



Factors of Leadership and Behaviour Towards Organisational Safety Performance: A Predictive Model for Small and Medium Manufacturing Industry

Syazwan Syah Zulkifly^{1*}, Nur Syifa Mohamad Zahir², Mokhtar Zamimi Ranjan³

¹ School of Business Management, Universiti Utara Malaysia, Sintok, Kedah 06010, Malaysia

² Inventec Appliances (Malaysia) Sdn. Bhd, Bayan Lepas, Pulau Pinang 11900, Malaysia

³ Department of Occupational Safety and Health, Ministry of Human Resource, Putrajaya 47500, Malaysia

Corresponding Author Email: syazwan.syah@uum.edu.my

<https://doi.org/10.18280/ijssse.130210>

ABSTRACT

Received: 9 January 2023

Accepted: 14 April 2023

Keywords:

leadership, safety behaviour, safety performance, SMEs, Malaysia, manufacturing

In Malaysia, small and medium enterprises (SMEs) account for the majority of workplace accidents. SMEs encounter challenges in achieving effective safety performance due to limitations in organisational resource in managing occupational safety risks. Scholars have a unified agreement on the substantial factor that contributes towards accident and injury, which is human factor namely unsafe behaviour. On the other hand, scholars advocated that leadership is an effective approach in encouraging safety behaviour at work, especially among SME workers. Through the conceptualization of Transformational-Transactional Leadership Theory and models established by previous studies, this paper proposed to model of both leadership styles in effecting safety behaviour as well as safety performance. A total of 107 responses were collected from Safety and Health / Human Resource personnel who work in the SME (manufacturing) firms in the northern region of Malaysia. In this research, a questionnaire was constructed by adapting items from previous studies. SmartPLS 3.2.9 was used to analyse the data by applying partial least square-structural equation modelling (PLS-SEM) analyses. The results of this research showed that safety behaviour had a substantial effect on safety performance. Furthermore, a significant mediating effect of safety behaviour could be found in the relationship between transformational and transactional leadership on safety performance. This research contributes to the existing body of knowledge by offering an alternative model that has been empirically validated which can be employed as a reference by academia and industry to explain the significant role of transformational-transactional leadership towards overall safety performance for SME manufacturing industry.

1. INTRODUCTION

Workplace accidents have reached the critical stage in Malaysia. Number of cases keep increasing year by year [1, 2]. Based on the statistics revealed by the Department of Occupational Safety and Health (DOSH), manufacturing sector contributes to the highest number of industrial accidents. As the overall data showed an increasing trend, small and medium enterprises (SME) sector was found to contribute 80% of the occupational accidents in Malaysia [3-5]. Based on the latest systematic review study, 50% of the accident cases in the world come from SMEs with an eight time likelihood of fatality [3, 4]. Therefore, addressing this problem and implementing proactive measures to improve workplace safety is imperative to prevent accidents that certainly would imposed adverse impacts on the involved organisations.

Malaysia's industrial development is supported by SME sector [5], specifically in terms of providing relevant employment opportunities [6]. Along with their rapid development, SMEs in Malaysia also account for the highest industrial accidents each year at about 60-70% of the total cases [7-12].

Studies on workplace accidents have been undertaken since

1940s and scholars have concluded that workplace accidents are mainly caused by unsafe behaviour and unsafe conditions [5, 13, 14], and Malaysia is not the exception [10-13]. Hence, factors that influence safety behaviour of workers need to be seriously addressed, including within the SMEs. In the context of SMEs, scholars worldwide have determined that firm size influences the effectiveness of safety management. Similarly, Malaysia's scholars have concluded that financial constraints, lack of expertise and staffing capabilities [14], lack of knowledgeable staff, the perceived difficulties to implement occupational safety and health (OSH) measures, perceived low likelihood of workplace accidents [15], and low level of safety awareness among employees [16] are the primary causes of SMEs' poor safety management, which have also linked to accidents. Solutions that are recommended by previous scholars to improve safety behaviour are more appropriate for large firms [17]. Recent research has indicated that improving safety behaviour and further reducing the incidence of accidents require a different strategy that is suited to their particular characteristics [18].

It has been found that safety climate [19-26], safety management [27-30] and safety leadership [31-34] are the leading factors of safety behaviour. Besides, safety training has also been found as one of the substantial factors that

influences safety behaviour [35-38]. On the other hand, the study [39] revealed that workers' influence, work environment and conditions, contractors, role of supervisors, project managers, organisations and the community are variables which have the potential to affect the safety behaviour of Malaysian employees.

