Causal Relationship Model of Factors Influencing Safety Behavior among Thai Flight Crew in Thailand

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Abstract

Purpose: A survey of the literature reveals that several past studies reveal that safety climate generally plays an important role in affecting safety-related behaviors in various safety-related contexts; nevertheless, relatively few studies have considered how safety climate could influence safety behaviors among flight crew. Research design, data and methodology: This study aims to contribute to the safety literature by investigating the impact of fleet safety climate on pilots' safety behaviors and to investigate the mediating roles of safety knowledge and attitudinal pride. Results: Based on a sample of 610 Thai commercial pilots in Thailand, the mediation structural equation modeling analysis affirmed that fleet safety climate had a positive significant effect on Thai pilots' safety behaviors, which are safety participation and safety compliance via an increase in their safety knowledge and attitudinal pride. Conclusions: Airlines can use the results from this study to establish and implement fleet-wide safety policies to reduce aviation risks at work. Future studies should apply multi-level analysis or qualitative method for deeper results.

Keywords: Aviation, Attitudinal Pride, Safety Behavior, Safety Climate, Safety Knowledge

JEL Classification Code: M50, M53, M54

1. Introduction

Safety has always been regarded as the ultimate goal in aviation. Even though, there are many related parties that help promote aviation safety such as cabin crew, flight engineer, mechanic, ground crew or air traffic controller, pilots are directly responsible for the safety of the entire flight operations (Durlak & Wells, 1997). Unfortunately, past studies indicate that air accidents are often caused by human errors (Helmreich, 1997; Wiegmann & Shappell, 2001). Indeed, it has been suggested that pilots are the primary cause of aviation accidents (DaRBy, 2006). According to Boeing (2020), between 1959 and 2019, there were a total of 637 fatal aviation accidents, the most of which were caused by human error, including those related to abnormal runway contact (ARC), controlled flight into terrain (CFIT) or loss of control inflight (LOC-I). Air accident causes vast loss of life and assets. It is therefore essential to gain more understanding about factors affecting pilots' safety behaviors and what could help enhance their safety performance.

While past research indicates that several individual, team and organizational factors are associated with an increase in safety behaviors (Crichton, 2017; Curcuruto & Griffin, 2018; Gao et al., 2016; Makary et al., 2006), this study emphasizes on the role of safety climate (Hofmann et al., 2003; Kapp, 2012; Quach et al., 2021). In particular, this study draws attention to the role of fleet safety climate (Brondino et al., 2012). In aviation contexts, fleets can be considered as work groups in the same way they are in other settings. Pilots flying in the same fleets of aircrafts generally receive the same training and operate by the same safety procedures. Pilots working within the same fleets also share work-related information with their peers and their behaviors could be influenced by the social norms. This could result in a unique molding and development of safety behaviors that differ from other fleets.

To explain the positive influence of fleet safety climate, the mediating roles of safety knowledge and attitudinal pride are examined (Goudarzi et al., 2011; Helm, 2013; Nigli & Joseph, 2017; Nouri et al., 2017; Zohar, 2000). On the contrary, safety knowledge can be instilled in pilots through a social learning process (Bandura, 1977). That is to say, through a strong safety climate within units, it is anticipated that pilots will be exposed to a higher level of safety emphasis within the socializing process of the work environment that informs their knowledge and how they should behave. On the other hand, from a social exchange perspective (Blau, 1964), it is possible that solid safety climate could drive a sense of organizational pride among flight crew, leading to their increased commitment to safety at work (Kraemer & Gouthier, 2014). Therefore, the question of this study is that how does fleet safety climate affect pilots' safety behaviors via safety knowledge and attitudinal pride?

