# SAFETY INTERVENTION PROGRAM FOR SUPERVISOR OF MANUFACTURING SECTOR IN MALAYSIA: A QUASI-EXPERIMENTAL RESEARCH

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(Received 31st March 2021; accepted 25th May 2021)

**Abstract.** Over the last decade, work-related accidents have been a major concern in Malaysia. Manufacturing continues to be the leading cause of accident cases. Previously published research revealed that unsafe behaviour committed by workers is the predominant factor for workplace accidents. Programs that promote safe behaviour among employees may help prevent work-related accidents. In Malaysia, various studies on safety behaviour as antecedents of workplace accidents have been undertaken, and it has been determined that failing to follow SOP and appropriately use PPE are the primary risky behaviours that result in accidents. Thus, intervention programs aimed at preventing such risky activities appear to be critical for reducing workplace accidents, particularly in the manufacturing sector. However, there is a dearth of such empirical intervention studies conducted in the Malaysian industry. The purpose of this study is to perform an intervention program aimed at enhancing worker safety behaviour through the supervisor's guidance in doing hazard self-assessment. Supervisors from high-risk manufacturing enterprises received a one-day instruction on the workplace hazard self-assessment module and were instructed to perform the intervention for 12 weeks with their employees. To test the effectiveness of the intervention program, a quasi-experimental design with a control group was employed. The findings demonstrated a substantial difference in safety behaviour between the intervention and control groups following the program, confirming the intervention's effectiveness.
**Keywords**: *safety behaviour, safety intervention, supervisor, manufacturing, Malaysia*

## Introduction

Previous scholars had agreed that safety behaviour is the main cause of workplace accident. Heinrich (1941) concluded that 88% of the industrial accidents are contributed by unsafe behaviour, whilst, the remaining percentage are from unsafe conditions and fate. Furthermore, it is stated that human factors, such as dangerous behaviour, are the primary predictors of industrial accidents, alongside engineering factors, technology factors, work system failure, and unsafe working conditions (Gyekye, 2010; Bowonder, 1987). Similarly, individual factor and unsafe acts such as jumping the SOP and failing to wear PPE are the main causes of accidents, followed by hazardous workplace's conditions, in Malaysia's manufacturing industry (Mansur et al., 2011; Hussin et al., 2009). Moreover, Ayob et al. (2018) scrutinized that the underlying factors towards accidents are namely lack of supervision and failure to comply with the safe usage of tools, vehicles, and machines. As safety behaviour predicted the most towards industrial

accidents, numbers of researcher, over decades, have researched the problems to determine the antecedents of safety behaviour. Many researchers determined that safety climate influence safety behaviour (Guo et al., 2016; Clarke, 2006; Cooper and Phillips, 2004). On the other hand, this could be including management safety commitment (Vinodkumar and Bhasi, 2010; O'Toole, 2002; Zohar, 1980). Besides these factors, safety training is also a substantial factor that is found to influence safety behaviour (Mashi et al., 2018; Khoo et al., 2016; Subramaniam et al., 2016; Lu and Shang, 2005).

There are also researchers who found safety leadership as factor to influence safety behaviour (Zulkifly et al., 2017; Cooper, 2015; Lu and Yang, 2010; Wu et al., 2008). Moreover, safety leadership is often regarded as a key ingredient in decreasing workplace injuries (Beus et al., 2016). Moreover, Zulkifly (2020) proposed that safety leadership in the form of coaching and monitoring has the potential to affect safety knowledge, attitude, and behaviour in Malaysia's manufacturing setting. The failure to operate in a safe manner by workers who work in dangerous working conditions, according to this research, is the cause of industrial accidents in Malaysia. Manufacturing is one of the most dangerous industries to work in, with a significant risk of injury (Sarok and Susil, 2012). Based on theese facts, this research advocated that the manufacturing employees also should identify the hazards and associated risks that they are facing while working, as well as predicting the consequences to ensure they maintain their safety behaviours at work.