Local scholars [23, 25-32] also highlighted the same idea whereby SMEs need special approaches to tackle workplace accidents. Most of the scholars opted to assess the influence of safety management on safety behaviour/performance. Limited research [22, 33] were found testing the significant role of owner-managers' leadership towards safety behaviour or safety performance in a separate model. As these scholars advocated that an alternative approach needs to be inexpensive and practical without incurring a lot of resources, this paper proposed that establishing self-regulation practices among supervisors through their safety leadership roles within the SMEs would be the best approach because safety leadership has been perceived as the most appropriate element to influence safety behaviour. The safety leadership approach is proposed because such effective approach can be financially beneficial to SMEs, whereby it positively affects employees' safety behaviour and attitude, reduces injury rates and increases productivity [40]. Moreover, the safety leadership approach utilises internal resource (leaders) to manage OSH through self-regulation and it will turn out to be inexpensive and sustainable, which is deemed to be appropriate for SMEs [22]. Prior to this study, the study [31] examined the safety leadership roles of the owner-managers of manufacturing SMEs in Negeri Sembilan, Malaysia. The results revealed that transformational safety leadership variables influenced the safety behaviour of manufacturing SMEs' employees. Moreover, the study [41] established an integrated safety management model whereby leadership was also proposed in the model to predict safety behaviour, and safety behaviour would predict safety outcomes (i.e., accidents, injuries, diseases and dangerous occurrences).

This study aimed to investigate the effect of supervisors' leadership styles and workers' safety behavior dimensions, as well as their direct and indirect impact on organizational safety performance in Malaysia's manufacturing SMEs. Previous research has provided insufficient investigation into these nature of relationships. A predictive model has been proposed consisting transformational leadership and transactional leadership as the independent variable, safety compliance and safety participation representing safety behaviour as the mediating variables, and safety performance as the independent variable. The measurement and structural model would be tested amongst the SME manufacturers in Malaysia together with its predictive power. As a result, it is expected that transformational and transactional leadership styles of the supervisors demonstrates a significant influence on workers' safety compliance and safety participation, and that these safety behavior dimensions mediate the relationship between those leadership styles and organizational safety performance. These findings contribute to the understanding of the critical role of safety leadership played by supervisors in promoting workplace safety behaviour amongst the workers and furthermore improve the overall safety performance, specifically for SME (manufacturing). The proven predictive model could serve as a reference for SMEs to utilize their existing resources in improving workplace safety and health, despite constraints related to their size and financial capacity.

2. LITERATURE REVIEW

This section explained the literature review conducted for this research, which comprised articles, books, reports and guidelines related to occupational health in Malaysia, safety culture, safety behaviour, safety leadership, safety knowledge, safety attitude, safety intervention and safety performance. Moreover, relevant theories were reviewed and summarised to construct the theoretical framework of the study.

2.1 Safety performance

An organisation's level of safety and health can be measured by its safety performance. Workplace accidents that have been statistically documented by the Occupational Safety and Health Administration in the US serve as the safety performance measure at the beginning of the research stage in the occupational safety and health (OSH) field [19, 34, 35]. Safety performance is also defined as the level of safety that keeps the number of accidents and injuries in the workplace under control [31]. Based on these facts, many studies employed the statistics of workplace accidents as the measure of safety performance in organisations [32, 33]. On the other hand, safety performance is also defined as the likelihood that workplace accidents will result in death or property loss [42-46]. Besides that, safety performance is also benchmarked as the magnitude of injuries caused by accidents, including death, permanent disabilities or cost of compensation payment [22].

As previous scholars measured safety performance from the recorded accidents/injuries, the authors [20, 32] advocated that more proactive measures such as safety behaviour should be used to evaluate safety performance. This opinion is in line with some previous studies, which have emphasised that safety performance should be measured by workers' safety compliance behaviour [34-37]. Moreover, the authors [46] agreed that safety performance should be measured by safety behaviour. They concluded that safety performance refers to employees' safety control and self-reported workplace injuries. Recently, scholars have come to a unified agreement that safety performance needs to be gauged by proactive measurements [5, 47].

Most of the previous literature measured safety performance with safety behaviour dimensions [33, 48]. There were also some studies which measured safety performance with the reduction of accident, injury and property loss [5, 32, 49]. Nevertheless, safety behaviour was concluded as the best measure for safety performance; thus, determining its antecedents is crucial to improve OSH. Based on this literature, this paper summarised that safety performance should be measured by both reactive and proactive measures to obtain precise results of the workplace safety and health level of an organisation. Recently, a systematic review study confirmed that most researchers opted to measure safety performance by using safety behaviour dimensions as its indicator to promote proactive measures [39]. Recent researchers applied the advocated task and contextual performance and established safety performance dimensions, namely safety compliance behaviour and safety participation behaviour [33, 48].

Safety behaviour refers to actions committed by employees to ensure safety and health of themselves as well as others while performing their duties at work. Notable studies measured safety behaviour in terms of compliance with safe working procedures, including wearing personal protective

equipment (PPE) [40, 41]. Safety compliance behaviour and safety participation behaviour, which were derived from proactive safety performance utilised [33], have been extensively used to measure safety behaviour in various OSH studies [33, 34, 47, 50]. Therefore, this paper adapted both safety behaviour dimensions to represent safety behaviour variables.

