personal injuries and harm to workers' health, but also material damage. Consequently, it reduces down time and labor absenteeism and improves workers' satisfaction and motivation. Similarly, by reducing the number of interruptions in the productive process, this management system can improve productivity, the quality of the products and the company's degree of innovation, thereby affecting customers' satisfaction and the company's reputation.

1.2 Ergonomics

Ergonomics is the science of fitting jobs to people. It encompasses the body of knowledge about physical abilities and limitations as well as other human characteristics that are relevant to job design. Ergonomics design is the application of this body of knowledge to the design of the workplace (i.e. work tasks, equipment, and environment) for safe and efficient use by workers. It is estimated that at least 50% of all work-related musculoskeletal disorders(MSDs) among the working population could be prevented by the appropriate implementation of an occupational safety and health management system. An ergonomics job design can also prevent ergonomics problems and musculoskeletal diseases(MSDs) thereby obtaining optimal performance as equipment, workstations, products and working methods are designed according to the principles of ergonomics.

Malaysia is an emerging industrial country with a rapid rise in Occupational Diseases (OD) which has proved to be a major problem among workers. A report from the Occupational health division (OHD) has shown a 100% increase in the number of cases, that is from 791 in 2009 to 1426 cases in 2010 (Department of Occupational Safety and Health Malaysia, 2013). This rise could have been due to the initiatives by Occupational Health Division's dialogue sessions to increase awareness on occupational diseases (OD) reporting especially in the health sector (Department of Occupational Safety and Health Malaysia). There were about 204 cases of Occupational Diseases reported in 2001 (0.09 cases in every 10,000 workers). However, this numbers have increased drastically to 1221 cases of Occupational Diseases in 2010 (2.26 cases in every 10,000 workers). Angelina, A. (2012)nbc.com.my/blog/socso reported in a National Broadcasting Company professional Group blog article that the Malaysian Social Security Organization (SOCSO) in 2011 paid RM1.8 billion in compensation and benefits to its members and contributors. The Deputy Minister of Human Resources Malaysia Datuk MaznahMazlan was quoted in the article saying that the total of medical and treatments compensation that involved diseases and accidents had shown an increase yearly with figures RM1.3 billion in 2009 to RM1.6 billion in 2010, also SOCSO's total recorded number of health problem cases is in the increase in yearly bases.

Work-related musculoskeletal disorders (WRMSDs) represents approximately, one third of workers' compensation costs in Malaysian private industry as reported by Azman (2007). Ergonomics risks at the workplace and bad work organization are parts of the contributing risk factors to occupational safety and health problems in the form of (WRMSDs) A number of conditions in the workplace are responsible for the increase in work related musculoskeletal disorders (WRMSDs) suffered by the workers (De Kort 1991). Thus these results are potentially useful for the industry, particularly, manufacturing industry, in increasing productivity, promoting safety practices and reducing WMSDs amongst Malaysian industrial workers at workplaces.

1.2.1 Ergonomics in Malaysian Manufacturing Industries

The knowledge and application of ergonomics field in Malaysian manufacturing industries are still considered to be at an early stage Sen(1998). Groups such as foreign top management, foreign academicians and local educational institutions have introduced ergonomics in various Malaysian manufacturing industries. The ergonomics

movement started from the foreign top management (such as from Japan and USA) working in the Malaysian multinational manufacturing industries. They could see the benefits of ergonomics implementation in improving the productivity, quality and Occupational Safety and Health (OSH) towards the workers when it was implemented in their own countries. Thus they encouraged local industries to adopt ergonomics principles application. In addition, foreign academicians brought their ergonomics expertise to Malaysian local universities offering ergonomics courses and ergonomics research in the engineering management undergraduate and postgraduate degree programs. They also conducted seminars, workshops and conferences and performed consultancy with the local industries. In terms of local educational institutions, various centres and institutes were established over the years. For example Multimedia University established the Centre of Excellence for Ergonomics Awareness and Identifying Frequently Used Ergonomics Programs in Manufacturing Industries Using Quality Function Deployment Ergonomics in 1998 (EC, 2002), University Malaysia Sarawak established Institute of Design and Ergonomics Application in 1997 (IDEA, 2000) and prior to that, the establishment of National Institute of Occupational Safety and Health (M) (NIOSH) in 1992. The purpose of the establishments is to provide education, to conduct research, carry out training and consultancy in ergonomics for the Malaysian manufacturing industries.

As it is pointed out earlier, ergonomics have been introduced by various groups over a decade ago and yet there are still challenges in implementing ergonomics in most of the Malaysian manufacturing industries. Yeow and Sen, (2002) reported many reasons that contribute to the challenges in implementing ergonomics in Malaysian manufacturing industries. The first being that ergonomics is new and unheard of by most of Malaysian industries; therefore, most of the manufacturing industries are still operating in a traditional way. For instance when they work towards optimizing their productivity, companies will carry out the work without any consideration for the human factors. Secondly the wrong perception of managers that ergonomics is costly, thereby giving negative influence to the effort in implementing ergonomics. They do not know that ergonomics can be investments that can help them raise the company's profit as ergonomics programs can gain savings by rejection, injury costs and increase productivity. Most of the employees are not educated and most of the workers are from other countries such as Indonesia and Bangladesh who are too timid to report to the management when they face poor OSH situations, fearing they may lose their jobs or be sent back to their own countries. The main factor of the poor concern for the operators' OSH by the management is due to the fact that cheap labour is in abundance. This further contributes to the challenges in implementing ergonomics in the Malaysian manufacturing industries. This is shown by the lack of OSH committees that were set up by the management, which can be found only in 25% of the industries even though it is required under OSH Act 1994 (Cruez, 2002).

Although various groups have assisted in introducing ergonomics, it is yet to get enough promoters or ergonomist in Malaysia since there are only a few organizations and institutions promoting ergonomics in Malaysia. One of the major factors was due to level of awareness of ergonomics applications and its benefits. Therefore, there is a need to evaluate the knowledge, understanding and implementation of ergonomics in Malaysian manufacturing industries after a decade of its introduction by various groups. The results will be able to identify the level of ergonomics implementation and awareness in Malaysian manufacturing industries hence, one of the objectives of this

study. Occupational safety and health and ergonomics are also concerned with human-system interaction and design considerations that include physical, cognitive, social, organizational and environmental factors aiming to improve workers' wellbeing and overall system performance by optimizing human system compatibility (Ahasan&Benincasa, 1999). Occupational Safety and Health and ergonomics applications made up by various adjacent strategies, which are determined by work execution conditions that cover all the health and safety situation in which workers are placed to meet their production objectives.

Perceptions of workers' health and safety in the workplace is dependent on several factors such as management decision, organizational safety, cultural norms, safety practices, local policies, and work procedures. Organizational commitment to health and safety has a major role to play towards ensuring that workers are protected from risks that are work related for improved performance. The health, safety and ergonomics issues are concerned with the evaluation of the human workforce, and the design of the working environment to obtain maximum satisfaction in productivity, workers' health, safety and wellbeing. (Ahasan, 2001).