Bahn (2012) stated that the proactive identification of hazards in the workplace strengthens all occupational health and safety initiatives. Managers as well as employees need to identify hazards the associated risks to assure their safety at workplace. Furthermore, Zhang et al. (2011) stated that to prevent workplace accidents, research on danger identification and control, as well as accident anticipation and comprehension, should be undertaken. By personally identifying the hazards that they are facing and assessing the associated consequences, it is proposed that the worker would perform their job or tasks in a safer manner. Moreover, noting hazards which the workers are exposed to and subsequently determining the suitable hazards' controls are the elements of pre-job safety analyses to ensure safety of workers (Morrish, 2017). This fact is supported by an agreement that an individual perceived risks associated to workplace hazards contributes to his/her safety behaviour (Mustafa et al., 2017; Xia et al., 2017).

This paper argued that an intervention programme focused on employee self-evaluation of hazards could enhance employees' knowledge and attitude toward safety, as well as modifying their unsafe behaviours. Thus, this paper is aiming to conduct an intervention research increase safety behaviour among Malaysia's workers who work in hazardous working conditions. The intervention program should be focusing on the self-assessment of hazards by workers with the guidance of their supervisors. The role of supervisors is crucial in improving safety behaviour among SME manufacturing workers in Malaysia (Khoo et al., 2016).

## *Literature review*

### *Factors influencing safety behaviour*

Three variables representing safety management practices namely 'management (safety) commitment', safety training, and 'safety rules & procedures' were significantly related to safety behaviour among manufacturing workers in Malaysia

(Subramaniam et al., 2016). On the other hand, Fitriani and Nawawiwetu (2017) conducted a non-experimental observation study to determine the factors contributed to safety behaviour in terms of complying with safe working procedure and also wearing personal protective equipment. A strong association between motivation, private problem, frequency of OSH training, positive reinforcement (reward), and negative reinforcement (punishment), with together with safety behaviour are among the manufacturing production workers. A work from Vinodkumar and Bhasi (2010) has determined the significant relationship between management safety practice (management commitment, safety training, workers' involvement in safety, safety communication and feedback, safety rules and procedures, and safety promotion policies) and safety behaviour. It has been concluded that management commitment, workers' involvement, safety rules & procedures and safety promotion policies had a direct influence towards safety behaviour dimensions.

Khosravi et al. (2014) had reviewed literatures on factors influencing unsafe behaviours on construction sites. Mainly, the study categorized the factors that could influence unsafe behaviour into several categories namely 'individual characteristics', 'site condition', 'work group', 'contractor', 'supervision', 'project management', 'organisation' and 'society'. This study also concluded that underlying factors (i.e.: organisation, project management and society) could supported the immediate factors (i.e.: site condition and individual characteristics) in reducing unsafe behaviour and furthermore to prevent workplace accidents. Similarly, Zid et al. (2018) performed a systematic literature review in developing a conceptual framework for safety behaviour in Malaysia's construction industry. The meta-analysis was conducted and the results summarised 3 main categories of variables which give direct impact towards safety behaviour. They are namely 'organisational' (i.e.: leadership, reward, communication), 'safety climate' (management commitment, safety management system, production pressure) and 'individual factor' (i.e.: safety knowledge, demographic, self- safety motivation). This paper also advocated that workers' perception about the risk at workplace could be a more effective element to prevent accidents.

Xu et al. (2018) applied Theory of Planned Behaviour (TPB) to explain factors influencing unsafe behaviour, by establishing the relationship between attitude, subjective norms and perceived behavioural control, and intention towards safety behaviour. The results found direct relationship between attitude, subjective norms and perceived behavioural control in terms of safety, and intention towards safety behaviour. It was also found that the attitudinal ambivalence (i.e.: wearing PPE could lengthen the work process, feeling unsafe at worksite etc.) mediates the relationship between the independent variables and intention towards safety behaviour. Xu et al. (2018) also emphasized the application on psychological theories to develop the leading factors towards safety behaviour. The research also proposed a more effective and human oriented safety intervention should be designed and implemented to prevent safety violations. Goh and Sa'adon (2015) performed a multi-method exploratory study, adopting the theory of planned behavior (TPB) to model the cognitive factors influencing the unsafe behavior of scaffolders. A cross-sectional study using questionnaire was conducted to 40 migrant workers from Bangladesh, India, and China, aiming to explore the cognitive factors influencing the unsafe behavior of not anchoring a safety harness while working at height using scaffoldings. Based on the multiple regression results, 'subjective norms' and 'attitude' were the significant variables influencing behavior of the scaffolders. Moreover, based on neural analysis performed,

'subjective norms' result in 42% impact and 'attitude' incurs 36% impact on scaffolders' of unsafe behaviour. Meanwhile, 'perceived behavioural control' provides only 22% impact on safety behaviour of the scaffolders.