Objectives of this study are to examine the causal relationship of safety climate and behaviors and examine mediation roles of safety knowledge and attitudinal pride. This study contributes to safety literature in several respects. First. although previous research has already revealed the role of group safety climate in other important work contexts (Lee, Huang, Sinclair, & Cheung, 2019), the significance of aviation fleets has not yet been rigorously studied in aviation context research. Apart from the influence of top organizational leaders via organizational safety climate (Shen et al., 2017; Walumbwa & Schaubroeck, 2009), fleets can present an important work context in which pilots' work-related behaviors are formed. Secondly, relatively few studies have examined how and why safety climate can have a virtuous influence on workers' safety-related behaviors. While previous research has already examined the mediating role of safety knowledge (Griffin & Neal, 2000; Guo, Yiu, & González, 2016), only a few previous studies have investigated how attitudinal pride may provide an additional explanation for the influence of safety climate.

2. Literature Review

2.1. Fleet Safety Climate and Safety Behaviors

The main emphasis of this study on how safety behaviors among Thai pilots can be further improved. According to past studies, safety behaviors can generally be divided into two specific dimensions, namely, safety compliance and safety participation. Safety participation is defined as the extent to which individuals are willing to participate in safety-related activities while safety compliance refers to the extent to which individuals willingly comply with safety procedures and regulations at work (Lu et al., 2017; Neal & Griffin, 2002). Similarly to organizational citizenship behaviors, safety participation includes such behaviors as participating in safety-related activities at work that are not formally required but are encouraged seeing that they are important to effective functioning of the organization (Daily et al., 2009). This may include joining safety promotional campaign activities and participating in safety-related events (Chmiel et al., 2017; Dahl & Olsen, 2013; Subramaniam et al., 2016). As for safety compliance, it can be considered as task-related behaviors that are formally specified in one's job descriptions (Didla et al., 2009) and are often monitored via the work-related assignment of key performance indicators. Examples of formally required safety behaviors in aviation contexts include following specific flight procedures and adhering to strict aviation checklists (Chen & Chen, 2014; Tjosvold, 1990).

Recent research in China has shown that more conscientious workers possess more positive attitudes towards questioning about unsafe acts, which in turn leads to more safety behaviors at work (Tao et al., 2021). Although research on the influence of these individual-level factors can have significant implications for recruitment and selection processes, this study argues that they are relatively difficult for the organization to manipulate. This study focuses on the role of safety climate, which falls under a direct manipulation of the organization. Safety climate is an environmental factor that can emerge at both the group and organizational levels (Newaz et al., 2019; Yari et al., 2019). Organizational safety climate refers to the company's overall emphasis on safety environment at work (DeJoy et al., 2010), whereas group-level safety climate provides a proximal interpersonal and professional settings for employees in several work group (Kapp, 2012; Navarro et al., 2013; Zohar, 2000). While past research has generally indicated that different levels of safety climates can lead to more desirable safety behaviors (Agnew et al., 2013; Morgeson et al., 2014; Oah et al., 2018), the focus of this research, in aviation context, is on safety climate at the group level, or fleet safety climate, which refers to the shared perceptions regarding safety requirements and norms among pilots within the same fleet of aircrafts (KAPP, 2012).

In particular, fleet safety climate can significantly manipulate pilots' safe behaviors as fleets represent their most close proximal social contexts at work. Pilots within the same fleets are trained to operate the same type of aircrafts that they are assigned to fly. They are also trained to follow the same standard operating procedures (SOPs) and depend upon the same technical knowledge. For example, a pilot operating a turbo prop aircraft like Q400 or any Short Take-off and Landing aircraft (STOL) has to be properly informed that such aircrafts can hardly handle cross-wind landings owing to its aerodynamic performance limitations while a jet aircraft like Boeing 737 can better handle cross-wind or even downwind landings due to better engine performance (Riebe, 1973). These technicality and complications require different training time and safety protocols. Over time, the emphasis on this safety-related practices can probably give rise to the emergence of safety norms that can affect pilots' flight behaviors. Therefore, it is possible to assume that different fleets of aircraft will have significantly different safety requirement levels (Zohar & Luria, 2010).