Based on those explanations, it could be understood that safety performance and safety behaviour had been interchangeably utilised by scholars to indicate proactive safety performance. However, there are scholars who remain to measure safety performance using the reduction of accidents, injuries and property/goods loss [18, 38]. Therefore, this paper decided to apply the safety performance measure proposed by the study [32], whereby the reduction of accidents, injuries and property/goods loss are used its parameter. Besides that, present research also opted to measure safety behaviour by its two dimensions namely safety participation and safety compliance as per practiced by other scholars.

2.2 Safety leadership

Leadership is defined as the capability of an individual to influence another person or a group of people to achieve mutual goals [51, 42]. Yukl [52] stated that leadership is a process of facilitating individuals towards understanding and performing procedures to accomplish objectives [52]. Leadership is also defined as a way of social influence that is permitted by individuals in formal positions of power within an organisation such as managers and/or supervisors [44]. There are numerous theories related to leadership styles which have been explained by previous researchers since the “Great Man Theory” until the recent theories such as leader-member exchange, transformational leadership, authentic leadership and servant leadership [45]. Burns [53] introduced two more styles of leadership behaviour, namely transactional and transformational leaderships [53]. These two styles are viewed as the most prominent leadership styles. The concept of transformational versus transactional was later enhanced by researchers [48, 54]. Transformational leadership is a situation where a leader emphasises followers’ intrinsic motivation and personal development to achieve the desired outcomes of their organisation, while transformational leaders inspire their followers to go beyond their expected performance in order to achieve organisational goals [54-56]. Alternatively, transformational leaders can be agents of change in the workplace [48]. Moreover, the study [57] viewed transformational leadership as a process of changing an organisation by transforming followers into leaders and leaders into agents of change.

Under the scope of leadership, researchers on the OSH area have come up with a term, which is safety leadership. Safety leadership is defined as the process of establishing desired goals, setting up an organisation and engaging in essential efforts that drive safety values [40]. The principal duty of safety leadership revolves around inspiring subordinates to create a safe work environment [58]. Safety leadership has been widely admitted to be critical, specifically when it comes to instilling a safe work culture [59, 60]. Leaders have already been actively involved in safety and have been studied by previous scholars in various contexts [61-67]. These researchers applied leadership theories or models to establish variables in order to measure leadership in the context of

workplace safety and health.

Safety leadership is defined as the behaviour of interaction between leaders and followers, where leaders can influence followers to react or behave in achieving organisational safety goals [40]. Under safety leadership, previous scholars utilised safety motivation and safety concern as dimensions that represent transformational leadership [33, 34]. In contrast, safety coaching and safety caring have also used by scholars to represent transformational leadership in studies that are related to occupational safety [31, 59, 68]. Based on a systematic literature review conducted [69], safety (transformational) leadership behaviours portrayed by the lower level of management are mainly reinforcing and communicating safety-related rules and procedures, expressing concern and cares towards workers safety, encouraging workers to involve in safety initiatives, guiding and supporting work-related safety practices, monitoring or controlling, and actively participating in workplace safety activities. In addition, it is suggested that leaders influence safety compliance behaviour of workers in shipping industry through coaching and role modelling [70].

This section discusses the concept of leadership and its various styles, including transactional and transformational leadership. Transformational leadership emphasizes personal development and intrinsic motivation of followers to achieve organizational goals, and it can also involve leaders being agents of change. Safety leadership is a specific type of leadership focused on creating a safe work environment and establishing safety values. Safety leadership involves the behavior of interaction between leaders and followers, with leaders influencing followers to behave in ways that achieve safety goals. Previous research has identified dimensions of safety leadership, including safety motivation, safety concern, safety coaching, and safety caring, which have been used to measure leadership in the context of workplace safety and health. Lower level management is primarily responsible for portraying safety (transformational) leadership behaviors such as reinforcing and communicating safety-related rules and procedures, expressing concern and care towards workers' safety, encouraging workers to involve in safety initiatives, guiding and supporting work-related safety practices, monitoring or controlling, and actively participating in workplace safety activities.

2.3 Safety leadership and safety behaviour

The significant relationship between leadership styles and safety behaviour has been established by prior studies [62, 65, 71-73]. Bilgiç et al. [71] adapted the Transformational-Transactional Leadership Theory and confirmed the effect of transformational and transactional leadership styles on safety behaviour, which was represented by safety participation behaviour and safety compliance behaviour [71]. A survey was conducted among blue-collar employees of a Turkish corporation. The findings indicated that transformational leadership affects safety participation, whereas transactional leadership affects safety compliance. Martínez-Córcoles et al. [65] conducted an investigation towards the relationship between leadership and safety behaviour where the theory of empowerment leadership was adapted [65]. The study, which was conducted in two nuclear power plants, revealed that empowering leadership enhances safety performance of workers, specifically in terms of safety participation behaviour.

Besides the elaborated studies above, there were studies that specially used the term "safety leadership" and determined it to have an impact on safety behaviour [31, 33, 34, 74, 75]. Lu and Yang [38] conducted a study to examine the effect of safety leadership variables (safety policy (transactional) as well as safety motivation and safety concern (transformational) on safety behaviour among dockyard workers in China [33]. The results revealed that safety leadership has a significant influence on safety behaviour. On the other hand, the authors [75] performed a study among workers who work in the healthcare industry for a long tenure. The research examined the influence of inconsistent safety-specific leadership style on safety participation behaviour and safety compliance behaviour. The results showed that transformational safety-specific leadership has a greater association with behaviour dimensions compared to passive safety-specific leadership. The performance of employees in terms of safety, especially their participation in safety, is improved through an empowering leadership style.