1.2.1.1 Ergonomics Program in system management process

Ergonomics program is a management's systematic process for anticipating, identifying, designing, developing, analyzing and controlling ergonomics risk factors to ensure the health and safety of the workers. Dahalan et al., (2003) have shown that forceful exertion, awkward postures, repetitive exertions and environmental factors which are ergonomics risk factors may cause MSD amongst the workers. A good number of ergonomics management programs had been carried out in the manufacturing industries such as orientation, information sharing, ergonomics training, inspection, risk assessment, ergonomics campaign. Ergonomics program ought to contain basic ergonomics principles, how to recognize symptom and risk factors of MSD. Moreover, management should ensure optimum functioning of the system components (human operator, equipment, task, workplace, environment, management) for effective ergonomics programs thus reducing MSD. Ergonomics program involving reactive and proactive measures have increased ergonomics awareness among all levels of workers thus reducing MSD (Munck-Ulfsält et al., 2003). Ergonomics management programs have been developed in the automotive company and implemented by Local Ergonomics Committees (LECs) whose functions it is to identify and evaluate jobs, develop and implement solutions in managing issues related to MSD and to ensure appropriate use of human resources in the plant. In addition, a new comprehensive documentation system was launched by Ford Automotive Company "the Ergonomics Evidence Book" to record information about plant ergonomics process. Five stages are required to successfully implement ergonomics. One of which is securing leadership commitment by implementing a preliminary leadership orientation program. The orientation program must be scheduled and organized to ensure the leadership awareness of the incoming process of ergonomics (Joseph, 2003).

Ergonomics training program also presents positive results in creating awareness, increasing ergonomics knowledge to prevent work related MSD and motivates employees to utilize their creative problem solving capacity (Munck-Ulfsält et al., 2003; Shahnavaz, 2000). By 2003, the Occupational Health Department in Volvo Car Corporation implemented ergonomics training from the top management to operators

to develop knowledge in the area of ergonomics and to maintain a high level of knowledge, the ergonomics training program must be continuous process. Also according to Munck- Ulfsält et al., 2003; Joseph, 2003; Smyth, 2003 ergonomics programs in the form of risk assessment and monthly/yearly inspection were also conducted to reduce WRMSD.

1.2.2 Musculoskeletal Disorders (MSDs) in the Manufacturing industry.

Musculoskeletal disorders have to do with conditions that are related to the nerves, tendons, muscles and supporting structures of the body (Bernard, 1997).Musculoskeletal disorders (MSDs) are disorders and injuries of the muscles, tendons, nerves, joints, ligaments, spinal discs and cartilages. Exposure to the activities of physical work and conditions which involves risks factors might contribute to or cause MSDs.

In 2007, there were 1,800,553 workers in the manufacturing industry with 24,146 in the auto manufacturing industry (Department of statistics Malaysia, 2010). Musculoskeletal disorders (MSDs) continue to be a major problem in the industry with back and shoulder disorders being among the most common and costly disorders (Ferguson et al., 2012). Automotive manufacturing is one of several industries that have a high incidence of musculoskeletal disorders (MSDs). One important risk factor for MSD include force level or load on the joint, postural stresses and forceful exertions as well as other related exposures (Ashish, D. N. 2014; Southard et al., 2007). Work related injuries and occupational diseases have become an increasing concern to employees, employers, and governments because of the impact on workers' health and productivity. Small and Medium Enterprises (SMEs) where the automotive industries fall into continues to be a vital component of the growing Malaysian economy.

1.2.3 Occupational safety and health management system in Malaysia manufacturing company.

OHSMS certification is a kind of soft regulation that requires a company to fulfil some legal obligations in addition to engaging in organizational processes to promoting continuous improvement of Health and Safety condition (Granerud & Rocha, 2011), the certification of OHSMS enables firms to document a certain pattern of conditions of work to show to both the larger public and its own customers that they are up to date in establishing standards for production.

Given the lack of empirical research identifying specific dimensions of an adequate safety management system, a combination of the characteristics of the management systems and models from both Malaysia's MS1722; OSHMS and international regulations and guidelines, created by various bodies and institutions from several countries such as BS 8800:1996, from the British Standards Institution; HSE, 1997; OHSAS international guidelines 18001/18002:1999; guidelines on occupational safety and health management systems, from the International Labour Office, 2001) will go a long way to achieve excellence in prevention of occupational problems. Safety must be integrated into all the organization's decisions and actions, and the prevention must be more organizational and strategic than material, given the important role that the human component plays in the causal chain of workplace accidents. Thus, there is a

need to implement a system to manage occupational risk prevention, foster the commitment and participation of all workers and achieve the support of the top management (Fernández-Muñiz et al., 2007).

1.3 Problem statement

Globally, an estimated 100 million occupational injuries occur each year (Leigh et al., 1999), such injuries account for an estimated 350,000 deaths (Concha-Barrientos et al., 2005). Musculoskeletal disorders (MSDs) are a tremendous burden in industries with low back and shoulder disorders among the most common and costly disorders (NRC, 2001; Dunning et al., 2010).

Recent trends have shown that work related musculoskeletal disorders (MSDs) and compensation costs for this type of disease are on the increase in many industries. Malaysia is also experiencing the same problems as it moves towards being an industrialized nation. Reports from SOCSO indicated that the number of cases has risen from 2 in the year 2000 to 326 in 2012. It is believed that many cases have not been reported due to lack of understanding and awareness of ergonomics. Ergonomics also has been highlighted as one of the important OSH Strategic Drivers under Occupational Safety and Health Master Plan for Malaysia 2015 (OSH-MP 15).Standards Malaysia Seminar (2013).

Automotive manufacturing industry is one of several industries that have a high incidence of musculoskeletal disorders (Ulin and Keyserling, 2004; Punnett, 1999; Landau et al., 2008). Musculoskeletal disorders have become a major public health problem because of high number of cases reported. Some even described MSD as one of the main health problems especially in the working population (How et al., 2004; Jzenlenberg&Burdoft, 2004). Musculoskeletal disorders (MSDs) are also a major cause of work-related disabilities and injuries in the developed and developing countries (Choobineh et al., 2004; Kaergaard& Andersen, 2000). It was shown that the prevalence of MSDs was 10%, it was as high as 80% in others (Eerd et al., 2003).

According to Loo and Richardson (2012), industrial workers in Malaysia were reported as oblivious to their poor work conditions (background stressors, heat stress, air conditioning, limiting working space and poor vision due to low lighting) and this could be due to their lack of education on environmental standards. Yeow and Sen (2002) reported that multinational companies in Malaysia had put ergonomics as a low priority as knowledge of ergonomics was regarded as low priority, due to the perceived high expenditure that ergonomics education could have brought.

According to Mustafa et al., (2009), a questionnaire based survey developed and conducted in 200 manufacturing industries (response rate- 22.5%) showed that 35.6% of the industries were classified high level awareness, 51% moderate levels and 13.3% having low level of ergonomics awareness. 33.3% of manufacturing industries implemented ergonomics programs. They reported that the main factors for the lack of ergonomics awareness was the lack of information/education/training and no pressure from the top management to initiate the ergonomics programs Even when the Malaysian OSH regulations implemented a lenient fine of RM4, 342 to RM 43,428 with jail time from 6 months to 2 years or both if an employer violates the OHS regulations.

The problem being faced by most small and medium industries is their budget constraints to hire professionals to carry out ergonomics improvements at the workplace like improving work procedures, material handling techniques, tool designs, work-station and team work environments to promote OHS. A study published by the National SME Development Council (2012) reported that small and medium sized enterprises (SME) with less than 150 employees accounted for 59% of jobs in all sectors and contributed 32% to total GDP (Surienty, 2012). With this in mind, the reported number of incidents in SME was 30%-50% higher than in big companies. Also they contribute 80% to the total number of accidents in Malaysia.

The major contributor to the failure of safety management at the workplace are in the construction and industrial sectors which include the use of machinery, transportation, materials and mechanical, electricity and electrical maintenance. The average industrial accidents in Malaysia has had a decline rate of 4.11% (2004/2005) to 3.94% (2004/2006) and 20.7% (2004/2007). But despite this, the number of accidents causing disability to the employees is alarming. From, 81,003 cases of industrial accidents (2003), 20.7% caused disability to the workers, while in 2005, 2006 and 2007 the number reduced to 70,690, 68,008 and 56,339 cases respectively. The number of employees who suffered permanent disability were18,744 cases (2005), 18,257 (2006) and 9,555 (2007) (Arifin et al., 2013).Also Table 2.2 indicates that in all sectors, the manufacturing sector still remains the sector with the highest rate of accidents throughout the period till 2013(DOSH annual report 2007-2013). Compensation paid due to industrial accidents reported by the Labor Department Peninsular Malaysia, Sabah, Sarawak, the Social Security Organization (SOCSO) and the Ministry of human resources has seen an increasing trend from with RM1,187,120 (2008) to RM2,000,000 (2012) (Labor and Human Resources Statistics 2012).