In this matter, past research indicates that safety climate can lead to several positive safety-related outcomes. For example, group safety climate can reduce risk perceptions among manufacturing workers in South Korea (Oah et al., 2018). In another context, group safety climate can predict safety performance among workers in mega-construction projects in Australia by improving their psychological contract perceptions (Newaz et al., 2019). Additionally, in a notable longitudinal study, group safety climate can promote safer driving behaviors among truckers, which in turn leads to a favorable reduction in future lost days due to injury (J. Lee et al., 2019). Despite these interesting findings, there are few studies that have examined the psychological mechanisms that underlie the influence of group safety climate. Below, there will be discussions on how and why fleet safety climate may exert its positive influence on pilot' safety behaviors.

2.2. The Mediating Role of Safety Knowledge and Attitudinal Pride

Safety knowledge is defined as an ability to know and recognize issues regarding the importance of safety in work process (Guo et al., 2016). In aviation, safety knowledge could play an important role in an unforeseen event such as in-flight engine failure, adverse weather conditions or terrorist threats. Pilots with safety knowledge will be able to recall what they have learned and act according to rectify the situations. The way flight crews react to adversity and determine the suitable choice is crucial to safe flight operations (You et al., 2013). Safety decision-making especially during undesirable situations can be recalled rapidly when one possesses proper safety knowledge (Ji et al., 2017). This is comparable to System 1 thinking, which is an unconscious mechanism that allows one's knowledge to be retrieved quickly when needed (Milkman et al., 2009). Apart from the technical knowledge and flying skills gained directly through flight school, pilots' learning will continue to expand once they join an airline. In particular, according to social learning theory, this study proposes that fleets provide an essential social context that shapes individuals' knowledge and shapes their behaviors as time goes by (Bandura, 1977). First, we argue that informal learning constantly takes place at the fleet level through a socialization process. Pilots socialize and share work-related information with peers in the same fleets. For example, in the event of engine failure inflight, operating a Boeing B747 may require different engine restart procedure due to different number of engines compared to Airbus A320 and B747 pilots can share this information among peers within their fleet. Secondly, we propose that pilots will try to emulate the behaviors of their peers to ensure that their behaviors is consistent with the fleet's accepted norms.

Attitudinal pride refers to the pleasure taken in being associated with employer (Helm, 2013, p. 544). Such pride is said to emerge when one is given information to help evaluate organizational membership in a positive way (Ng, Yam, & Aguinis, 2019). According to social exchange theory, it posits that when a party receives a positive treatment from another, they will feel obligated to reciprocate positive behaviors (Blau, 1964). In the organizational context, such behaviors may include showing a strong commitment to organizational missions and devoting a significant amount of their resource to achieve work goals (Best & Kahn, 1993). Attitudinal pride can be considered as a type of positive attitude that reflects individuals' gratitude toward the organization (Gouthier & Rhein, 2011). In particular, this study posits that fleet safety climate can induce feelings of pride among pilots, which will in turn lead to safer work behaviors. There could be several reasons for this phenomenon. Firstly, in aviation contexts, fleet safety climate can be considered as a reflection of the overall emphasis among pilots on passenger safety. When safety of passengers is regarded as the ultimate goal of work units, it is likely that pilots will take greater pride in their jobs and be proud to work for their airline, such that they will take their work more seriously and professionally (Borst & Lako, 2017; Kraemer et al., 2017). Secondly, the emphasis on safety could also be considered as the employer's obligation to maintain safety standards to ensure the pilots' safety, which could in turn prompt the latter to feel grateful for the employer's concerns for their safety and to engage in more positive behaviors (Newaz et al., 2019). Thirdly, when pilots fly safely, passengers and other stakeholders will likely appreciate not only the pilots who fly the aircrafts but also the airlines that employ them. Such appreciation may further amplify feelings of pride and safety performance among pilots.