This section discusses several studies that have established a significant relationship between leadership styles and safety behaviour. The Transformational-Transactional Leadership Theory has been used to confirm the impact of transformational and transactional leadership styles on safety behaviour, specifically safety participation behaviour and safety compliance behaviour. Empowering leadership has also been found to enhance safety performance of workers, particularly in terms of safety participation behaviour. Other studies have specifically used the term "safety leadership" and found that it has a significant influence on safety behaviour. Inconsistent safety-specific leadership styles were found to have a lesser association with safety behaviour dimensions than transformational safety-specific leadership. Overall, these studies suggest that safety leadership plays a critical role in improving safety culture and behaviour in the workplace.

2.4 Safety behaviour and safety performance

Scholars have come to a unified agreement where safety behaviour is the substantial predictor of workplace accidents [11, 13, 14, 18, 76-78]. Recent study which was conducted among foreign construction general workers in Hong Kong revealed that safety behaviour had a negative and significant effect on safety outcomes, which was measured by the frequencies of injury and near miss [79]. According to a recent study of 161 respondents in the production sector of coal mining contractor companies in the Indonesian province of East Kalimantan, the direct effect of safety leadership and safety culture on safety performance is greater than when it is mediated by safety behaviour [80].

Based on the literature reviewed, it can be concluded that workplace safety is a critical concern that requires attention from organizations, managers, and employees. There are various factors that contribute to workplace accidents, including human factors, organizational factors, and environmental factors. Safety leadership and safety culture play a significant role in promoting a safe work environment, as they influence employees' attitudes and behaviors towards safety. Safety behavior is also a crucial predictor of workplace accidents, as employees' adherence to safety rules and regulations can mitigate the risks of accidents. To enhance workplace safety, organizations especially SMEs should focus on approaches that encourage employees' participation in safety initiatives, and regularly assess and evaluate their safety

compliances. Safety leadership is proposed to be the most appropriate approach by this research.

3. THEORETICAL PERSPECTIVE

The theoretical basis for this study was derived from the Transactional-Transformational Leadership Theory and Domino Theory.

3.1 Transformational-transactional leadership theory

Transformational and transactional leadership theories are two of the most popular leadership theories. Theories of transformational and charismatic leadership have become more popular since the late 1980s. Several theorists have put proposed various iterations of transformative leadership, including Bass [62]. Burns, who was a renowned leadership scholar, has made a distinction between transactional and transformational leadership. Most leadership models, which include transactional leadership, concentrate on the exchanges between leaders and their followers. Transactional leadership refers to leadership styles in which followers are rewarded by leaders for meeting specific goals or performance criteria [63]. Marcin [81] stated that transactional leadership styles depend on mutual transaction between leader-follower relationships whereby followers will be rewarded when they perform their duties efficiently and they will face punishment when they do not perform their duties [81]. This leadership is also recognised as managerial leadership because the center of attention of this leadership style is on the responsibility of administration, organisation and group performance. According to the study [82], transactional leadership consists of three basic elements. The first element is contingent reward that describes the extent to which effective transaction and exchange is set up between leader and followers. The second element is management by exception and there are active and passive management. A leader who adopts active management monitors employees' work performance closely to prevent and solve a problem throughout the process, while a leader who adopts passive management only fixes a problem after it occurs [83]. Lastly, the third element is the absence or avoidance of any leadership behaviour whereby a leader is never around in an organizational environment when needed, always postpones problems and avoids making decisions.

Unlike transactional leadership, transformational leadership is the process through which a leader interacts with followers and forges a bond that increases both level of drive and morals. Sultana et al. [84] stated that a transformational leader must have the ability to purify ethics, trust and requirements of followers into a vision and then guide them to pursue that vision [84]. This kind of leader strives to assist followers in realizing their greatest potential while paying close attention to their needs and motivations [45]. The transformational leadership style can be classified into four categories, namely idealized influence (charisma), inspirational motivation, intellectual stimulation and individual consideration [82, 85].

3.2 Domino theory

Heinrich has introduced another concept of accident causation in 1941 through the Domino Theory [64]. The Domino theory was established through the study of accident cost and safety efficiency impact. He discovered management

role as an approach for accident prevention. He used the metaphor of domino blocks to represent the chain of element that contributes accident occurrence. The domino blocks start from social environment and ancestry, faults of a person, unsafe act or condition, accident and injury respectively. These elements are believed to be connected through a cycle. Thus, when one element is removed from a cycle, the entire process will stop [65]. The removal of either element will nullify the accident chain reaction through the concept of Domino model. The central point of the Domino theory is unsafe act or unsafe condition that includes errors and technical failure which cause an accident. Heinrich [86] stated that this element is the most significant factor that causes an accident, so lifting up this domino block is the easiest and the most efficient option in order to prevent an accident. Therefore, his philosophy of accident prevention focused on eliminating unsafe acts and people-related factors that lead to injuries [87]. Based on this theory, present research proposed that safety behavior would significantly influence safety performance of organisations in terms of accidents, injuries, property damages and equipment failures.