1.3.1 Study justification

An effective implementation of occupational safety health management system will assist in the formation of good safety behavior as the implementation requires employers to cater for the safety needs of their employees where the employees are expected to be responsible towards their own occupational safety. Therefore, identification of WRMSDs risk factors and understanding their negative influence on the quality of the production may be an opportunity to improve quality and eliminate WRMSDs (Kuorinka, 1996).

In Malaysia, there is paucity of reports on risk factors among automotive factory workers because comprehensive studies in determining the risk factors have not been done in manufacturing industries. It is very important to conduct research in this area because the automotive industry plays a vital role in the economic development of Malaysia. The study on ergonomics risk factors among the automotive workers in relation to OSHMS implementation will help to identify the risk factors that contribute to MSD symptoms of this population. Result obtained can be used as baseline information so that future studies can be carried out. Hence, intervention and preventive measures can be done by the factory's management. In relation, MSDs also can affect the quality of life among factory workers where it will disturb their productivity. This will in turn cause great economic burden to the factory's management due to the claim on medical expenses to treat MSDs among the workers.

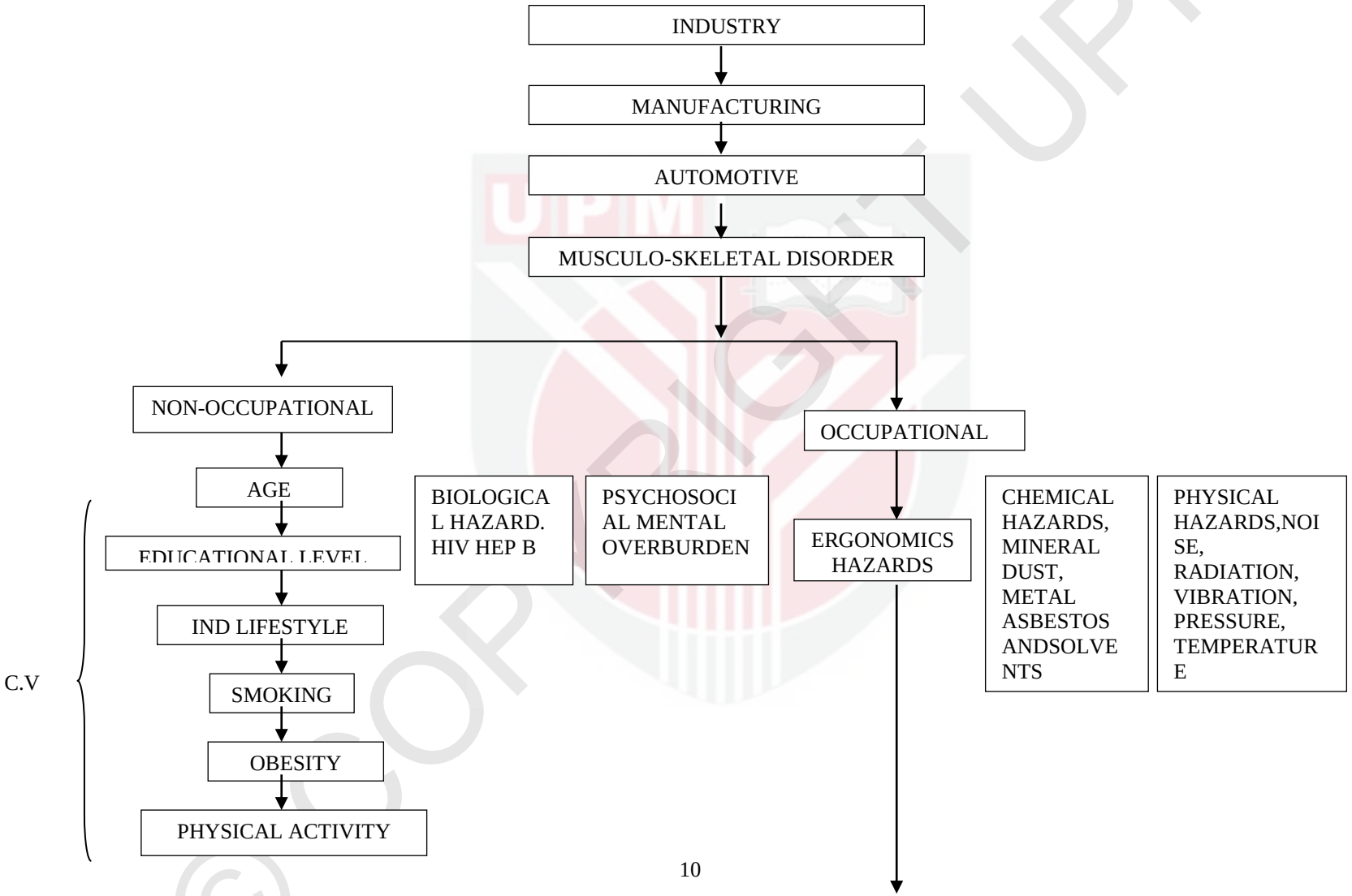
This study will try to promote the benefits derived from ergonomics programs and OSHMS as a systematic process for identifying, anticipating, designing, developing, analyzing and controlling ergonomics risk factors. The study will also improve the awareness of ergonomics among automotive industry workers on the need to effectively implement ergonomics programs that will ensure positive results in creating awareness; increase ergonomics knowledge to prevent work related MSD as well as to motivate employees to solving their problems. Adopting the health management principles will raise the level of awareness and implementation of occupational safety and health management system procedure among workers in automotive manufacturing industry to help check the risk in the workplace. The result of this research will foster health and safety practices in the workplace and open up possibility for future study on occupational safety and health management system and ergonomics program. It will also be useful for primary and secondary initiation of preventive measure of hazards at work place that will eventually result in increase in workers' productivity. Enhancement of effective implementation of specific written policies concerning health and safety will be ensured through inspection, periodic reporting and enforcement of government laws. The result of the study will aid and assist suggestion to management and stake holders to become certified and accredited.

1.3.2 Conceptual framework

The issue of health, safety and ergonomics are concerned with the evaluation of the human workforce, and the design of the working environment to obtain maximum satisfaction in productivity, workers' health, safety and wellbeing. Occupational safety and health and ergonomics may include other components (Ahasan, 2001) including work-related problems. Since health, safety and ergonomics applications are the basic needs for an individual worker's mental, physical, and social development, therefore many aspects of strenuous tasks or manual materials handling (MMH) that are intense but usual in developing countries need to be addressed. It is also believed that an Occupational Safety Health/ergonomics program will be enhanced by a "go ahead spirit" through workers' and employers' participation in improving health and safety. Therefore, a great deal of emphasis has to be placed on the improvement of the work environment with the collaboration of all parties concerned (Abeysekera, 1997). It is also necessary to control all the factors that influence human (both physical and mental) and industrial productivity.