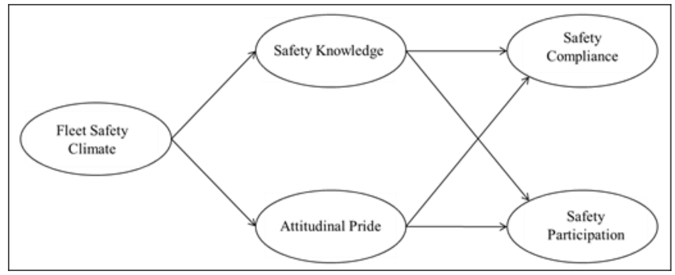
Empirically, safety knowledge has been shown to be an important mediating psychological mechanism in the relationship between safety climate and safety behaviors (Shen et al., 2017). This work seeks to ensure such findings in the pilot contexts. Apart from this, there is no direct empirical evidence regarding the influence of attitudinal pride on workers safety-related behaviors; however, past studies has shown that attitudinal pride is related to several work-related attitudes such as job satisfaction (Helm, 2013) and also task performance (Seyedpour et al., 2020). Based on these reasons, theoretical model has been developed, which is portrayed in Figure 1 and this study also hypothesizes that:

Hypothesis 1: Safety knowledge play mediation role in the relationship between fleet safety climate and pilots' safety behaviors.

Hypothesis 2: Attitudinal pride play mediation role in the relationship between fleet safety climate and pilots' safety behaviors.

Hypothesis 3: There is a significant relationship between fleet safety climate and safety compliance and safety participation, whereas safety knowledge and attitudinal pride are accounted for mediations.

Figure 1 Conceptual model developed by authors' literature review and hypotheses



3. Methodology

3.1. Overview of Sample and Data Collection

Research hypotheses were tested by using a sample of commercial pilots in Thailand. This is an essential sample for investigating air safety because several aviation-related accidents in Thailand are said to be related human error (Charoensook, 2018; K.-S. Lee, 2009). Samples were drawn from both airplane in commercial airlines as well as helicopter in offshore transportation (IFR) and general aviation (VFR) industries totaling in seven air carriers in Thailand. Inclusion criteria is that samples will be only derived from Thai pilots regardless of aircraft types. Apart from this will be excluded from the sample selection. Currently, according to the data from Civil Aviation Authority of Thailand, there are 9,209 active civilian pilots in Thailand. 6,048 pilots hold commercial pilot license and 3,161 pilots hold air transport pilot license. After being allowed access from each of the airline companies' HR departments, self-administrated questionnaire surveys with rating scale were sent to the pilots through each company intra email system. Data collection started from January to March 2021. Surveys questionnaires with rating scale was divided into 6 parts including fleet safety climate, attitudinal pride, safety knowledge, safety participation, safety compliance and demographic data. Advantages of using email-based surveys are that the anonymity of the respondents could be confirmed and surveys can be directly sent to target samples. Seven hundred surveys were sent out. In total, six hundred and ten responses were completely returned. This specific sample size was considered a priori by considering the suitable sample size for analyzing structural equation modelling (SEM) as the minimum acceptable sample size for an analysis should be at least 200 or about 8-15 cases per manifest indicator, whichever is larger (Kline, 2015).

The original rating scales were developed in English and they were all translated into the Thai. A complete list of items and their measurement properties are presented in Table 2. Fleet Safety Climate ($\alpha = 0.95$) was measured using the 3-item scale adapted from the study by Neal and Griffin (2006). Attitudinal pride ($\alpha = 0.95$) was measured using the 3-item scale developed by Gouthier & Rhein (2011). Safety Knowledge ($\alpha = 0.92$) was measured using the 3-item scale developed by Guo (2016). Safety Participation ($\alpha = 0.92$) was measured using the 7-item scale developed by Lu (2017). Safety Compliance ($\alpha = 0.94$) was measured using the 3-item scale developed by Neal and Griffin (2006). All rating scales were based on a 5-point Likert type format (1 = strongly disagree, 5 = strongly agree). Hypotheses were tested by using structural equation modeling in R (Team, 2014). Several indices were used to assess the model fit (Browne & Cudeck, 1993). After the fit of the measurement model was assessed, the analysis estimated the hypothesized structural model. The model involves testing the partial mediation structural model. This model results were used to test the indirect effects of fleet safety climate on safety participation and safety compliance via safety knowledge and attitudinal pride.

