

An Empirical Investigation of the Influence of Safety Climate on Organizational Citizenship Behavior in Taiwan's Facilities

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Although the social exchange relationships between employers and employees are increasingly important to the performance of safety management systems, the psychological effects of work attitudes on this relationship have been less studied. Using a sample of first-line operators and their supervisors from 188 facilities in Taiwan which had Occupational Health and Safety Assessment Series 18000 (OHSAS 18000) certification, the current research conducted an empirical investigation of the influence of safety climate on organizational citizenship behavior (OCB). Work attitude was used to disclose the psychological effect. Research results indicated that (a) safety climate was a significant predictor of OCB, (b) the psychological effect significantly influenced social exchange relationships, and (c) job satisfaction showed a stronger mediating influence than organizational commitment due to the frequent top management turnover. Discussions and implications are also addressed.

safety climate organizational citizenship behavior social exchange relationship
psychological effect

1. INTRODUCTION

In support of safety management systems, occupational safety and health (OSH) has been widely studied to reduce the occurrence of accidents, in part because workers who experienced accidents in their jobs would tend to be dissatisfied with their organizations [1, 2, 3, 4]. In recent decades, OSH issues have become increasingly important for ensuring both employees' productivity and product quality,

mainly due to the generally complex operation processes and the awareness of workers' welfare. As suggested by Pater [5], a firm that emphasizes safety can (a) reduce costs, (b) improve employees' relationships, (c) reduce liability, (d) market themselves better, and (e) boost morale and productivity. This encourages the adoption of an OSH management system (OSH MS) to reduce risks and hazards better. Safety climate has been seen as a sign of employees' work attitude toward and perception of OSH [6, 7, 8]. Among the tactics

used in dealing with this issue are ergonomic and psychosocial approaches. However, there have been fewer studies addressing the psychological effects of safety climate on organizational citizenship behavior (OCB), and thereafter on organizational performance. Work environment, organizational commitment, management safety practices, job satisfaction, safety behavior, and supervisor safety are all issues that would influence safety management [9, 10, 11]. Therefore, questions may be raised such as “Will a firm that implements OSH MS form a social exchange relationship between employers and employees, and then be reciprocated with employees’ autonomous OCB to improve performance?” and “Will this relationship be influenced by a psychological effect?” In Taiwan, there has been an increasing need of OSH in manufacturing industry. Therefore, the concern in the current research is that there would be a connection between safety climate and OCB with a mediation of work attitude. By focusing on facilities who have received Occupational Health and Safety Assessment Series 18000 (OHSAS 18000) certification in Taiwan, this current research statistically examines (a) the relationship between safety climate and OCB, (b) the relationship between safety climate and work attitude, and (c) the mediation of work attitude on the influence of the relationship between safety climate and OCB.

2. RELATED CONCEPTS

2.1. OHSAS 18000 and Safety Climate

OHSAS 18000 contains OHSAS 18001 for OSH MS specifications and OHSAS 18002 for explanations of specification. OHSAS 18002 also describes ways of working towards implementation and registration. It was developed by a group of certification bodies and various national standards organizations to enable companies to control their occupational risk and demonstrate their commitment to provide their workers with a safe working climate, to protect their employees

from accidents, and to enhance the companies’ financial performance [12, 13]. To do so, companies have first to begin with OSH policy to obtain compliance that demonstrates their core values and commitment to health and safety. Any potential hazards must be determined and identified, and their risk assessed and controlled on a continuing basis. In order for OSH MS to be implemented effectively, companies must ensure its usefulness, e.g., whether or not occurrences and related costs of accidents and illness are reduced, whether or not the company image is improved because of the demonstration of a commitment to manage and minimize risks to employees and customers, etc. There are two main points that were originated by Zohar [14] while adopting OHSAS 18000 in OSH MS implementation. The first is that management should state their commitment to safety and continual improvement, and the second that employees’ safety must be involved in the system as safety climate that is defined as the sum of shared perception of the work environment. After this, safety climate is found to affect safety behavior and safety performance [15, 16, 17].