### *Perceived risks associated to occupational hazards and safety behaviour*

Mustafa et al. (2017) determined that risks associated to hazards perceived by bus drivers influence their safety driving performance. Furthermore, Mustafa et al (2015) had also determined that there is a substantial correlation between vocational students' perceptions of hazards and their safety behaviour in workshops. Fitriani and Nawawiwetu (2017) performed a study to determine whether management interventions under the Deming model reduce dangerous behaviours of workers. Case study conducted periodically for three years. The case study was conducted periodically during three years (2012-2015). To assess the intervention's effectiveness, safety performance indicators and standardised questionnaires were used. Besides, checklists and random observations were used to assess risky and safe behaviours. The findings revealed that implementing treatments had a significant impact on reducing unsafe behaviours. Following interventions, the obtained results of safety performance metrics and the training status improved to a satisfactory level. The training module consist occupational safety and health topics mainly focus on identification of hazards and their implications towards safety and health, ergonomic, work-related accidents and diseases, fire safety, machine guarding, and the importance of personal protective equipment (PPE).

Mazlina Zaira and Hadikusumo (2017) said current safety management should be geared toward improving behavioural safety performance, and safety interventions should be directed on changing unsafe acts into safe behaviours. Hence, the multi-level integrated safety intervention model is divided into three levels, with "management safety intervention", "technical safety intervention", and "human safety intervention" functioning at the different levels. In regards to the term "human safety intervention", the concepts to be covered include behavioural-based safety (BBS), training in workplace safety, awareness campaign, workplace inspections, hazard/risk assessment, and more. The research also promotes the notion that "human safety intervention'" could have an impact on human knowledge, competence, attitude, and behaviour toward safety.

### *Safety intervention and safety behaviour*

An occupational safety and health information intervention research was held by Ismail et al. (2018). Students from the health sciences programme at Universiti Putra Malaysia participated in the quasi-experimental investigation. OSH data were integrated into a mobile application utilising online software, and respondents were asked to utilise the applications for fourteen days. The results indicated that respondents' safety knowledge-attitude-practice increased significantly. A self-administered survey was utilized to evaluate respondents' level of knowledge, attitude, and practise before to and following their usage of the applications.

Liu et al. (2016) used retrospective experimental design with three groups (one behaviour intervention group, one education intervention group, and one control group). After giving birth, both intervention groups received a folding leaflet about child passenger safety, a height chart, and a standardised safety education. The behaviour

intervention group was also given a free child car seat (CSS) and on-site installation instruction upon discharge. The control group received nothing concerning child passenger safety, only a height chart, and no instruction on newborn care. The results revealed that there were significant different between the used of CSS for the three groups regarding the pre and post intervention. However, behaviour intervention group shows a significant increase in “drivers-wearing seat belts” as compared to other groups. Lack of understanding and attitude led to low use of CSS among newborn parents.

### *Propsoed underpinning theory*

Zhang et al. (2011) had briefed the development of hazard theory and analysed the concept of hazard based on accident causation theory. Subsequently, the study summarised that controlling of initial hazards, first triggering hazards and direct hazards through anticipation of the consequences which is resulting the accident could enhance the accident prevention at workplaces. Zhang et al. (2011) added a case study within coal mines in China as the example to explain the hazard theory. For example, in a coal mine gas explosion accident, the direct hazard is gas, the first triggering hazard is the fire source that initiates the explosion (e.g., open flame, electric spark, colliding and friction spark), the initial triggering hazards are all people (e.g., violated operation), and the triggering condition is existing oxygen and its concentration approaching a certain level. To avoid gas explosion incidents in coal mines, all of these phases of dangers must be assessed, and management must apply suitable control measures to prevent industrial mishaps.

