Safety Culture

Safety culture is considered to be the result of personal and collective attitudes, beliefs, and behaviour patterns, and it determines the commitment, willingness, style, and ability of organizations to manage health and safety issues.

1. Introduction

Transportation is one of the most important areas in many sectors. In the transportation industry, fatigue in truck drivers is generally identified as the main safety issue because it has consistently been linked to road crashes [1][2][3][4][5][6]. A transportation department study from the United States reported that three independent studies identified lack of alertness or driving fatigue as one of the main reasons for serious accidents [3]. Fatigue has been linked to 10–20% of road accidents [7][8][9][10][11]. Furthermore, another truck driver study showed that 19% of tractor-trailer drivers have confirmed falling asleep at the wheel once or more in the month [12]. The association between rates of road accidents and fatigue is well documented [13]. Perceptions of what constitutes a safe environment may be different from person to person, for instance the perceptions of the safety directors may differ from those of the dispatchers. These perceptual differences may represent a tendency to disconnect from negative results and connect to positive results, depending on the self-serving motivations and bias of the individual [14]. In fact, there is evidence to show that people explain and interpret their safety environments according to their beliefs, the perceived importance of events, and the impact of particular issues on their well-being [15]. Therefore, there is a need for the implementation of a safety culture that prevents accidents, efficiently saves resources, and mitigates losses [16].

In many countries, safety culture in the oil and gas industry is fundamentally competitive because it is one of the global requirements for sustainable growth. The association between strong safety culture and the occurrence and seriousness of accidents has long been recognized in various industrial environments [17][18]. Moreover, the literature review on safety culture has identified several management practices, i.e., beliefs and values, which underline the relevance of health and safety and could contribute to a strong safety culture [19]. In many manufacturing environments, the existence of a solid safety culture has produced a positive effect on safety consequences [20][21]. Perceptions of health and safety in workplace conditions have been linked to variables of incidents, such as near accidents, accident rates, and anxiety [22]. In addition, the safety expectations of the workers could be affected by their compliance with safety practices [22][23].

Previous studies in the Malaysian oil and gas transportation sector have examined the effects of exhaustion-related psychological risk factors [24], psychological well-being and fatigue [25][26], perceived stress [27], and driving fatigue [4][28]. Although these factors are important, the impact of safety culture on driving performance has been neglected. Currently, there is an urgent need to address the low performance of Malaysian oil and gas tanker drivers, which is caused by a lack of safety culture. There is a lack of evidence for the ways in which safety culture affects driving performance in the context of oil and gas transportation, especially in Malaysia [4].

2. Impact of Safety Culture on Driving Performance

2.1. Safety Culture

Safety culture has been an interesting subject worldwide for both scientists and researchers because it is responsible for many organizational accidents and disasters [29]. Safety culture plays a crucial role in assessing the success or failure of an organization [30]. The term safety culture was coined as a result of the Chernobyl disaster in 1986 [31]. Safety culture refers to the extent to which individuals and organizations are committed to taking personal responsibility for safety, act to recognize and communicate safety concerns, adapt and modify behaviour based on lessons learned from previous mistakes, and how they are rewarded in line with these values [32]. According to Choudhry [29], safety culture can be

defined as the outcome of the attitudes, values, competencies, and behavioural habits of the individuals and the groups that represent the organization's commitment to effective health and safety programs.

Using social cognitive theory, Bandura [33] attempted to understand the principle of safety culture as mutual determinism and derived three elements: behaviour, the individual, and the environment. Geller [34] adopted Bandura [33] and has been working to define the characteristics of each part, which has led to the development of a Total Safety Culture model. Choudhry et al. (2007) likewise adopted and developed Bandura (1986), and asserted by his modern paradigm that safety culture is a substance focused on interactions between individuals, workplaces, and organizations.

In summary, the literature revealed that safety culture is a term that has been tested outside the context of the Malaysian oil and gas sector, for instance, in construction companies, [35][36][37][38], vocational colleges [39], the manufacturing industry [30][40], and health care organizations [41]. Further attention is required to examine the safety culture in oil and gas transportation companies. This effort will enrich the understanding of safety culture in the oil and gas transportation context.

2.2. Driving Performance

Driving performance refers to a driver's effectiveness in accomplishing driving duty, which can be measured by studying driver vigilance, driver reaction time, and attention to duties [42][43][44]. In general, performance is the accomplishment of a specific job measured against recognized precision, completeness, speed, and cost. In a contract, performance is deemed to be the fulfilment of an obligation [45]. Driving performance involves attention [46] (which must often be split between driving duties such as maintenance of the lane position), speed, and other tasks, such as those which deal with dashboard instruments. The growing number of "technological" automotive distractions (e.g., smartphones, GPS, and entertainment systems) competing for driver attention is particularly worrying. Such distractions have been one of the primary causes of performance deficiency [47][48].

Previous research in the last decade has indicated that driving performance is influenced by several factors. These include driving for prolonged periods, monotonous environments [49][50][51], personality traits, age, executive functions [52], foggy conditions [53], drowsiness [54], a loss of focus [55], mental workload, the demand of the task [56][57], speed [53], and driver distractions, such as alcohol and energy drinks, eating, texting, loud music, mobile phone and smartwatch use, and caffeine [46][58][59][60][61][62][63]. Although the above studies focused on many important factors that influence driving performance, to date, the effect of safety culture on driving performance has not yet been empirically investigated.

2.3. Safety Culture and Driving Performance

In the transportation sector, safety measures are crucial and there is an ever-increasing demand for safe environments. Previous studies have discussed transport safety, including safety performance and safety cultures. Rigid safety requirements may create issues for tight scheduling requirements [64][65][66][67][68]. Moreover, these activities often lead to physical and mental fatigue, which lead to deteriorating levels of performance and safety [69]. Another study demonstrated that human accidents are caused by poor safety culture and other associated factors [70]. The safety of a journey relies mainly on the performance of the driver. The driver is the leading human operating a car, and in this specific situation, the car is considered the machine. The duties of the driver are very challenging because they must satisfy the many different demands and requests of a job [71]. They must also retain their driving skills, particularly in instances when the vehicle in question is a train or a commercial truck, and be attentive and environmentally friendly during monotonous journeys [72] [73]. Both simulated and real case studies have demonstrated the connection between safety culture and impaired performance [69][74], medical and health services [67], manufacturing [75], vehicle driving [49], train driving [76][77], and oil and gas upstream operation [78].

In summary, previous studies have proven that there is empirical evidence for the relationship between safety culture and employee performance [65][66][74][79], medical and health services [67], manufacturing [75], operating nuclear power [64], vehicle driving [49][69], the rail industry [70][71][72][73][76][77], and oil and gas upstream operation [78][80]. However, the literature of previous studies shows that there is a lack of evidence for the relationship between safety culture and driving performance in the oil and gas transportation context, especially in Malaysia. Therefore, we proposed a hypothesis as below:

Hypothesis 1. *safety culture has a significant impact on the driving performance of oil and gas tanker drivers*.

3. Conclusions

Safety culture is highly important in many industries and, as in many other industries, the oil and gas transportation sector has experienced road accidents due to poor driver performance. Safety culture should be adopted in order to reduce this. The PLS-SEM technique has been utilized to examine the impact of safety culture on driving performance. Based on the data obtained from the oil and gas transportation sector in Malaysia, a direct path has been validated in the developed model. Moreover, the direct path between variables has been identified through the examination of the relationship between variables. The outcomes agree that the adoption of a safety culture can enhance the performance of drivers and can contribute to reducing the possibilities of road accidents.

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