Management support or commitment to safety was regarded as the most important factor of safety climate [1, 14, 16]. Hayes, Perander, Smecko, et al. [9] used a similar concept of safety climate to propose a work safety scale (WSS) for measuring perceptions of workplace safety. The results indicated that WSS could predict job satisfaction, accident rates, and employee’s compliance with safety behaviors. Generally, the perceptions of organizational safety policies, supervisor safety support, and employee safety control would play critical roles in predicting both injury incidence and satisfaction with the company. Furthermore, because our current research focus is on the social exchange relationship between employers and employees, management commitment, employee involvement, and coworker safety are important aspects that can help to explain the role that safety climate plays for companies that have received OHSAS 18000 certificates.

2.2. OCB

The fundamental concept of OCB was first introduced by Organ [18]. It is defined as “individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization” (p. 4) [18]. Both in- and extra-role behavior has an effect on employees’ performance [19]. Turnley, Bolino, Lester, et al. [20] have found that psychological contract fulfillment is strongly related to employees’ behavior. As suggested by Organ and Ryan [21], on the one hand, OCB was a multidimensional concept with five dimensions to describe it: (a) altruism: employee will provide aid to other people or group; (b) conscientiousness: employee will perform more than the requirement of organization; (c) civic virtue: employee will autonomously participate and get involved in the issues and governance of the organization; (d) courtesy: employee will take measures to help prevent work-related problems; and (e) sportsmanship: employee will be willing to forbear minor and temporary personal inconveniences and impositions. On the other hand, Graham [22] suggested a different set of four factors for OCB: (a) interpersonal helping, (b) individual initiative, (c) personal industry, and (d) loyal boosterism. Van Dyne, Graham, and Dienesch [23] proposed that (a) obedience, (b) loyalty, and (c) participation were the three categories of OCB. In order to make up for the lack of consensus on citizenship-like behaviors, Podsakoff, MacKenzie, Paine, et al. [19] integrated past research and proposed seven common dimensions to describe OCB: (a) helping behavior, (b) sportsmanship, (c) organizational loyalty, (d) organizational compliance, (e) individual initiative, (f) civic virtue, and (g) self-development.

Different from the aforementioned that focused mainly on behavior, Williams and Anderson [24] emphasized individuals and organizations that benefited from OCB and divided them into OCBI (OCB beneficial to individual) and OCBO (OCB beneficial to organization). LePine, Erez, and Johnson [25] indicated that altruism and courtesy were related to OCBI, whereas sportsmanship,

civic virtue, and conscientiousness to OCBO. The effect of OCB on organizational performance has been convincing. For example, Podsakoff and MacKenzie [26] examined the impact of OCB on job performance, and found that OCB made important contributions to organizational effectiveness; and among dimensions of OCB, the effect of helping behavior, in particular, was stronger and more consistent than others.

2.3. Safety Climate and Work Attitudes

Work attitude is generally a conceptual set of attitudes related to work, including job satisfaction, job involvement, and organizational commitment [11, 21, 27, 28]. Organizational commitment, in particular, is “the relative strength of an individual’s identification with and involvement in a particular organization” (p. 27) [29]. Williams and Anderson [24] suggested that job satisfaction and organizational commitment should be considered together to address their relative effects on OCB. A meta-analytic review of 55 studies [21] also indicated that job satisfaction, organizational commitment, perceived fairness, and leader support were correlated to OCB. Job satisfaction was well regarded as an attitudinal variable on jobs [4, 9, 10, 30]. It has been found to be an antecedent positively related to accidents and injury [30, 31]. As suggested by Hayes et al. [9], job satisfaction can be explained by management safety practices and supervisor safety. Particularly, Dembe, Erickson, and Delbos [4] indicated that the incidence of occupational injuries and illness was related to (a) low family income, (b) living in a rural area, (c) work in a high-hazard occupation, (d) job dissatisfaction, and (e) exposure to hazardous job activities. It should be noted that occupational accidents could be both the antecedent and consequence of job satisfaction [4]. It is well believed that the occurrence of accidents comes from human behavior and/or unsatisfactory working climate. Therefore, it must be clarified whether a worker experiences job dissatisfaction because of being hurt at work, or whether job dissatisfaction is a predictor of an accident. To avoid this confusion, the current research considers the adoption of OHSAS 18000

by employers a spontaneous behavior that demonstrates management's commitment of work safety and accident reduction, and thereafter job satisfaction is enhanced.