4. METHOD

4.1 Research framework and development of hypotheses

This study adapted the research framework from Christian et al. [41] as per depicted in Figure 1. With safety performance

(safety compliance and safety participation) serving as the mediating variable and safety outcome (accidents/injuries) serving as the dependent variable, the previous researcher categorized transformational leadership as one of the distal situation-related factors. In this study, the variables were adapted to safety compliance and safety participation which measured safety behaviour construct [48, 88], whereas safety outcome was adapted as safety performance construct [89].

Christian et al. [41] outlined the debatable issues on safety performance. Different studies described safety performance by different contexts. Some studies described safety performance as safety behaviour of a person [90-93]. On the other hand, there were also some studies which viewed safety performance in terms of safety outcomes [89]. By assessing both safety performance variables, the debatable issues on safety performance can be clarified and the connection between safety behaviour and safety outcome can be known.

On the other hand, most studies have assessed the correlation between transformational leadership and safety behaviour in a single context [90-93]. However, the study [41] stressed the importance of combining both elements of safety performance, namely safety behaviour and safety outcome in one facet as they may have different impact on its antecedence. Besides, safety behaviour is chosen as the mediating component as it is classified as a proximal variable in terms of psychological factors.

This research developed its framework based on related theories and previous literature. The framework is shown in Figure 2.

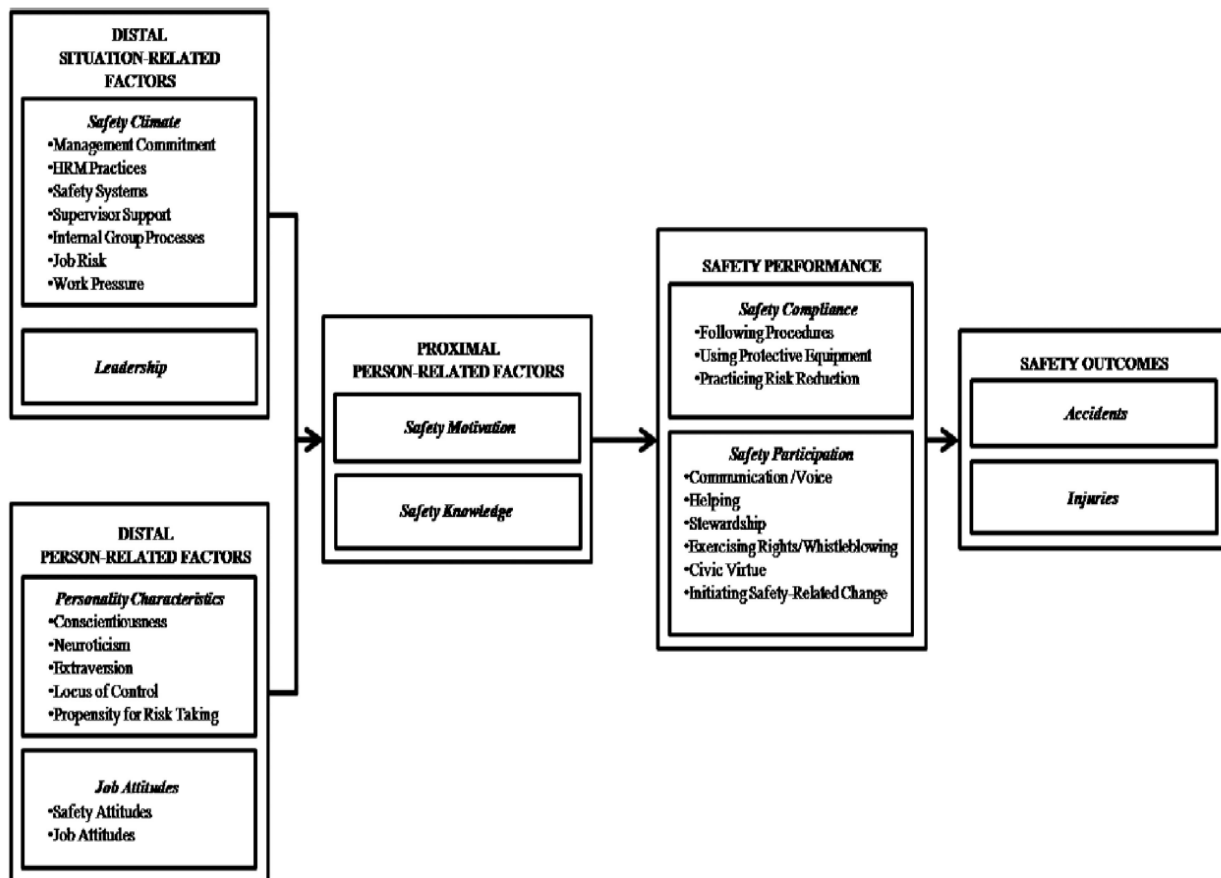


Figure 1. Safety performance integrated model [71]

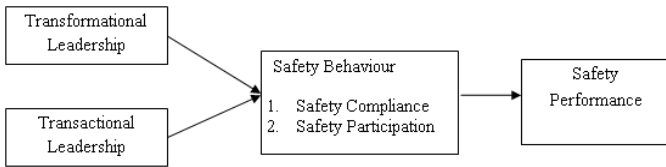


Figure 2. Framework of the research

Consequently, the research hypotheses were developed as follows:

H₁: SMEs workers' safety behaviour has a significant effect on organisational safety performance.