4. Results and Discussion

4.1. Descriptive Statistics

For the descriptive properties of the samples. Most respondents were male (93.60%), holding a bachelor's degree or equivalent (75.60%). Most of the pilots received sponsorship for flight training (57.70%), worked as Pilot-in-Command position (51.30%), obtained Air Transport Pilot License (53.30%) and operated Fixed-wing Aircraft (76.60%). These six demographic variables were also controlled for in the analyses. The result indicated that none of these demographic variables had significant effects on safety compliance and safety participation. Hence, they were not included in the further analysis. The analysis results shown below were remain unchanged with or without these demographic controlling variables.

4.2. Confirmatory Factor Analysis

Measurement model in this study was fitted with empirical data as per model fit indices ($\chi2 = 551.36$, df = 142, $p < .000$; relative $\chi2 = 3.88$; GFI = .91; CFI = .95; TLI = .94; RMSEA = .06; SRMR = .06). The discriminant validity of the constructs was assessed by using the square roots of the Average Variance Extracted (AVE) (Fornell & Larcker, 1981). As shown in Table 1, the size of the AVE values was greater than the correlations shared between the construct and other constructs in the model. This indicated the discriminant validity among constructs. In terms of convergent validity, the factor loadings on each construct were examined. The standardized factor loadings were all above .60, ranging from .62 to .92. The size of the Average Variance Extracted (AVE) for each variable was also acceptable at the recommended value of .50. Composite Reliabilities (CR) of constructs also ranged from .81 to .95, exceeding the recommended value of .60 (Bagozzi & Yi, 1988). Besides, Cronbach's alphas showed satisfactory levels of reliability of internal consistency, ranging from .87 to .93 (Hulland, 1999).

Table 1: Means, Standard Deviations, Bivariate Correlations, Standardized Multiple Correlation and Average Variance Extracted

Variables (n = 610)	*Mean*	*SD*	1	2	3	4	5
1. Fleet Safety Climate (FSC)	2.90	.94	(.87)	.55	.63	.49	.26
2. Safety Knowledge (KNW)	3.77	.69	.60	(.84)	.44	.48	.42
3. Attitudinal Pride (ATT)	3.72	.60	.68	.48	(.91)	.38	.39
4. Safety Compliance (COM)	3.53	.70	.55	.54	.42	(.83)	.25
5. Safety Participation (SPT)	3.84	.75	.28	.46	.42	.28	(.77)

Note. All values in this table are significant at p < .00; Numbers below diagonal line are bivariate correlations; Number over diagonal line are standardized multiple correlations shared between the constructs; Numbers in the diagonal line in parentheses are square roots of AVEs, which are greater than the size of standardized multiple correlations shared between the constructs.

Table 2: Estimated Factor Loadings, Standardized Factor Loadings, AVE, CR and Cronbach's Alpha