2.4. Safety Climate, Organizational Commitment, and OCB

Organizational commitment is defined as a psychological contract that links employees to their organization and can be used to predict turnover intention of staff, performance of employees, and organizational effectiveness [32]. Mowday, Porter, and Steers [29] suggested four representative antecedents of organizational commitment: (a) personal characteristics, (b) job characteristics, (c) work experiences, and (d) structural characteristics. Randall [33] also indicated that the employee's citizenship behavior might be limited when the level of commitment was low. These antecedents well explained the importance of organizational commitment. Furthermore, as suggested by Allen and Meyer [34], the components of organizational commitment could be categorized as (a) affective, (b) continuation, and (c) normative commitment. Affective commitment is a psychological state where individuals are identified with the organization so that they will be positively involved in the organization and attach their affectivity to it. Continuation commitment is takes place when employees realize that the cost of leaving the organization is greater than staying. Normative commitment refers to the sense of obligation to the organization, which is caused by the common social values that a worker should be loyal to the employer or by the organizational socialization process. In addition, a meta-analysis indicated that organizational commitment were linked to (a) job satisfaction, (b) job involvement, and (c) occupational commitment, and these three types of commitment could predict turnover intention; particularly affective commitment had strongest relation to attendance, performance, and OCB [35].

With regard to safety-related subjects, it is believed that management would be mostly interested in affective commitment since its objective is to inspire a willingness to reduce at-

risk behavior, improve the working environment, and control hazards [36]. As suggested by Koradecka [37], a company should build a connection between OSH and the management's objective while transferring knowledge in the domain from OSH to small and medium-sized enterprises. However, this can happen only when employees recognize the company's safety commitment, and when the value of safety is shared with the whole organization. By this, the employees' psychological attachment to the organization can be reinforced and the consequent behaviors can be a reduction in turnover intension, safety behavior, and citizenship behavior. This kind of relationship is well defined as a social exchange that has been widely used to explain the relationships between employers and employees, and thereafter predict employees' citizenship behaviors [18, 38].

The social exchange theory [39] suggests that when someone's behavior or actions are beneficial to another, an implicit obligation for future reciprocity will be created. This implicit obligation will then result in certain behavior that benefits the initiating party. Hofmann and Morgeson [40] suggested that the perceived organizational support and leader-member exchange affected employees' safety communication and safety commitment, and therefore could ultimately predict accidents. More recently, Hofmann, Gerras, and Morgeson [3] further integrated citizenship behavior into research, and suggested that leader-member exchange be reciprocated by expanding their safety citizenship role definitions that were significantly related to safety citizenship behavior under the mediation of safety climate. Importantly, social exchange relationships accentuate the employee's obligation towards, identification with, and affective attachment to the organization. Organizational commitment is also suggested to be significantly related to OCB. However, interesting issues remain unknown, such as the social exchange relationship between safety climate and OCB through the use of organizational commitment as a mediator, and the relationship between safety climate and

organizational commitment, or between safety climate and OCB.

3. METHOD

The conceptual model used to present the research problem is illustrated in Figure 1. It contains three components: safety climate (SC), work attitudes (WA), and OCB. The independent variable, SC, is described by management commitment, employee involvement, and coworker safety; while the dependent variable, OCB, is described by OCB-organization (OCBO), OCB-individual (OCBI), and in-role behavior (IRB). The variable of WA, including job satisfaction (JS) and organizational commitment (OC), is designed to be a mediating factor in order to disclose whether or not the psychological effect influences the relationship between SC and OCB.

There are four hypotheses defined as follows.

- H1: SC is significantly related to WA.
 H1-1: SC is significantly related to JS.
 H1-2: SC is significantly related to OC.
 H2: WA is significantly related to OCB.
 H2-1: JS is significantly related to OCBO.
 H2-2: JS is significantly related to OCBI.
 H2-3: JS is significantly related to IRB.
 H2-4: OC is significantly related to OCBO.
 H2-5: OC is significantly related to OCBI.
 H2-6: OC is significantly related to IRB.
 H3: SC is significantly related to OCB.
 H3-1: SC is significantly related to OCBO.

H3-2: SC is significantly related to OCBI.

H3-3: SC is significantly related to IRB.

H4: WA mediates the relationships between SC and OCB.

H4-1: JS significantly mediates the relationships between SC and OCBO.

H4-2: JS significantly mediates the relationships between SC and OCBI.

H4-3: JS significantly mediates the relationships between SC and IRB.

H4-4: OC significantly mediates the relationships between SC and OCBO.

H4-5: OC significantly mediates the relationships between SC and OCBI.

H4-6: OC significantly mediates the relationships between SC and IRB.