In addition, the most popular theory related to safety behaviour is the model of Antecedent-Behaviour-Consequence or renowned as the ABC Theory. “Antecedent" is referred to a source or a condition that occurs which triggers to cause an action of a person. "Behaviour" is also what people do or in a simple word is an “action” while "Consequences" is a result of the behaviour or action taken (Miltenberger, 2008). Mousavi et al. (2017) conducted a review on the antecendents of safety performance (safety behaviour and occupational accidents) and summarised that the antecedents of safety behaviour could be categorized into four dimensions which are: Working environment, task and work characteristic, as well as organisational factors.

From these two theories, this paper concluded accident reduction could be achieved when hazards at workplace are identified and the consequences towards workers are determined. Furthermore, the control measures are embedded in the work process at management as well as workers’ personal level. Moreover, behaviour modification towards safety could be realized when the employees themselves understand the hazards that they are facing in the daily routine tasks as well as the associated risk that they might be imposed if they do not work according to the safe working procedures. The knowledge about hazards and risks associated to their work would further develop their safety attitude as well as motivate them to commit in working safely by avoiding the violating of safety procedures established by their employers.

## Materials and Methods

### *Research design*

This paper proposed a post-test quasi-experimental research (with non-equivalent control group) as the research design. The experimental group received the safety intervention for a period of 12 weeks. Following the intervention, data was collected by self-administering the post-test to both the experiment and control groups.

### *Population and sampling*

The sampling unit for this study is the workers of manufacturing companies who are their workplaces are defined as "factory" by Factories and Machinery Act 1967. Inclusion criteria are defined as the key features of target population for a researcher to answer the research questions. Whilst, the exclusion criteria are features that could answer the research questions but own other characteristics that could interfere the optimum outcome of the research (Patino and Ferreira, 2018). *Table 1* depicted the inclusion as well as exclusion criteria for present research's sampling purposes.

***Table 1***. *Inclusion and exclusion criteria for sampling.*

| Item | Inclusion criteria | Exclusion criteria |
|---|---|---|
| 1 | High accident | Low accident |
| 2 | Production line workers | Workers from other than production line |
| 3 | Below than supervisor level | Supervisors and above |
| 4 | Local workers | Foreign workers |

For present research, the production workers from statistically high accident manufacturing companies were included whereas the workers from low accident rate workplace are excluded. The statistics of industrial accidents will be obtained from the respective DOSH state offices. In addition, the production line workers who own the position level below than supervisor was included while supervisors and above will be in the exclusion criteria. Lastly, only local workers were included in this research and none of the foreign workers to be included to avoid language barrier effect towards the research outcomes. The ability to generalize the small group sample size to the larger population is determined by the adequacy of sample size. Sample size of this study is determined by G*Power, as depicted in *Figure 1*.