H₂: The transformational leadership of supervisors has significantly affected the safety performance of SMEs as mediated by safety behaviour.

H₃: The transactional leadership of supervisors has significantly affected the safety performance of SMEs as mediated by safety behaviour.

4.2 Sampling method and sample size

This study included 107 human resource personnel within small and medium manufacturing firms in the states of Penang, Perlis and Kedah, who play a vital role in occupational safety and health. The sample size was determined using the G*Power 3.1.9.7 tool and the minimum total size calculated was 107 firms. Figure 3 shows the sample size computation in detail.

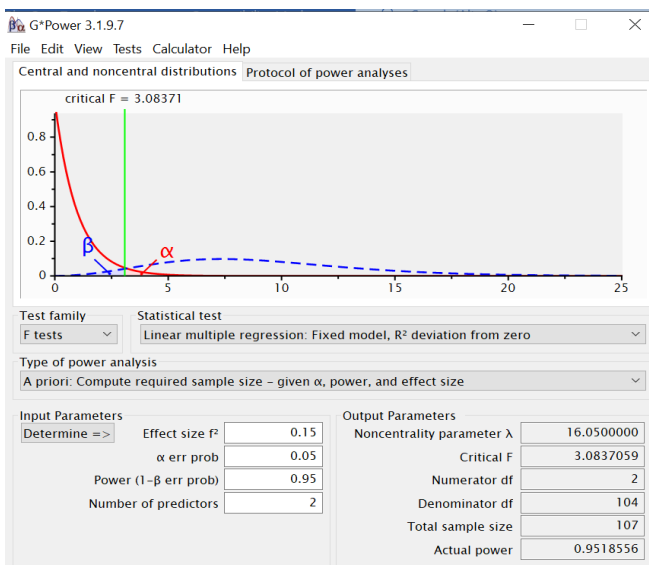


Figure 3. Output of power analysis using G*power

4.3 Study instrument

The two independent variables in this study were transformational leadership and transactional leadership. The two dimensions that described the mediating variable, which was safety behaviour, were safety compliance and safety participation. Furthermore, safety performance was identified as the independent variable in this study.

The researcher adapted measurement from previous studies. The items were adjusted and modified to meet the study settings. Then, several amendments and modifications were made towards the measurement items, and the experts from related field reviewed them for accuracy and appropriateness. The current instruments were translated into Malay Language

to enhance respondents' comprehension. Subsequently, prior to the actual data collection, a pre-test was performed to verify reliability and (face and content) validity of the instrument.

The details of research instrument are summarised in Table 1. A seven-point Likert scale for all items with 1= extremely disagree to 7 = extremely agree was applied for the measurement instrument.

Table 1. Research instrument's breakdown

Items	Name of Variables	Number of Items	Source
1	Safety Performance (SPM)	4	Lu and Shang [89]
2	Safety Behaviour	3- Safety Compliance (SC) 3-Safety Participation (SP)	Neal and Griffin [30]
3	Transformational Leadership (TF)	8	Sawhney et al. [94]
4	Transactional Leadership (TC)	8	Sawhney et al. [94]

5. RESULT

This paper assessed measurement models to determine the reliability and (discriminant and convergent) validity of the framework. Furthermore, the structural model assessment was employed to analyze the structural framework and examine the hypotheses.

5.1 Assessment of measurement model

Indicator loadings measurement, internal consistency reliability via Cronbach's alpha and composite reliability (CR), convergent validity evaluated via average variance extracted (AVE), and discriminant validity demonstrated by Fornell-Larcker Criterion and Heterotrait-Monotrait Ratio (HTMT) values are four steps of assessing a reflective measurement model [72]. These steps were applied in this research.

Based on the results presented in Table 2, majority of the loading values exceeded the recommended values (0.70). Subsequently, all CR values were above the cut-off value, which was 0.70 [95]. Additionally, all AVE values were acceptable because they were greater than 0.5 [96, 97].

In contrast to the standards provided by Fornell-Larcker, HTMT was preferred to be employed [96]. The HTMT values for conceptually equivalent constructs should be less than 0.9. According to the results tabulated in Table 3, the differentiated values were all less than 0.85 in this research. Hence, the outcome proved that each construct distinguished itself from others.