3.1. Measures

A questionnaire was designed as the measure instrument for variables. It contained four major parts: SC, JS, OC, and OCB. It was constructed by using a 7-digit rating scale (from 1 to 7) using bi-polar descriptors for each question. In order to make the designed questionnaires more readable for respondents, a series of in-depth interviews with domain experts in the fields of both OSH MS and OHSAS 18000 were conducted. Furthermore, before the questionnaires were sent out to the target respondents, a pilot test was conducted via a series of interviews with a limited number of individuals to develop the validity, readability, and reliability of the questionnaires.

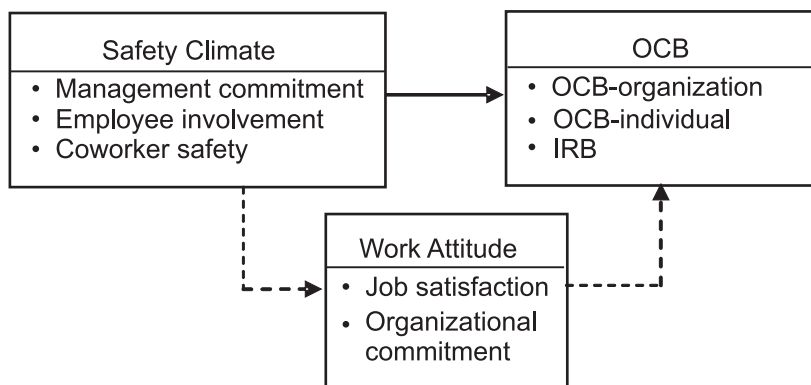


Figure 1. Conceptual model. Notes. OCB—organizational citizenship behavior, OCB-organization—OCB beneficial to organization, OCB-individual—OCB beneficial to individual, IRB—in-role behavior.

Details are described in Table 1. First, 23 question items for SC, including management commitment to safety, employees' involvement in safety, and coworker safety, were developed based on those in Wu's [41] study. Second, for JS, three items used in Barling, Iverson, and Kelloway's study [30] were included. Third, five items from Allen and Meyer's [34] affective commitment scale were used for measuring OC. Finally, 18 items for OCB were developed by considering those in both Williams and Anderson's [24] OCBI and IRB scales and Lin's [42] OCBO scale.

TABLE 1. Questionnaires for Data Collection

Safety Climate
1. Management has announced willingness to allocate sources for safety and health improvement.
2. Management has announced that safety and production are equally important.
3. Management has announced its willingness to promote employees' safety and health.
4. Management frequently participates in meetings on safety and health.
5. Management truly executes safety and health operational procedures.
6. Management pays a lot of attention to occupational safety and health.
7. Management frequently makes rounds to check safety.
8. Management frequently examines safety management operations.
9. Management pays a lot of attention to the welfare of the workforce.
10. Management frequently encourages the workforce to follow safety and health regulations.
11. Management holds in high esteem employees who exhibit safe and healthy behavior.
12. Management has announced a clear reward–penalty regulation for safe and healthy behavior.
13. Employees can participate in the development of regulations that aim at organizational safety.
14. Employees can frequently communicate with their management about safety issues.
15. Employees understand the safety and health regulations in the company.
16. Employees can obtain sufficient information about safety.
17. Employees understand workplace hazards.
18. The company can implement employees' safety suggestion.
19. My coworkers are willing to encourage others to follow safety and health regulations.
20. My coworkers care about the safety problems of others.
21. My coworkers are willing to encourage others to be careful at work.
22. My coworkers are not willing to take risks.
23. My coworkers are willing to keep their workplace safe.
Job satisfaction
1. I am satisfied with the management's regulations.
2. I think this is a good place to work in.
3. I do my best to keep this job.
Organizational commitment
1. I would be happy to work in this company for the rest of my life.
2. I am happy to talk about my company with outsiders.
3. I always feel that the company's problems are my problems.
4. I have a strong feeling that I belong to my company.
5. My company is very important to me, personally.