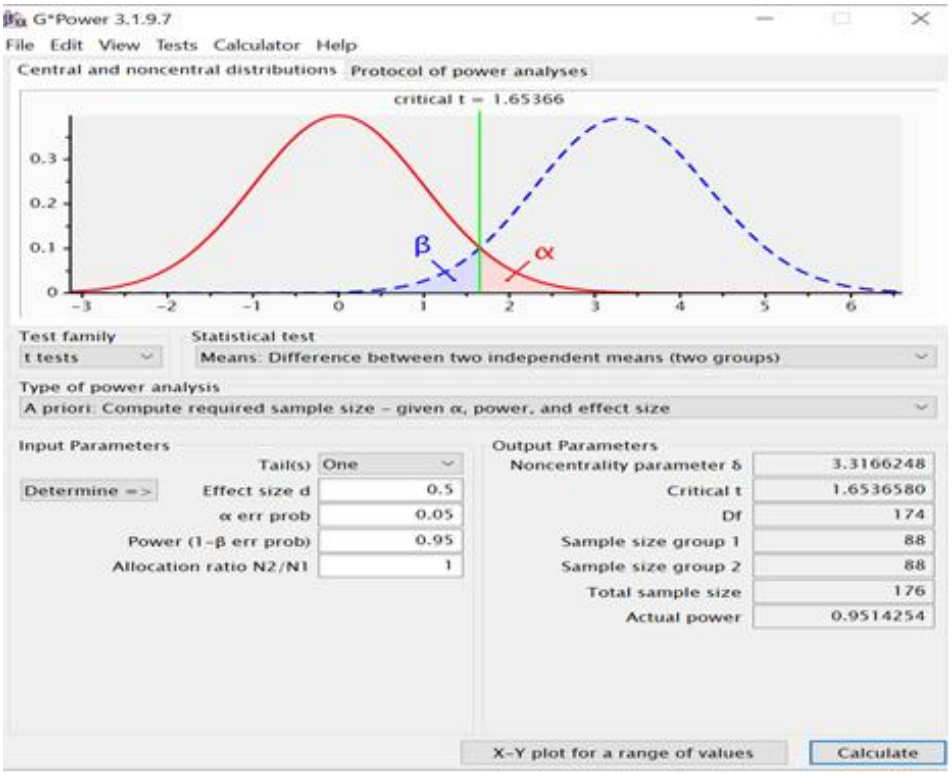


***Figure 1.*** *Sample size.*

### *Intervention implementation*

A specific intervention program focusing on hazard self-assessment by the workers was conducted. The module is suggested to adapt the concept of Kiken Yochi Training (KYT) form Japan. KYT is a method of conducting small group dialogues concerning workplace hazards and conditions (Yaacob et al., 2016). This will assist workers in identifying and comprehending the sorts of accidents that may occur as a result of such circumstances, as well as identifying risk locations and response strategies. KYT leads in an increase in workers' awareness of danger and incentive to work in teams, communicate knowledge about hazards, and enhance their problem-solving abilities (Chen and Jin, 2012). As a result of these KYT advantages, human mistakes will be reduced and safety performance will be improved. According to Yaacob et al. (2006), KYT has been shown to have a beneficial influence on accident rates across cultures. While the core premise of KYT remains the same, its execution must be carefully modified to local cultural norms in order to maximise its effectiveness (Legg et al., 2015). For the intervention, supervisors are instructed to guide their subordinates on identifying and evaluating hazards, the steps of the intervention is laid out as follows;

Step 1: Identifying the critical hazards
Step 2: Evaluating the risks
Step 3: Determining the solution measures
Step 4: Implementing the solution
Step 5: Monitoring the safety behaviour

### *Instruments*

The instrument for data collection in this study is a self-administered questionnaire. As specified in the study design, questionnaire will be utilised to determine the effectiveness of the intervention. According to Wiersma and Jurs (2009), Likert scale surveys utilise many scales that allow respondents to select the scale that best describes their feelings or perceptions concerning certain situations or conditions, making it becomes one of the best methods. This questionnaire for this research was adapted from previous research (Kao et al., 2019) to measure safety behaviour among the respondents involved in this study, and applied 5-Likert scale of measurement.

### *Data analysis technique*

Data was analysed using SPSS Version 20, where by and descriptive statistics was used to show the level of safety behaviour (low, moderate or high) among the respondents based on Davis Convention (Davis, 1971). Furthermore, the independent sample t-test was performed to compare the mean scores for safety behaviour between the experimental and control group.

## Results and Discussion

This section presented the results of the research. Furthermore, the findings are also discussed.

### *Respondents background*

As explained earlier, this is a quasi-experimental research by design, whereby an intervention group and a non-equivalent control group. Most of the respondents of both experimental and control group are male which are 62.5% and 59.1 % respectively. The remaining percentages are female. Most of the respondents from experimental and control group aged from 20 to 40 years old with 81.82% and 75% respectively. Additionally, 15.91 % from the experimental group aged from 41 to 50 years old abd 22.7% of the same age group of the respondent found in the control group Majority of the respondents in the experimental group (77.27%) work for 1-10 years in their respective companies wheres 65.9% of the respondents from the control group work up to 10 years for their respective companies. A total of 25% and 28.41 % from the respondents of experimental group hold MCE/SPM/SPMV and HSC/STPM/Certification for their highest educational background. Similarly in the control group, 25 respondents (28.4 %) and 22 (25%) own MCE/SPM/SPMV and HSC/STPM/Certification respectively. Each group has 15 people (17.05%) who own diploma or advance diploma as their highest qualification background. Based on the results also, majority of the respondents have experience in undergoing OSH related training, making up to 71.59% for experimental group and 68.2 % for the control group. Moreover, 66 (75%) of the respondents in experimental group and 69 (78.4%) from the control group have never experiencing workplace accident during their service in the respective firms. *Table 2* summarized the details of the respondent's background which could be concluded as homogeneous.