The existing OSH is focused on ergonomics issues because it influences physical and work organization hazards on musculoskeletal, cardiovascular and mental health which are related to the common health targets like smoking, exercise and obesity (Punnett et al., 2009). Other health hazards that are major concerns of MSDs that workers are exposed to include lower back pain, upper body, neck aches, discomfort, fatigue, backaches, wrist/hand pain, dissatisfaction, stress, problems of noise, heat, humidity and dust resulting in major problems like respiratory diseases, injuries, musculoskeletal disorders, cancer, reproductive disorders, eye damage, hearing loss, mental, neurological illness and other communicable diseases (Punnett et al., 2009).Musculoskeletal, mental and cardiovascular health all shares several occupational risk factors, both physical and psychosocial (Punnett et al., 2009). Key psychosocial factors like quantitative demands (time pressure), supervisor and co-worker support have been reported to affect cardiovascular disease and mental health (Punnett et al., 2009). To create a good work environment, a conceptual framework is

thus explored in Figure 1.1which tells how human activity (job-tasks) interacts with work environment and how work-related problems (WRPs) can be minimized through direct actions.



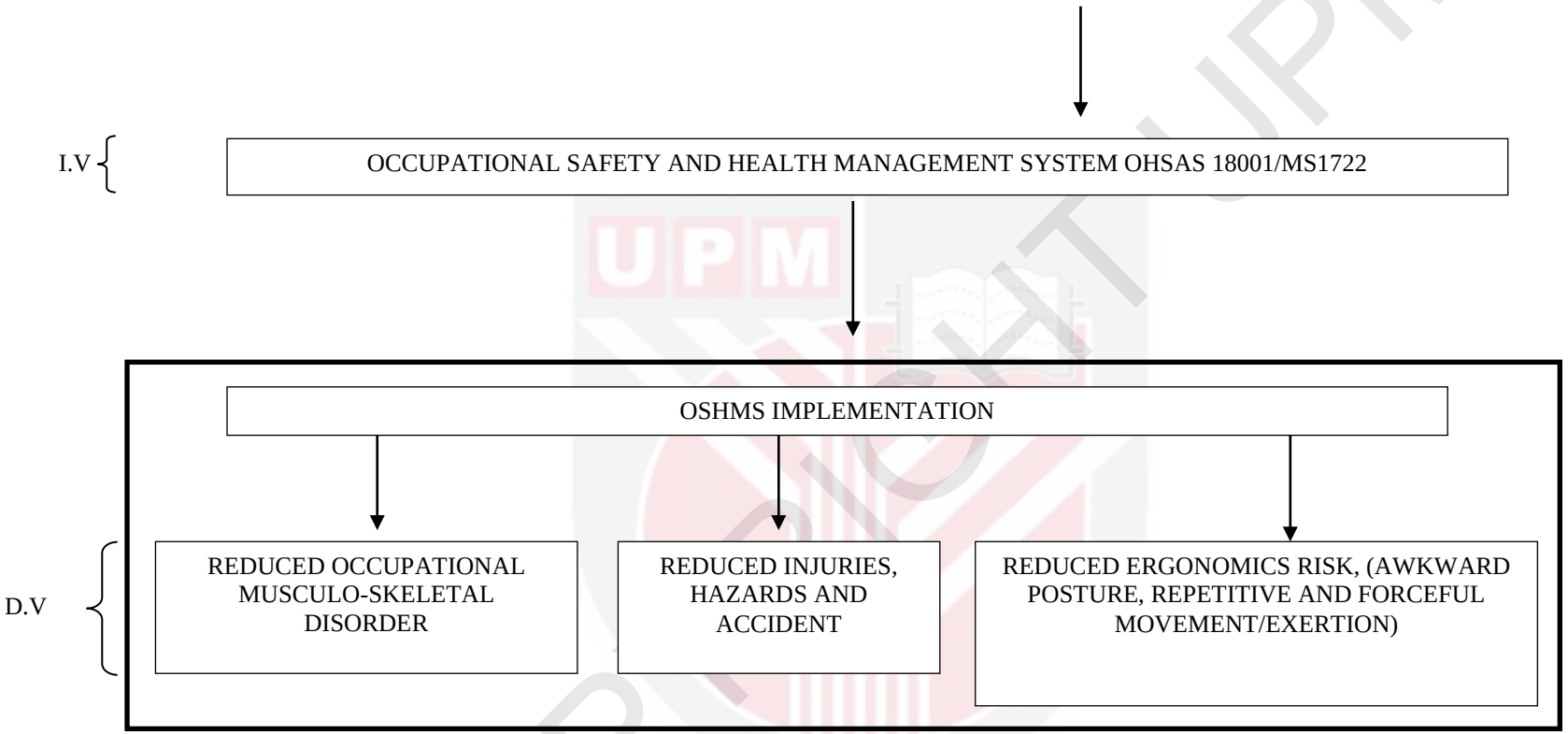


Figure 1.1: Conceptual framework for the implementation of occupational safety and health management system to reduce ergonomics risk

Figure 1.1 is a schematic representation of how human characteristics and activities involving both non-occupational activities (age, individual life style, smoking, obesity, physical activities) and occupational activities can lead to hazards and injuries including biological hazards, psychosocial hazards, ergonomics hazards, chemical and physical hazards which in turn can give rise to musculoskeletal disorders (MSDs)if occupational safety and health measures are not adhered to.
On the other hand with the awareness and implementation of occupational safety and health management system procedures (OHSAS18001/MS1722)developed standards that companies can comply with, work related risk/injuries, ill health resulting from exposure stressors will be prevented, avoided or reduced (interactions with work environment and how work-related problems (WRPs) can be minimized through direct action of occupational safety and health management system.

1.4 Objectives of the study

1.4.1 General objective

The general objective of this research is to compare the implementation of occupational safety and health management system in reducing ergonomics risk among OSH certified and uncertified automotive parts factory workers.

1.4.2 Specific Objectives

1) To determine the socio-demography of workers.
2) To compare the body posture of workers in the OSHMS certified and uncertified automotive industry.
3) To compare the ergonomics risk management of workers in OSHMS certified and uncertified automotive industry.
4) To compare the occupational hazard management of workers in OSHMS certified and uncertified automotive industry.
5) To compare the occupational safety and health procedure among workers in OSHMS certified and uncertified automotive industry.
6) To compare the environmental management among workers in OSHMS certified and uncertified automotive industry.
7) To determine the association between OSHMS certified and uncertified workers with occupational hazard, ergonomics risks, environmental management and OSH.
8) To determine the relationship between ergonomics risk factors with OSHMS certified and uncertified workers.
9) To determine the relationship between ergonomics risk with demographic factors of workers.

1.4.3 Study Hypothesis

1) There is a significant difference between the body postures of workers in the OSHMS certified and uncertified automotive industry.
2) There is a significant difference between the ergonomics risks management of workers in the OSHMS certified and uncertified automotive industry.

3) There is a significant difference between the occupational hazard management, occupational safety and health procedure and environmental management of workers in the OSHMS certified and uncertified automotive industry.
4) There is a significant association between OSHMS certified and uncertified workers with occupational hazard management, ergonomics risks management, environmental management and OSH.
5) There is a significant relationship between ergonomics risk factors with OSHMS certified and uncertified.
6) There is a relationship between ergonomics risk with demographic factors of workers.

1.4.4 Variables Definition

1.4.4 1 Conceptual definition

Occupational Safety and Health Management System

Occupational Safety and Health Management System is a systematic means for employers to handle challenges and reduce haphazard attitudes to risk and problems in the work environment (Granerud and Rocha 2011).

Ergonomics risk factors

Ergonomics risk factors (RRF) are the internal and external risk factors that can impose biomechanical stress on the workers (Lim, 2008).

1.4.4.2 Operational Definitions

Occupational Safety and Health Management System

Occupational Safety and Health Management System provides a set of tools that enhance safety, risk management efficiency related to all organization's activity, it is a systematic means for employers to handle challenges and reduce haphazard attitudes to risk and problems in the work environment**.** It is an interdisciplinary field which encompasses among others, the disciplines of industrial hygiene, occupational medicine, occupational nursing,

engineering, epidemiology, and toxicology. It includes the surroundings and conditions that affect employees and other related persons at workplace. The prevention of work related injuries still remained as a major problem faced by all types of organization. OSH management system (OSHMS) is an integral part of the overall management system of the organization.(Levitt and Samelson, 1993).