Table 2. Results of measurement model (convergent validity)

Variable	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
SC	0.923	0.951	0.867
SP	0.899	0.937	0.831
SPM	0.933	0.952	0.832
TC	0.897	0.914	0.575
TF	0.938	0.948	0.697

Table 3. Discriminant validity (Heterotrait-Monotrait Ratio: HTMT)

	SC	SP	SPM	TC	TL
SC					
SP	0.732				
SPM	0.654	0.631			
TC	0.449	0.610	0.541		
TF	0.605	0.678	0.547	0.552	

5.2 Assessment for structural model

In assessing the structural model of this research, bootstrapping (5000 re-sampled) was conducted [96]. First, Variance Inflation Factor (VIF) values were determined to discover multicollinearity of each variable. The VIF value should be lower than 5 to indicate that multicollinearity did not exist. The VIF's results for this research are depicted in Table 4.

Table 4. VIF

	SC	SP	SPM	TC	TL
SC			1.806		
SP			1.806		
SPM					
TC	1.446	1.446			
TF	1.446	1.446			

Based on the results of VIF, all values were far below than 0.5, indicating the inexistence of multicollinearity.

Furthermore, hypotheses were tested and the results are presented in Table 5.

Bootstrapping analysis (5,000 re-sample) revealed that safety compliance and safety participation of safety behaviour greatly influenced safety performance in a direct manner. ($\beta=0.40, p<0.05$ and $\beta=0.31, p<0.05$).

Table 5. Path co-efficient

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	Results
H ₁	SC -> SPM	0.403	0.101	3.983	Supported
H ₂	SP -> SPM	0.309	0.103	3.005	Supported
H ₃	TC -> SC -> SPM	0.123	0.059	2.092	Supported
H ₄	TF -> SC -> SPM	0.155	0.053	2.923	Supported
H ₅	TC -> SP -> SPM	0.141	0.053	2.686	Supported
H ₆	TF -> SP -> SPM	0.106	0.046	2.291	Supported

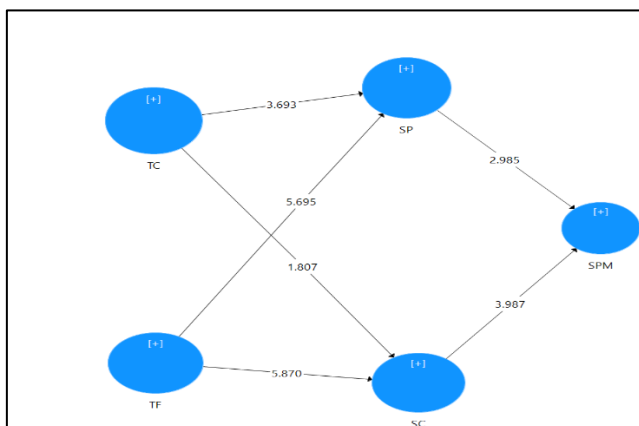


Figure 4. Results of structural model

Furthermore, safety behaviour in terms of safety compliance and safety participation mediated the relationship between transformational leadership and safety performance ($\beta=0.16, p<0.05$ and $\beta=0.11, p<0.05$).

Similarly, both dimensions of safety behaviour mediated the effect of transactional leadership on safety performance ($\beta=0.12, p<0.05$ and $\beta=0.14, p<0.05$).

Subsequently, R^2 values were determined. According to the general criteria established [95], endogenous constructs with R^2 values of 0.75, 0.50, or 0.25 can be classified as considerable, moderate or weak respectively. Ramayah et al. [98] affirmed that the effect of the relationship for PLS-SEM is weak, moderate or strong when R^2 values are 0.02, 0.13 or 0.26 respectively. By considering the aforementioned facts, Table 6 summarises the R^2 values.

According to Cohen [99], f^2 values can be used by researchers to distinguish the relative impact of a predictor construct towards a dependent variable of a construct. Basically, the f^2 value of 0.35 and larger is considered large, whereby 0.02 and less is considered small effect size. Moreover, all the f^2 values between 0.02 and 0.35 are considered medium effect size [73, 74, 100]. Based on the results tabulated in Table 7, all f^2 values were between 0.02 and 0.35. Transformational leadership had larger effect size towards safety compliance and safety participation compared to transactional leadership. Safety compliance had a larger effect size on safety performance compared to safety participation. The path-coefficient results were also illustrated in Figure 4.

Furthermore, PLS predict was conducted to determine the case-level prediction on a construct level [75]. The outcomes of the PLS predict analysis are shown in Table 8. According to the findings, the predictive importance of the construct was indicated by the Q^2 value that was greater than 0. Additionally, majority of the PLS RMSE values were lower than LM RMSE values, indicating a high level of predictability for the construct.