Variables	Items	*Estimated Loadings*	*Standard Loadings*
Fleet Safety Climate (FSC)	*AVE = .77; CR = .91; α = .91*		
	1. My fleet places a strong emphasis on workplace health and safety. (FSC1)	1.00	0.88
	2. Safety is given a high priority in my fleet. (FSC2)	0.98	0.84
	3. My fleet considers safety to be important. (FSC3)	1.03	0.91
Safety Knowledge (KNW)	*AVE = .72; CR = .88; α = .88*		
	1. I know how to maintain or improve workplace health and safety. (KNW1)	1.00	0.85
	2. I know how to reduce the risk of accidents and incidents in the workplace. (KNW2)	1.08	0.91
	3. I know what are the hazards associated with my jobs and the necessary precautions to be taken while doing my job. (KNW3)	0.92	0.79
Attitudinal Pride (ATT)	*AVE = .83; CR = .93; α = .93*		
	1. I feel proud to work for my organization. (ATT1)	1.00	0.92
	2. I feel proud to contribute to my organization's success. (ATT2)	0.91	0.89
	3. I feel proud to tell others for which organization I am working. (ATT3)	1.04	0.92
Safety Compliance (COM)	*AVE = .70; CR = .87; α = .87*		
	1. I always use checklist. (COM1)	1.00	0.76
	2. I use the correct safety procedures for carrying out my job. (COM2)	1.10	0.86
	3. I ensure the highest levels of safety when I carry out my job. (COM3)	1.03	0.88
Safety Participation (SPT)	*AVE = .60; CR = .91; α = .90*		
	1. Attending safety meetings. (SPT1)	1.00	0.62
	2. Volunteering for safety committees. (SPT2)	1.33	0.77
	3. Participating in setting safety goals. (SPT3)	1.55	0.82
	4. Making safety-related recommendations about work activities. (SPT4)	1.52	0.83
	5. Encouraging co-workers to get involved in safety issues. (SPT5)	1.00	0.65
	6. Rising safety concerns during planning session. (SPT6)	1.55	0.83
	7. Expressing opinions on safety matters even if others disagree. (SPT7)	1.42	0.79

Note. AVE = average variance extracted; CR = composite reliability; α = Cronbach's alpha; All factor loadings are significant at p < .00

4.3. Structural Equation Model

According to adequate reliability and validity of measurement model, the hypothesized structural model was then examined. All paths in the model were estimated as shown in Table 3.

Mediation only model was fitted with empirical data as per model fit indices ($\chi2 = 590.32$, df = 145, $p < .000$; relative $\chi2 = 4.07$; GFI = .90; CFI = .94; TLI = .93; RMSEA = .07; SRMR = .06). The results showed that fleet safety climate had direct positive effects on attitudinal pride and safety knowledge ($\beta = .81$, $p < .000$; $\beta = .49$, $p < .000$, respectively). Attitudinal pride and safety knowledge were positively related to safety participation ($\beta = .16$, $p < .000$; $\beta = .29$, $p < .000$, respectively) and attitudinal pride and safety knowledge were also positively related to safety compliance ($\beta = .12$, $p < .000$; $\beta = .33$, $p < .000$, respectively). Overall, this model explained 41%, 32%, 22% and 28% of the variance in attitudinal pride, safety knowledge, safety participation and safety compliance respectively.

Table 3: Estimated and Standardized Path Coefficients for Structural Equation Model

Paths & R^2	*Estimated Loadings*	*Standard Loadings*	*Coefficient of Determination*
Fleet Safety Climate > Safety Knowledge	.49	.56	-
Fleet Safety Climate > Attitudinal Pride	.81	.64	-
Safety Knowledge > Safety Compliance	.33	.40	-
Attitudinal Pride > Safety Compliance	.16	.22	-
Safety Knowledge > Safety Participation	.29	.31	-
Attitudinal Pride > Safety Participation	.26	.26	-
Safety Knowledge R^2	-	-	.32
Attitudinal Pride R^2	-	-	.41
Safety Compliance R^2	-	-	.28
Safety Participation R^2	-	-	.22

All factor loadings are significant at p < .00

In terms of the indirect effects, contrast effect and total effect of mediation only path analysis as shown in Table 4, the results revealed that the indirect effects of fleet safety climate on safety compliance and safety participation via safety knowledge were significant; moreover, the indirect effects of fleet safety climate on safety compliance and safety participation via attitudinal pride were also significant. However, contrast effects between 4 indirect effects were not significant. Total effect of path analysis was significant. Therefore, all hypotheses were supported

Table 4: Result of Indirect Effect, Contrast Effect and Total Effect – Mediated Paths Analysis