Ergonomics risk factors

Ergonomics risk factors consist of internal risk factors which are work related and can cause musculoskeletal disorders. Examples of such factors are awkward postures,

heavy workload, static postures, prolonged sitting or standing, vibration from power tools, repetitive tasks and manual material handling. External factors include environmental factors such as temperature, stress and lightening which can indirectly contribute to musculoskeletal disorders too.(Lim, 2008).

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APPENDICES

APPENDIX 1

UPM REQUEST LETTER FOR PERMISSION TO CONDUCT STUDY

FAKULTI PERUBATAN DAN SAINS KESIHATAN
FACULTY OF MEDICINE AND HEALTH SCIENCES
Our Ref : UPM/FPSK/600-4/1/5
Date : 16 October 2012

To whom it may concern

Dear Sir/Madam,

STUDENT CONFIRMATION

With reference to the above, I hereby certify that the following student is a postgraduate student from Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.

Name	:	IKPEGBU MAVIS AMARACHI
Matric No	:	GS32806
Passport No	:	A00907049
Programme	:	MASTER OF SCIENCE
Field of Study	:	OCCUPATIONAL HEALTH AND SAFETY
Semester	:	2
Supervior	:	PROF. MADYA DR. SHAMSUL BAHRI MOHD TAMRIN
Intake	:	SECOND SEMESTER 2011/2012
Department	:	ENVIRONMENTAL AND OCCUPATIONAL HEALTH
Studies Duration	:	1-3 YEAR

Thank you.

"WITH KNOWLEDGE WE SERVE"

Yours sincerely,

PROF. DR. AMIN ISMAIL
Deputy Dean (Graduate Studies, Student's Affairs & JINM)
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia

Fakulti Perubatan dan Sains Kesihatan, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan.
603-8947 2300 603-8947 2585 http://www.medic.upm.edu.my.
Fakulti Perubatan dan Sains Kesihatan, Aras 9 & 10B, Grand Seasons Avenue, 72, Jalan Pahang, 53000 Kuala Lumpur.
603-2050 1000 603-2050 1001

APPENDIX 2

INFORMATION SHEET

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

RESPONDENT'S INFORMATION SHEET

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

STUDY TITLE : IMPLEMENTATION OF OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM IN REDUCING ERGONOMIC RISK AMONG CERTIFIED AND UNCERTIFIED AUTOMOTIVE INDUSTRY WORKERS.

INTRODUCTION: OCCUPATIONAL SAFETY AND HEALTH IS AN IMPORTANT KEY FACTOR WHICH AFFECTS WORKERS PRODUCTIVITY AND EFFECTIVENESS.IT'S PRIMARY OBJECTIVE IS TO MAINTAIN THE WORKING ABILITY OF THE LABOUR FORCE AS WELL AS TO IDENTIFY,ASSESS AND PREVENT HAZARDS WITHIN THE WORKING ENVIRONMENT.

WHAT WILL YOU HAVE TO DO? THE RESPONDENT IS REQUIRED TO ANSWER ALL THE QUESTIONS BY FILLING UP THE QUESTIONNAIRE DURING LUNCH BREAK.

WHO SHOULD NOT ENTER THE STUDY?
EXCLUSIVE CRITERIA: WORKERS WHO ARE BELOW THE AGE OF 20 AND ABOVE THE AGE OF 50, WORKERS WHO HAVE NOT WORKED UP TO ONE YEAR AS AT THE TIME OF DATA COLLECTION; WORKERS WITH PREVIOUS HISTORY OF OCCUPATIONAL ACCIDENTS AND MUSCULOSKELETAL DISORDER.

WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) **TO YOU AS THE SUBJECT?** THE SUMMARY REPORT HIGHLIGHTING THE RESULT AND RECOMMENDATIONS OF THE STUDY WILL BE COMMUNICATED TO THE WORKERS WHICH WILL IN TURN HELP THEM TO BECOME CONCIOUS AND ALSO PRACTICE GOOD SAFETY WORK BEHAVIOUR ALWAYS WHICH WILL HELP IN THE IMPROVEMENT OF THEIR QUALITY OF LIFE.

THE INFORMATION/IDENTITY GIVEN BY THE RESPONDENT WILL NOT BE GIVEN TO THE EMPLOYER ONLY THE SUMMARY OF THE OVERALL RESULT AND RECOMMENDATION OF THE STUDY.

b) **TO THE INVESTIGATOR?** AT THE END OF THE STUDYTHE RESEARCHER WILL USE THE RESULT OF THE STUDY TO PROFER NECESSARY ADVISE ABOUT OSHMS TO INDUSTRIES.

WHAT ARE THE POSSIBLE RISKS? NONE

WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL? YES.

THE RESPONDENT WILL BE ASSURED THAT THE INFORMATION FROM THEM WOULD NOT BE MADE AVAILABLE TO OTHERS.IT WILL STRICTLY BE USED FOR ACADEMIC PURPOSES.

WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH? MAVIS AMARACHI IKPEGBU

APPENDIX 3

CONSENT FORM AND QUESTIONAIRE (MALAY VERSIONS)

JAWATANKUASA ETIKA UNIVERSITI UNTUK PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR, MALAYSIA

BORANG PERSETUJUAN RESPONDEN

TAJUK PENYELIDIKAN : PELAKSANAAN PENGURUSAN KESELAMATAN DAN KESIHATAN PEKERJAAN DALAM MENGURANGKAN RISIKO ERGONOMIK DI KALANGAN PEKERJA AUTOMOTIF YANG DIIKTIRAF DAN YANG TIDAK DIIKTIRAF.

PENYELIDIK :MAVIS AMARACHI IKPEGBU

Saya..... No Kad Pengenalan. .....
beralamat.....
.....dengan ini bersetuju untuk mengambil bahagian secara sukarela dalam menyertai penyelidikan klinikal *(pengajian klinikal/ pengajian soal selidik/ percubaan ubat-ubatan) seperti yang disebut di atas.

Saya telah diberi penjelasan secara menyeluruh mengenai dasar penyelidikan klinikal dari segi metodologi, risiko dan komplikasi (seperti tertulis pada Helaian Penerangan Responden). Saya memahami bahawa saya berhak menarik diri dari penyelidikan ini pada bila-bila masa tanpa memberi sebarang alasan.Saya juga memahami bahawa sebarang maklumat yang berkaitan identiti saya akan dirahsiakan.

Saya* berminat / tidak berminat untuk mengetahui keputusan kajian yang dijalankan ke atas sampel yang diambil dari saya.

*potong yang tidak berkenaan

Tandatangan .....
(*Responden*)

Tandatangan .....
(*Saksi*)

Tarikh :.....

Nama :.....

No. K/P: .....

Saya mengesahkan bahawa saya telah menerangkan kepada responden sifat dan tujuan penyelidikan klinikal tersebut di atas.

Tarikh .....

Tandatangan .....
(*Penyelidik*)

SISTEM PENGURUSAN KESELAMATAN DAN KESIHATAN PEKERJAAN DAN ERGONOMIK DALAM INDUSTRI PEMBUATAN AUTOMOTIF

Tandakan jawapan dengan ✓ lam kotak yang berkenaan. Satu tanda pada satu soalan. Jawab semua soalan.