Table 6. R^2 values

	R^2	Results
SC	0.386	Strong
SP	0.523	Strong
SPM	0.425	Strong

Table 7. f^2 values (effect size)

	SC	SP	SPM	TC	TL
SC			0.156		
SP			0.091		
SPM					
TC	0.092	0.267			
TF	0.145	0.150			

Table 8. The results of PLSPredict

PLS RMSE(PLS)	LM RMSE(LM)	PLS >LM?
0.688	0.777	Yes
0.759	0.803	Yes
0.680	0.744	Yes
0.650	0.733	Yes
0.696	0.780	Yes
0.629	0.697	Yes
0.688	0.675	No
0.708	0.744	Yes
0.688	0.706	Yes
0.782	0.823	Yes

6. DISCUSSION

The results of this study supported theories related to accident causations whereby both safety behaviour dimensions had a significant effect on safety performance, which was measured by accidents, injuries, equipment failures and property losses. The results, which indicated that 42.5% of safety performance was explained by safety compliance and safety participation, could offer empirical evidence in which 57.5% of safety performance were also explained by other variables.

The significant role of leadership on safety compliance and safety participation also provided a better understanding towards leadership-behaviour theories that were established by previous scholars. From the results of this study, it could be observed that transformational leadership plays a significant role in influencing safety behaviour and improving safety performance.

In this study, the structural model was proved for the indirect effect of transformational leadership on safety compliance, safety participation and safety performance. Meanwhile, the mediating role of safety participation appeared to be significant towards the effect of transactional leadership on safety performance, which supported the Integrated Safety Management Model [41]. This study further expanded on previous studies which determined the relationship between transformational and transactional safety leadership and safety behaviour dimensions. Based on the results, it could be found that incorporating transformational leadership among supervisors in SMEs would improve their workers' safety behaviour [33, 34, 101]. In light of these facts, this study proposed a method to build transformational leadership within SME supervisors as a way to enhance their safety performance.

Prior studies also highlighted that the transformational elements of safety leadership have a considerable impact on safety performance which is measured by accidents, injuries, property damages and production loss [32, 59]. Hence, this paper improved those studies by inserting the connection between transformational and transactional leadership and determining the mediating effect of safety behaviour towards safety performance.

7. THEORETICAL AND MANAGERIAL IMPLICATIONS

This study offered actual data on the considerable impact of safety behaviour on safety performance, which was found to be inadequate in the context of Malaysian SMEs [77].

Furthermore, this paper could serve as a reference regarding the mediating roles of safety behaviour dimensions in the relationship between transformational/transactional leadership and safety performance which has not yet been researched [80]. Besides offering a valid and reliable research instrument for researchers in the context of SME, this paper also contributed to the body of knowledge by establishing a predictive framework that could be utilised by future researchers.

On the other hand, the findings of the present study have several managerial implications. The present study has important implications for SME business owners and managers seeking to improve safety performance within their organizations. Specifically, the study suggests that supervisors' leadership roles can be leveraged to promote safety behavior among employees and enhance safety performance. Despite the financial and resource-related obstacles faced by SMEs, supervisors' leadership responsibilities can serve as valuable internal resources for improving safety outcomes. By understanding the effect of leadership on safety behavior, SME employers can develop effective strategies for enhancing safety performance and reducing injuries and accidents. Moreover, by prioritizing supervisors' leadership roles in promoting safety behavior, SMEs can create a culture of safety that benefits the organization as a whole. Overall, this study underscores the importance of leadership in promoting safety behavior and offers practical guidance for SME business owners and managers seeking to enhance safety performance within their organizations. Despite facing obstacles which must be overcome by SMEs, especially in terms of their financial stability and other resources [102-104], the crucial leadership responsibilities of supervisors should be maximised as internal resources in order to enhance safety performance within SME manufacturing companies through influencing workers' safety behaviour. By understanding the effect of leadership towards safety behaviour, SME employers can develop effective strategies to enhance safety performance of their organizations, specifically in decreasing injuries and accidents.

8. CONCLUSION

Accidents impose detrimental financial and non-financial implications on organisations, including lost productivity, property damage and equipment failures. Scholars in occupational safety and health area have concluded that accidents in workplaces are mainly caused by safety behaviour. Previous studies in Malaysia found the influence of transformational and transactional element of safety leaderships towards safety behaviour of workers as well as organisational safety performance in separate manner. Whereas, the findings of the present study demonstrate that supervisors' transformational and transactional leadership styles significantly influence workers' safety behavior dimensions, including safety compliance and safety participation. Furthermore, the study also revealed that these leadership styles have a mediating effect on organizational safety performance. In other words, supervisors who exhibit transformational and transactional leadership styles are likely to foster a culture of safety among workers, resulting in improved safety compliance and participation. This, in turn, leads to better organizational safety performance. These

findings have important implications for organizations seeking to improve their safety culture and performance, as they highlight the critical role that leadership plays in promoting workplace safety. On the other hand, the introduced model, which highlights the mediating role of safety behavior towards the effect of safety leadership and performance - that has been limitedly explored in previous studies - has high predictive power in the context of Malaysia's SMEs in the manufacturing industry. Through the highly predictive model, instilling safety leadership among supervisors, SME manufacturing firms will be able to improve their safety behaviour and increase their organisational safety performance.

ACKNOWLEDGMENT

The authors were grateful to the anonymous referees of the journal for their extremely useful suggestions in improving the quality of the article. Usual disclaimers apply.

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