TABLE 1. (continued)

Safety Climate**Organizational Citizenship Behavior**

1. I am happy to help in promoting my company's reputation.
2. I am happy to attend any meeting in my company.
3. I actively help my company find problems.
4. I actively bring up suggestions for my company.
5. I collaborate with my coworkers in accomplishing tasks.
6. I pay a lot of attention to my behavior that is important to my company.
7. I actively understand company's decisions.
8. I help coworkers who are overworked.
9. I actively help my supervisor in his/her job.
10. I am willing to listen to my coworkers' problems.
11. I am willing to provide my coworkers with information they need.
12. I always finish my work on time.
13. I work hard in my job.
14. I am willing to attend activities that are directly related to my performance.
15. I always fulfill my job description.
16. I always complete my duties.
17. I have always been successful in my job.
18. I always reach the goal that I expect in my job.

3.2. Participants

According to the Industrial Development Bureau of the Ministry of Economic Affairs, in 2004 there were 188 facilities in Taiwan who had OHSAS 18000 certification. Since employee citizenship behavior was the main concern in our study, we sent five questionnaires to each facility to first-line operators and their supervisors; with a total of 940 questionnaires sent out. A numerical mark list was used for all of the respondents. When a questionnaire was returned, the number of the respondent was checked off the list. After 3 weeks, in order to increase the response rate, follow-up via e-mail and telephone was made to those who had not responded. Of the 940 questionnaires that were mailed, a total of 138 was returned, of which 121 were valid, indicating a 12.87% valid response rate. Since this response rate was difficult to accept, we made some e-mail and telephone contacts both with those who did not reply and to those who returned only one copy. By this, it was found that some companies had an informal agreement within the organization that questionnaires from outside sectors should be forwarded to the administrative office responsible for replying. Therefore we checked how many of the 188 facilities were

covered, and found there were 113, indicating a 60.11% distribution. Although not very high, it was considered acceptable to move to the stage of data analysis.

The obtained descriptive statistics are listed in Table 2. They included gender, experience of accident, age, position, before-job safety training, full-time safety technician, and motivation of OHSAS 18000 registration. It was found that 45.4% of the participants were supervisors, 28.9% operators, and 25.6% others. For those classified as others, most were staff members. Although our research was aimed at operators and supervisors, staff members could have good knowledge of their companies' safety policies and the safety conditions in their organizations, and in consequence their responses were considered valid. Before-job safety training is very important to the OSH MS. It was found that most participants (92.6%) were given safety training at the time they entered their company. However, there were still 9 participants (7.4%) (in seven facilities) who had not received before-job safety training. The reason was that 6 of those were trained in their previous companies that were similar to the present, although 3 had worked for companies that were not similar.

TABLE 2. Descriptive Statistics

Items	Statistics			
Gender	Male		Female	
	93 (76.9%)		28 (23.1%)	
Experience of accident	Yes		No	
	21 (17.4%)		100 (82.6%)	
Age (years)	20–29	30–39	40–49	≥50
	20 (16.5%)	49 (40.5%)	36 (29.8%)	16 (13.2%)
Position	Operator		Supervisor	
	35 (28.9%)		55 (45.4%)	
			Other	
			31 (25.7%)	
Received before-job safety training	Yes		No	
	112 (92.6%)		9 (7.4%)	
Company has full-time safety technician	Yes		No	
	116 (95.9%)		5 (4.1%)	
Motivation of OHSAS 18000 registration	Planned policy	Forced by suppliers and customer		Not aware
	99 (81.8%)	16 (13.2%)		6 (5%)

3.3. Analysis Criteria

The internal consistency reliability using Cronbach’s α was to test the internal consistency of each factor of this research. The higher the α coefficient, the stronger the interrelationship of each item of measures. Regression analysis was used to explore the relationship between variables and to examine the hypotheses, while hierarchical regression analysis was used to test the mediating effect of WA for the relationship between SC and OCB. In particular, the mediating effect test was based on the method [43] that follows a test procedure (denoted by TP). This research adopts the TP to test whether or not the mediating effect is significant. The TP has four steps: test the relationship between the predictor (e.g., SC) and the dependent (e.g., OCB), and the result should be significant; select a mediator (e.g., JS) as an outcome variable and then test whether or not its relationship with the predictor (e.g., SC) is significant. Only if the result is significant can the test be moved to the third step; with the predictor (e.g., SC) controlled, test the relationship between the mediator (e.g., JS) and the dependent (e.g., OCB), and the result should be significant; and with the mediator (e.g., JS) controlled under the same hierarchical structure in the third step, test the relationship between the predictor (e.g., SC) and the dependent (e.g., OCB), and the result should be insignificant. With all four of these

conditions satisfied, the mediating effect can be regarded as significant.