KEGUNAAN PENYELIDIK

SEKSYEN A SOSIO-DEMOGRAFI

1. ID ……

2 Jantina Lelaki ☐ Perempuan ☐ A1 ☐

3. Umur ☐ tahun A2 ☐

4 Warganegara ☐ Bukan warganegara ☐ A3 ☐

5. Bangsa …… A4 ☐

6. Taraf perkahwinan Bujang ☐ Berkah win ☐ Bercerai ☐ Balu ☐ Duda ☐ A5 ☐

7. Tahap pengajian ☐ Tidak bersekolah Sekolah Rendah ☐ Sekolah Menengah ☐ Kolej ☐ Universiti. ☐ A6 ☐

SEKSYEN B PENGALAMAN KERJA

1. STATUS PEKERJAAN TERDAHULU

1.1 Adakah anda pernah bekerja di tempat lain sebelum ini ☐ Ya ☐ Tidak B1 ☐

1.2 Jikaya, nyatakan maklumat pekerjaan seperti di bawah B2 ☐

JENIS PEKERJAAN	TEMPOH BEKERJA	TAHUN MULA BEKERJA

2 STATUS PEKERJAAN TERKINI

2.1.1 Rawatan logam/Kimpalan ☐ Ya ☐ Tidak B3 ☐

2.1.2 Pencampuran /Setem ☐ Ya ☐ Tidak B4 ☐

	KEGUNAAN PENYELIDIK
2.1.3 Pengacuan/Pengedaran alat ganti □Ya □ Tidak	B5
2.1.4 Pemangkasan/Ditubuhkan □Ya □ Tidak	B6
2.1.5 Poliuretana /Pembungkusan□Ya □ Tidak	B7
2.1.6 Perahan/Aksesori □ Ya □ Tidak	B8
2.1.7 Tekanan hembusan /Penapisan □Ya □ Tidak	B9
2.2 Tempoh bekerja di bahagian sekarang ……..tahun	B10
2.3 Jumlah jam bekerja sehari ……jam	B11
2.4 Adakah anda bekerja shif tetap □Ya □ Tidak	B12
2.5 Adakah anda bertukar shif □Ya □ Tidak	B13
2.6 Adakah anda bekerja setiap hari termasuk hujung minggu dan cuti umum □Ya □ Tidak	B14
2.7 Berapa lamakah anda berehat dan tidur setiap hari ……jam	B15

SEKSYEN C KESIHATAN DAN KESELAMATAN PEKERJAAN

1. Adakah tempat kerja anda mempunyai polisi kesihatan dan keselamatan pekerjaan □Ya □ Tidak	C1
2. Adakah polisi itu diwujudkan bersama oleh jawatankuasa keselamatan dan kesihatan, majikan, dan wakil pekerja□Ya □ Tidak	C2
3. Adakah polisi itu khusus kepada sifat dan aktiviti organisasi □Ya □ Tidak	C3
4. Adakah Polisi Kesihatan dan Keselamatan Pekerjaan dipaparkan di lokasi yang strategik di tempat kerja (boleh dilihat oleh semua pekerja) □Ya □ Tidak	C4
5. Adakah tempat kerja anda menyediakan program induksi atau latihan keselamatan kepada pekerja □Ya □ Tidak	C5
6. Adakah latihan keselamatan dan kesihatan pekerjaan di tempat kerja anda berterusan dan ia dilaksana dan direkodkan di seluruh organisasi □Ya □ Tidak	C6
7. Adakah sesi pemilihan untuk wakil kesihatan dan keselamaran atau jawatankuasa kesihatan dan keselamatan di tempat kerja anda □Ya □Tidak	C7
8. Adakah prosedur kecemasan dan pertolongan cemas terdapat di tempat kerja dan adakah perkerja mengetahuinya □Ya □Tidak	C8
9. Adakah terdapat pemeriksaan keselamatan dan kesihatan pekerjaan dan pelan pembaikan yang berterusan di tempat kerja□Ya □Tidak	C9

KEGUNAAN PENYELIDIK	
10. Adakah pekerja dapat mengakses maklumat tentang kesihatan dan keselamatan pekerjaan □Ya□Tidak	C10
11. Adakah terdapat tersedia kemudahan peralatan kebakaran yang cukup dan boleh dicapai □Ya □Tidak	C11
12. Adakah anda mengetahui cara yang betul mengendalikan peralatan kebakaran □Ya □Tidak	C12
13. Adakah terdapat disediakanjurnal keselamatan, poster keselamatan & tanda-tanda amaran Ya □Tidak	C13
14. Adakah pencegahan, persediaan dan persiapan kecemasan telah ditubuhkan dan disenggarakan □Ya □ Tidak	C14
15. Adakahsistem ini boleh memastikan bahawa maklumat yang diperlukan, komunikasi dalaman danpenyelarasan disediakan untuk melindungi semua orang sekiranya berlaku kecemasan □Ya □ Tidak	C15
16. Adakah sistem ini berhubung dan memberikan maklumat kepadapihak berkuasa. □Ya □ Tidak	C16
17. Adakahsistem ini berhubung dan memberikan maklumat kepada kawasankejiranan □Ya □ Tidak	C17
18. Adakah sistem ini berhubung dan memberikan maklumat kepadapihak perkhidmatan kecemasan □Ya □ Tidak	C18
19. Adakah sistem ini menyediakan bantuan kecemasan dan pembantu perubatan □Ya □ Tidak	C19
20. Adakah sistem ini menyediakan bantuan kebakaran □Ya □ Tidak	C20
21. Adakah sistem ini menyediakan pemindahan mangsa di tempat kerja□Ya □ Tidak	C21
22 . Adakah sistem ini menyediakan maklumat yang relevan dan latihan kepada semua peringkat pekerja termasuk latihan yang tetap dalam prosedur pencegahan dan persediaan kecemasan. □Ya □ Tidak	C22
23. Adakah pegawai pertolongan cemas dan pegawai perubatan sentiasa tersedia semasa waktu bekerja □Ya □ Tidak	C23
SEKSYEN D ERGONOMIK RISIKO PENGURUSAN	
1. Adakah kerja mengangkat dan membimbing barang dilupuskan, sekiranya boleh □Ya □Tidak	D1
2. Adakah peralatan mekanikal, penghantar atau troli digunakan untuk Mengurangkan kerja mengangkat dan membawa barang sekiranya mungkin □Ya □Tidak	D2
3. Adakah manual pengendalian bahan atau kerja berbahaya dikenal pasti dan dinilai□Ya □Tidak	D3
4. Adakah langkah-langkah kawalan praktikal dijalankan dan dikekalkan	D4

KEGUNAAN PENYELIDIK

untuk menghapus atau mengurangkan risiko sejauh mungkin
□Ya □Tidak

5.	Adakah semua insiden yang berkaitan dengan pengendalian manual telah disiasat secukupnya □Ya □Tidak	D5
6.	Adakah maklumat, arahan dan latihan cara mengangkat yang betul disediakan untuk semua orang yang terlibat dalam proses pengendalian manual, menyiasat kemalangan, atau melaksanakan tugas yang mana bahayanya telah dikenal pasti □Ya □Tidak	D6
7.	Adakah pekerja memahami faktor-faktor risiko pengendalian manual dan mereka mengetahui prosedur pengurusan risiko □Ya □Tidak	D7
8.	Adakah pekerja mengambil bahgian dalam semua peringkat pengurusan risiko□Ya □Tidak	D8
9.	Adakah anda bekerja menggunakan peralatan yang betul □Ya □Tidak	D9
10.	Adakah manual penggunaan peralatan disediakan untuk pekerja □Ya □Tidak	D10
11.	Adalah peralatanberada dalam keadaan yang baik dan diselenggarakan dengan baik □Ya □Tidak	D11
12.	Ketika membeli peralatan / bekalan, adakah pekerja akan dirunding dan diberi percubaan kali pertama sebelum menandatangani pembelian □ Ya □Tidak	D12
13.	Adakah ergonomik dianggap termasuk dalam fasa reka bentuk di dalam projek □Ya □Tidak	D13
14.	Adakah reka bentuk dan penyelenggaraan proaktif, adalah perubahan kepada peralatan dan operasi yang dibuat sebelum kecederaan berlaku □Ya □Tidak	D14
15.	Adakah terdapat peruntukan dalam bajet tahunan untuk penambahbaikan dalam reka bentuk dan pengubahsuaian stesen kerja, peralatan baru, sesi latihan, dan kontrak kepakaran luar □Ya □Tidak	D15
16.	Adakah terdapat pembangunan dan pelaksanaan amalan kerja selamat dan prosedur untuk semua pekerjaandan tugas-tugas; khususnya bagi mereka yang mempunyai pelbagai faktor risiko (iaitu daya yang berlebihan, tempoh, pengulangan dan kedudukan tidak betul). □Ya □Tidak	D16
17.	Adakah pengurus, pekerja, ahli jawatankuasa kesihatan dan keselamatan pekerjaan atau wakilnya memeriksa hazad ergonomik □ Ya □ Tidak	D17
18.	Adakah terdapat pemeriksaanyang tetap untuk memastikan pekerja menggunakan peralatan yang sesuai □Ya □Tidak	D18
19.	Adakah anda pernah mengalami kemalangan semasa bekerja □Ya □Tidak	D19

