

# INVESTIGATION THE CONTRIBUTION OF PROCESS AREAS TO LOWER BACK PAIN AMONG MANUAL ASSEMBLY WORKERS IN MEDICAL DEVICE INDUSTRY

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## Abstract

Work-related musculoskeletal disorders are the leading cause of occupational health issues in manufacturing, especially for manual assembly processes. One of the primary prevalence of work-related musculoskeletal disorders among manual assembly workers in the medical device industry is low back pain. This paper investigated the risk factors associated with process areas on the low back pain cases among manual assembly workers in one multinational medical device company. This report represents the second of three stages of an investigation study; namely validation of risk factors. Interview sessions were conducted with six manual assembly workers who obtained the highest musculoskeletal disorder scores of low back pain in the earlier study. Results of the interviews were characterized into three major risk factors; lifting weights during work, chair condition and working posture. These three risk factors were then validated with a larger group of 153 female participants of the same population using Cornell Musculoskeletal Discomfort Questionnaire and an additional self-administered questionnaire. The results show that lifting weights during work and chair conditions have the highest risk of low back pain with each 48% prevalence, while the risk due to working posture is lower at 17%. The study's outcome will be used in the third stage of the investigation study, that is, to formulate improvement actions with ergonomics specialists.

## 1 Introduction

Malaysia is currently recognised as a fast-developing country, which has changed from agro-based to industrial, translated via a series of Malaysia Industrial Master Plans (IMPs) [1]. Medical devices industry has been identified as one of the high potential growth sectors, with RM7.7 billion total approved investment in 2021 that created 12,498 job opportunities in Malaysia [2]. There are currently more than 200 medical devices manufacturers who produce a wide range of products such as hospital care products, medical gloves and surgical instruments [3]. Even during the peak of pandemic Covid-19, the medical devices sector was identified as essential and had been given the approval to operate under defined strict standard operating procedures [4].

Many multinational companies (MNCs) in the medical devices industry have invested in the latest automation and technologies to benefit from high productivity in order to maximise profitability and maintain low production costs with essential quality requirements [5]. However, not all products can take advantage of economies of scale. There are increasing demands to shift from mass production to mass customization or mass personalisation [6][7]. Therefore, companies are still depending on manual or semi-automatic

assembly lines, which are more flexible with the assignment of skill-based workers [8].

Workers in industrial sectors are, on the other hand, heavily exposed to experience musculoskeletal disorder (MSD) when carrying out their manufacturing tasks which involve activities such as repetitive tasks/movements, lifting and carrying heavy objects or performing tasks in awkward postures [9]. Too often, the design of manual assembly lines does not consider the complexity of the processes, which in the end impacts the productivity, cost, safety and welfare of the workers [10] [11].

MSD encompass a wide range of inflammatory and degenerative conditions of the muscles, tendons, ligaments, joints, peripheral nerves, and supporting blood vessels that can affect various parts of the body, often the neck, shoulder, forearm, hand, upper back, lower back, legs and feet [12]. Consequently, Persatuan Keselamatan Pekerja (PERKESO) / Social Security Organization in Malaysia has reported an exponential increase in confirmed work-related Musculoskeletal Disorder (MSD) cases in Malaysia from 2005 to 2019 [13], as shown in Figure 1.

Further gender breakdown according to the last three years' data from 2017 to 2019 is presented in Table 1. The data