***Table 2**. Background of the respondents.*

| Category | Experimental group | | Control group | |
|---|---|---|---|---|
| | Frequency | Percentage | Frequency | Percentage |

| | | (N) | (%) | (N) | (%) |
|---|---|---|---|---|---|
| Gender | Male | 55 | 62.50 | 52 | 59.1 |
| | Female | 33 | 37.50 | 36 | 40.9 |
| Education level | LCE/SRP/PMR | 13 | 14.77 | 15 | 17.0 |
| | MCE/SPM/SPMV | 22 | 25.00 | 25 | 28.4 |
| | HSC/STPM/Cert. | 25 | 28.41 | 22 | 25.0 |
| | Diploma/Adv. Dip. | 15 | 17.05 | 15 | 17.0 |
| | Degree and above | 13 | 14.66 | 11 | 12.5 |
| Age | 20-30 years old | 38 | 43.18 | 32 | 36.4 |
| | 31-40 years old | 34 | 38.64 | 34 | 38.6 |
| | 41-50 years old | 14 | 15.91 | 20 | 22.7 |
| | 51 years old and above | 2 | 2.27 | 2 | 2.3 |
| Tenure | Less than 5 years | 44 | 50.00 | 30 | 34.1 |
| | 5-10 years | 24 | 27.27 | 28 | 31.8 |
| | 11-15 years | 10 | 11.36 | 15 | 17.0 |
| | More than 16 years | 10 | 11.36 | 15 | 17.0 |
| Accident | Yes | 22 | 25.00 | 19 | 21.6 |
| | No | 66 | 75.00 | 69 | 78.4 |
| OSH training | Yes | 63 | 71.59 | 60 | 68,2 |
| | No | 25 | 28.41 | 28 | 31.8 |

### *Reliability test*

Reliability assessment for this study was conducted by determining the Cronbach's alpha values. The results are depicted in *Table 3*. Based on the findings, it appears that the instrument's reliability is exceptional (Tabachnick and Fidell, 2014; Nunally and Bernstein, 1994).

***Table 3***. *Cronbach's alpha*.

| Group | Cronbach's alpha | N of items |
|---|---|---|
| Experimental | .983 | 7 |
| Control | .932 | 7 |

### *Normality test*

There are several methods to determine whether a set of data is normally distributed or otherwise. They include Kolmogorov–Smirnov or Shapiro-Wilk test, skewness and kurtosis test, and eyeball indicator (histogram) (Orcan, 2020; Kim, 2013). For this research, normality of the data was determined by the z-score of the skewness and kurtosis. The results are depicted in *Table 4* and *Table 5*. Based on the results, it could be concluded that the data is normally distributed as the z-score of the skewness and kurtosis are within the range of +1.96 and -1.96 (Orcan, 2020; Tabachnick and Fidell, 2014). Thus, parametric statistical analysis was proceeded for this study.

***Table 4***. *Normality test (skewness).*

| Category | Skewness | Std. Error | Z skewness |
|---|---|---|---|
| Experimental | -0.244 | 0.257 | -0.950 |
| Control | -0.200 | 0.257 | -0.778 |

***Table 5***. *Normality test (kurtosis).*

| Category | Kurtosis | Std. Error | Z skewness |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Experimental | -0.871 | 0.508 | -1.715 |
| Control | 0.299 | 0.508 | 0.589 |

### *Descriptive analysis*

For the purpose of this research, descriptive analysis was conducted to obtain the mean values for measuring the level of safety behaviour among manufacturing workers. The level was determined based on Davis convention. The level is low when the mean value fall within the range of 1.00-2.33, medium (mean=2.34-3.67), and high when the mean value is from 3.68-5.00. Result for mean values is summarised in *Table 6*. According to the results, the level of safety behaviour for the control group is medium (mean=2.4578). However, the level of safety behaviour for experimental group is high (m=4.0747). This result indicates that the level of safety behaviour is higher for intervention than the workers who did not undergo the intervention.