KEGUNAAN PENYELIDIK

20. Adakah terdapat rekod 'tiada kemalangan' □Ya □ Tidak D20

21. Adakah anda mengangkat barang berat10-15kg □Ya □ Tidak D21
20 kg dankeatas□Ya □ Tidak

22. Adakah anda membongkok ketika bekerja □Ya□ Tidak D22

23. Adakah anda memusingkan badan ketika bekerja □Ya □ Tidak D23

24. Adakah anda sentiasa bekerja dalam keadaan berdiri □Ya □ Tidak D24

25. Adakah badan ada sentiasa menyentuh objek ketika bekerja □Ya □ Tidak D25

26. Adakah anda melakukan kerja yang sama sepanjang masa D26
(kerja berulang) □ Ya □ Tidak

27. Adakah anda mengalami sebarang kesakitan, ketidakselesaan atau D27
keperitan di mana-mana bahagian badan □ Ya □ Tidak

28. Jika ya, adakah anda mengambil sebarang ubatan atau sedang D28
menjalanirawatan□Ya □ Tidak

29. Adakah anda pernah mengambil cuti sakit sebelum ini kerana sakit atau D29
ketikselesaan badan □Ya □ Tidak

SEKSYEN E PERSEKITARAN PENGURUSAN

1. Adakah laluan pejalan kaki bebas daripada halangan berbahaya seperti E1
penunjuk elektrik dan hos □Ya □Tidak

2. Adakah permukaan lantai tahan gelinciran□Ya □Tidak E2

3. Adakah permukaan lantai diselenggara dan berada dalam keadaan baik E3
□Ya □Tidak

4. Adakah terdapat peruntukan khas untuk saliran dan tahan gelinciran di E4
kawasan basah seperti dapur, bilik mandi □Ya □Tidak

5. Adakah tanda-tanda amaran yang biasa didirikan berhampiran tumpahan E5
□Ya □Tidak

6. Adakah laluan di kawasan kerja bebas dari halangan □Ya □Tidak E6

7. Adakah besi penghalang atau penghalang keselamatan yang lain E7
disediakan di atas tanjakan dan tangga□Ya □Tidak

8. Adakah pencahayaan yang disediakan mencukupi□Ya □Tidak E8

9. Adakah terdapat peruntukan bagi pakaian peralatan perlindungan peribadi, E9
seperti kasut tahan gelinciran□Ya □Tidak

10. Adakah terdapat tanjakan di kawasan-kawasan di mana perubahan E10
ketinggian aras lantai dan akses troli diperlukan atau di kawasan di mana
barangan dibawa dengan kerap □Ya □ Tidak

KEGUNAAN PENYELIDIK

11. Adakah tangga yang digunakan direka dan digunakan dengan selamat □Ya □ Tidak — E11 ☐

12. Adakah ujian penilaian bunyi bising telah dijalankan dan langkah pengawalan telah dilaksankan □Ya □ Tidak — E12 ☐

SEKSYEN F PEKERJAAN HAZAD DAN KECEDERAAN PENGURUSAN

1. Adakah bahaya dan risiko telah dikenal pasti secara berterusan □Ya □Tidak — F1 ☐

2. Adakah bahaya dan risiko yang mungkin timbul dalam organisasi aktiviti direkodkan □Ya □Tidak — F2 ☐

3 Adakah bahaya dan risiko dinilai secara berterusan □Ya □Tidak — F3 ☐

4 Adakah bahaya dan risiko dikawal secara berterusan □Ya □Tidak — F4 ☐

5 Adakah rancangan kawalan bahaya dalam tindakan □Ya □Tidak — F5 ☐

6 Adakah kawalan bahaya terus diperbaiki berdasarkan pengalaman tempat kerja dan pengetahuan am □Ya □Tidak — F6 ☐

7 Adakah ada tindakan yang diambil untuk memastikan penggunaan, operasi , pengendalian, penyimpanan dan pengangkutan loji dan bahan-bahan dengancara yang selamat □Ya □ Tidak — F7 ☐

8 Adakah anda mempunyai dan menggunakan borang aduan hazad □Ya □Tidak — F8 ☐

9 Adakah anda mempunyai dan menggunakan senarai semak untuk mengenalpasti hazad dan penilaian risiko peralatan□Ya □ Tidak — F9 ☐

10 Adakah syarikat mendaftarkan bahan berbahaya dan keselamatan bahan helaian data (MSDS) untuk semua bahan kimia □ Ya□Tidak — F10 ☐

11 Adakah syarikat mempunyai borang laporan kemalangan □Ya □Tidak — F11 ☐

12 Adakah syarikat mempunyai sistem untuk melaporkan dan Memperbaiki hazad □Ya □Tidak — F12 ☐

13 Adakah anda mempunyai akses kepada laporan berkenaan dengan persekitaran dan keselamatan kerja disamping mengekalkan maklumat-maklumat sulit □Ya □ Tidak — F13 ☐