Indirect Effect, Contrast Effect and Total Effect	*Coeff*	Std. *Coeff*	SE	z	*p* - value
Indirect Effect 1 (FSC > KNW > COM)	0.16	0.23	0.02	7.63	.00***
Indirect Effect 2 (FSC > KNW > SPT)	0.14	0.17	0.02	6.07	.00***
Indirect Effect 3 (FSC > ATT > COM)	0.10	0.14	0.02	4.99	.00***
Indirect Effect 4 (FSC > ATT > SPT)	0.13	0.16	0.02	5.52	.00***
Contrasting Indirect Eff.1 and Indirect Eff.3	0.06	0.08	0.03	1.85	.06
Contrasting Indirect Eff. 2 and Indirect Eff.4	0.00	0.00	0.03	0.18	.85
Total Effect	0.54	0.71	0.04	12.42	.00***

Note. *** p < .00

Objectives of this study are to examine the causal relationship of safety climate and behaviors and examine mediation roles of safety knowledge and attitudinal pride. This study results found that the use of fleet safety climate had a positive effect on pilots' safety behaviors by enhancing their perceptions of attitudinal pride and safety knowledge. Hence, both hypotheses were supported Theoretical implications and practical implications will be discussed below.

4.4. Theoretical and Practical Implications

Theoretically, this study adds to the concurrent knowledge in the behavioral science and safety literature by focusing the significance of fleet safety climate on pilots' safety behaviors. Based upon the results, fleet safety climate could be considered as another essential aspect of teamworking relationship that makes team members feel that they are on the same boat and need to work together in order to ensure a better flight operation as stated in several past studies (Chen & Chen, 2013, 2014). Additionally, the results help clarify the important role of attitudinal pride and safety knowledge in the relationship between fleet safety climate and safety behavior. In particular, fleet safety climate was found to positively influence perception of attitudinal pride and safety climate. Moreover, whereas perception of attitudinal pride and safety climate were found to describe significant variance in the two forms of safety behaviors as confirmed by past studies (Ng et al., 2019; Oo et al., 2018). The results also revealed that perceptions of safety knowledge played stronger role in inducing positive safety behaviors than attitudinal pride. It is possible that knowledge involves expressing a learning experience and recall what they have learn to response to the situation at work. Several past studies also confirmed this result regarding safety knowledge (Latham & Saari, 1979; Zohar, 1980). To the best of authors knowledge, this study is among the very first studies that incorporate attitudinal pride as a mediator in this type of safety causal relationship.

Practically, to the concept of fleet safety climate, pilots always spend most of their flying time engaging in collaborative flying activities in the cockpit and they feel that, as part of team, no one will never understand what they do except for those pilots within the same fleet. Therefore, by promoting positive fleet safety climate, this could possibly enhance safety behavior both safety compliance and safety participation through safety knowledge and attitudinal pride within the same fleet.

4.5. Limitations

Despite the novel findings of this research, several limitations could be expected. Firstly, this study considers the formation of individuals' perception on a level of safety climate, attitudinal pride and safety knowledge and safety behaviors, future research might extend the result of this study by using a multilevel method as perceptions of psychological-related variables could be more efficiently interpreted at both individual and group levels of analysis (Pohl & Galletta, 2017). Secondly, the results are obtained by analyzing the quantitative data. There might be some hidden implications that quantitative analysis cannot dig into or reveal. Future research might adapt qualitative research method to further amplify analysis result into a richer and deeper aspects. Thirdly, in this study, the number of different fleets of different types of aircraft both fixed wings and helicopters are not listed. Moreover, the number of pilots operating each type of aircraft and the number of pilots operating more than one fleet are not classified. Future studies should include these factors into an analyses process.

5. Conclusion

The study has examined the causal relationship between pilots' perception of fleet safety climate, attitudinal pride, safety knowledge, safety compliance and safety participation. The results imply that perceptions of safety climate play an essential role in motivating pilots to perform safety behaviors. The partial mediating effects that attitudinal pride and safety knowledge have on the causal relationship among pilots' perceptions of their companies' safety climates have also been affirmed. The conceptual model proposed earlier is considered as among the very first attempt to explore the causality of those safety-related factors in Thai commercial aviation context. The findings from this study have a number of theorical and practical implications as aforementioned.

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