***Table 6**. Descriptive analysis.*

| Group | Mean | Level | Reference |
|---|---|---|---|
| Experimental | 4.0747 | High | Davis (1971) |
| Control | 2.4578 | Medium | |

### *Independent T-test*

The independent t-test, alternatively referred to as the two-sample t-test, is a parametric tests tool used to assess if there is a statistically significant difference between the means of two independent groups (George and Mallery, 2016; Tabachnick and Fidell, 2014). *Table 7* depicts the average scores of safety behaviours after the 12 weeks of intervention program.

***Table 7**. Independent sample test.*

| Category | | Levene's test for equality of variances | | t-test for equality of means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | t | df | Sig. (2-tailed) | MD | SED | 95% confidence interval of the difference | |
| | | | | | | | | | Lower | Upper |
| Safety behaviour | Equal variances assumed | 2.215 | .138 | 17.780 | 174 | .000 | 1.61688 | .09094 | 1.43740 | 1.79636 |
| | Equal variances not assumed | - | - | 17.780 | 163.513 | .000 | 1.61688 | .09094 | 1.43732 | 1.79645 |

**MD=Mean Differences; SED=Std. Error Difference.*

In an independent t-test, first Levene's test was conducted. Levene's test is an inferential test used to determine variance homogeneity for at least two groups of data. If the resulting p-value of Levene's test is less than 0.05, the observed differences in sample variances are unlikely to have occurred as a result of random sampling from a population with equal variance. As a result, the null hypothesis of equal variances is rejected, and it is determined that the variances of the population diverge (Gastwirth et al., 2009). Based on the results stated in *Table 6*, the p-value for Levene's test was not

significant ($p>0.05$), indicating the homogeneity of variance among the population. Secondly, the assessment of the equality of mean values was conducted. The result is $t(163.513)=17.780$, $p<0.05$. As shown in *Table 6*, the mean value of safety behaviours differed significantly between the experimental and control group. The results of this study advocated that safety intervention program for supervisors could cause a higher level of safety behaviour among workers. This result is similar to Sivanathan et al. (2005) who found that transformational leadership intervention imposed to supervisors has increase safety behaviour among swimming instructors.

## Conclusion

The purpose of this paper is to test whether by implementing safety intervention towards the supervisors could cause high safety behaviour among production line workers in highly accident manufacturing plants in Malaysia. The main focus of the research is to implement the occupational hazard identification and self-evaluation program towards the supervisors to increase their leadership roles of safety that is advocated to influence safety behaviour of workers. The quasi-experimental results show the huge different of mean values between experimental group and control group, advocating the causal effect of the intervention. Moreover, the mean comparison by inferential analysis shows significant different of scores between both group, conforming the effectiveness of the intervention.

This study will help the government to formulate efficient safety strategies that are especially focused on manufacturing workers and which will help to reduce industrial accidents in the manufacturing industry. This intervention could serve as a guide in building modules and guidelines of safety behaviour practises in Malaysia's manufacturing sector. On the other hand, this research owns several limitations that need to be highlighted. A quasi-experimental design makes the respondents were not randomly assigned, henceforth reduced its validity (Mohamed et al., 2018). However, this paper has taken initiative to impose a control group in tackling the validity threats (Piaw, 2012; Campbell and Stanley, 1963). Future researchers are proposed to include pre-test to treat the historical bias and also consider time series data collection to improve the validity of the research (Krishnan, 2019).

## Acknowledgement

The Director of DOSH Kedah and other associated officers are acknowledged for their advices and assistance towards the process on this study. Nonetheless, a mark of gratitude is conveyed to the management of the participating companies and all the respondents for their cooperation towards the accomplishment of this study.

## Conflict of interest

The authors declare that there is no conflict of interest for this article.

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