14 Adakah terdapat rekod mengenai kecederaan dan penyakit yang disebabkan kerja□Ya □ Tidak — F14 ☐

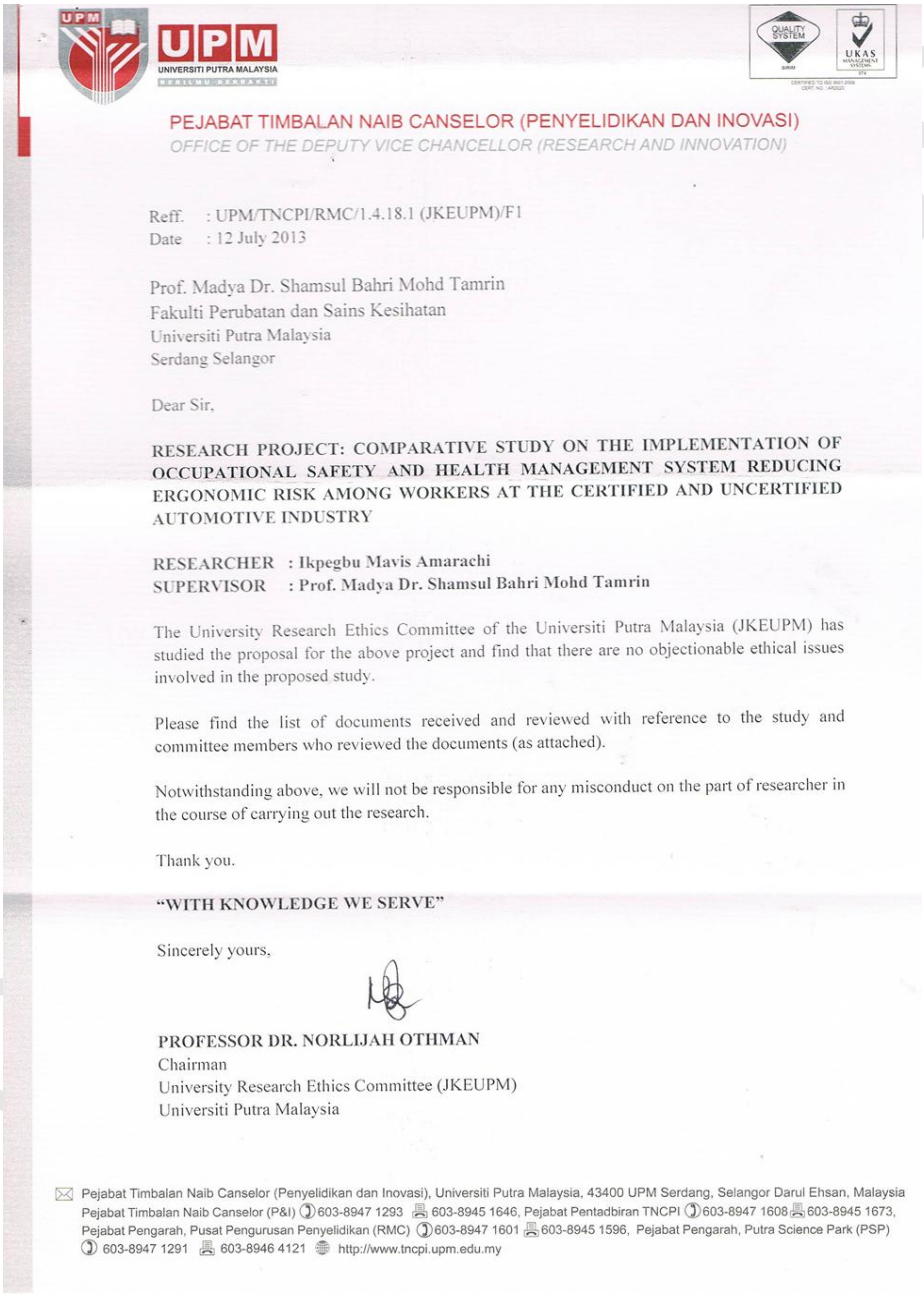
15 Adakah terdapat rekod pada had pendedahan pekerja□Ya □ Tidak — F15 ☐

16 Aktiviti mengenalpasti hazad di tempat kerja dan penilaian risiko dijalankan sebelum apa-apa pengubahsuaian atau pengenalan kaedah kerja, bahan, proses atau jentera baru.□Ya □ Tidak — F16 ☐

KEGUNAAN PENYELIDIK	
17 Adakah penilaian dilakukan dalam perundinganyang melibatkan pekerja dan wakil mereka, dan juga jawatankuasa keselamatan dan kesihatan pekerjaan. □Ya □ Tida	F17
18 Adakah penilaian dilakukan dalam perundinganyang melibatkan pembekal kontraktor dan penjual □Ya □ Tidak	F18
19 Adakah penyiasatan sumber dan punca kecederaan yang berkaitan dengan kerja, keuzuran, penyakit dan insiden didokumenkan.. □Ya □ Tidak	F19
20 Adakah siasatan dijalankan oleh pegawai yang kompeten. □Ya □ Tidak	F20
21 Adakah hasil siasatan disampaikan kepada jawatankuasa keselamatan dan kesihatan, jika wujud. □Ya □ Tidak	F21
22 Adakah jawatankuasa keselamatan dan kesihatan membuat cadangan yang bersesuaian berdasarkan hasil siasatan mereka. □Ya □ Tidak	F22
23 Adakah tindakan pembaikan yang dilakukan hasil daripada siasatan yang dilaksanakan untuk mengelakkan pengulangan kerja-kerja berkaitan kecederaan, keuzuran, dan penyakit pekerjaan □Ya □ Tidak	F23
24 Adakah laporan yang dihasilkan oleh penyiasatan agensi-agensi luar seperti inspectorat dan institusi insurans (contohnya JKKP) bertindak dengancara yang sama seperti penyiasatan dalaman. □Ya □ Tidak	F24
25 Adakah sesi latihan telah disediakan bagi pengurus, penyelia, wakil keselamatan dan kesihatan dalam prosedur dan teknik penyiasatan kemalangan □Ya □ Tidak	F25

APPENDIX 4

ETHICS COMMITTEE APPROVAL



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BERILMU BERBAKTI

PEJABAT TIMBALAN NAIB CANSELOR (PENYELIDIKAN DAN INOVASI)
OFFICE OF THE DEPUTY VICE CHANCELLOR (RESEARCH AND INNOVATION)

Reff. : UPM/TNCPI/RMC/1.4.18.1 (JKEUPM)/F1
Date : 12 July 2013

Prof. Madya Dr. Shamsul Bahri Mohd Tamrin
Fakulti Perubatan dan Sains Kesihatan
Universiti Putra Malaysia
Serdang Selangor

Dear Sir,

RESEARCH PROJECT: COMPARATIVE STUDY ON THE IMPLEMENTATION OF OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT SYSTEM REDUCING ERGONOMIC RISK AMONG WORKERS AT THE CERTIFIED AND UNCERTIFIED AUTOMOTIVE INDUSTRY

RESEARCHER : Ikpegbu Mavis Amarachi
SUPERVISOR : Prof. Madya Dr. Shamsul Bahri Mohd Tamrin

The University Research Ethics Committee of the Universiti Putra Malaysia (JKEUPM) has studied the proposal for the above project and find that there are no objectionable ethical issues involved in the proposed study.

Please find the list of documents received and reviewed with reference to the study and committee members who reviewed the documents (as attached).

Notwithstanding above, we will not be responsible for any misconduct on the part of researcher in the course of carrying out the research.

Thank you.

"WITH KNOWLEDGE WE SERVE"

Sincerely yours,

PROFESSOR DR. NORLIJAH OTHMAN
Chairman
University Research Ethics Committee (JKEUPM)
Universiti Putra Malaysia

Pejabat Timbalan Naib Canselor (Penyelidikan dan Inovasi), Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia
Pejabat Timbalan Naib Canselor (P&I) 603-8947 1293 603-8945 1646, Pejabat Pentadbiran TNCPI 603-8947 1608 603-8945 1673,
Pejabat Pengarah, Pusat Pengurusan Penyelidikan (RMC) 603-8947 1601 603-8945 1596, Pejabat Pengarah, Putra Science Park (PSP)
603-8947 1291 603-8946 4121 http://www.tncpi.upm.edu.my

BIODATA OF STUDENT

My names are Mavis Amarachi Ikpegbu (Mrs), a Nigerian national, married with three kids. I obtained a Bachelor of Science Degree in Health Education from the University of Port Harcourt River State Nigeria in the year 1997. My job experience includes presently, Manager at Pavis Ventures (M) Sdn Bhd with the responsibility of overall management of the company.

LIST OF PUBLICATIONS

Ikpegbu, Amarachi Mavis, Anita Binti Abdul Rahman and Shamsul Bahri Bin Hj Mohd Tamrin (2015). Occupational Hazards and Work Environment Management among Osh Certified and Uncertified Automotive Parts Manufacturing Industry Workers.*Middle-East J. Sci. Res., 23 (2): 160-164.*

Ikpegbu, Amarachi Mavis, Anita Binti Abdul Rahman and Shamsul Bahri Bin Hj Mohd Tamrin (2014). Ergonomics Risks Reduction: In Osh Certified and Uncertified Automotive Parts Manufacturing Industry Workers.*Middle-East J. Sci. Res., 22 (9): 1272-1280.*

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