However, Holmbeck [44] argued that sometimes the regression coefficient might only slightly decrease, but the p value will decrease drastically. This causes the regression coefficient to decrease greatly, but shows that the predictor is significant to its outcome. In this case, therefore, the z score test can be used to test the mediating effect in our current research. The z score test is described as follows

$$z = \frac{b_{\text{indirect effect}}}{SE_{\text{indirect effect}}}, \tag{1}$$

$$b_{\text{indirect effect}} = (b_{mx})(b_{ym.x}). \tag{2}$$

$$SE_{\text{indirect effect}} = \left[(b_{mx}^2)(SE_{ym.x}^2) + (b_{ym.x}^2)(SE_{mx}^2) \right]^{1/2}, \tag{3}$$

where m is the mediator, x is the predictor, y is the outcome, b is the coefficient that is unstandardized, SE is standard error, mx is the prediction of m from x , and $ym.x$ is the prediction of y from m , with x in the model. The z score can be compared with a prior critical value ($z = 1.645$ for a one-tailed test when $p < .05$, and $z = 2.326$ when $p < .01$) and test the significance of the indirect path.

3.4. Internal Consistency Reliability

The reliability of SC, WA, and OCB is .943, .910, and .931, respectively. The estimates of internal consistency reliability are described in Table 3,

containing variables, factors, item, item-to-total correlation, and Cronbach's α . It was found that the values of Cronbach's α for each factor were all above .8, which confirms their high reliability [45].

TABLE 3. Reliability Analysis

Variables	Factors	Item	Item-to-Total Correlation	Cronbach's α
Safety climate	management commitment	5	.8060	.9400
		6	.8298	
		7	.7034	
		8	.7888	
		9	.7739	
		10	.8302	
	employee involvement	11	.8198	.9056
		12	.8051	
		13	.7004	
		14	.7132	
		15	.8089	
		16	.8113	
	coworker safety	17	.7785	.8865
		18	.6611	
		19	.8083	
		20	.8028	
		21	.7677	
		23	.6597	
Work attitude	job satisfaction	1	.8147	.8969
		2	.8147	
	organizational commitment	1	.7117	.8001
		2	.4456	
		3	.4696	
		5	.6293	
		6	.5976	
		8	.5091	
Organizational citizenship behavior	OCBO	1	.7698	.8916
		2	.6425	
		3	.8073	
		4	.7202	
		5	.7152	
		6	.6461	
	OCBI	7	.5764	.9069
		8	.7542	
		9	.7351	
		10	.6090	
		11	.7244	
		12	.7178	
	IRB	13	.8013	.9225
		14	.7377	
		15	.8118	
		17	.8590	
		18	.8594	

Notes. OCBO—organizational citizenship behavior beneficial to organization, OCBI—organizational citizenship behavior beneficial to individual, IRB—in-role behavior.

4. RESEARCH FINDINGS

The regression analysis results for SC are listed in Table 4. It was found that SC was significantly related to both JS and OC, based on the observations that $\beta = .733$ and $p < .001$ for JS and $\beta = .444$ and $p < .001$ for OC. Therefore, we accepted hypotheses H1-1 and H1-2. This implies that better SC will be likely to lead to better WA. It was also found that SC was a significant predictor of OCBO ($\beta = .491$, $p < .001$), OCBI ($\beta = .517$, $p < .001$), and IRB ($\beta = .526$, $p < .001$). This implies that when employees work in a better SC, they will be likely to demonstrate more discretionary behavior that may benefit organizational performance. We therefore accepted hypotheses H3-1, H3-2, and H3-3.

[43], so we accepted hypotheses H4-1, H4-2, and H4-3, implying that JS was likely to have a significant mediating effect on the relationship between SC and OCB.

For the mediating test of OC, it was found from the upper part of Table 6 that OC was significantly related to OCBO ($\beta = .479$, $p < .001$), OCBI ($\beta = .525$, $p < .001$), and IRB ($\beta = .530$, $p < .001$). Therefore, we accepted hypotheses H2-4, H2-5, and H2-6. OC was then used in the mediating test for the relationship between SC and OCB. From the lower part of Table 6, it was found that when SC was controlled, on the one hand, OC showed a significant link to OCB. On the other hand, with OC controlled, it was found that SC was not significantly related to OCB. This result did not match the requirement of TP.

TABLE 4. Regression Analysis Result for Safety Climate (SC)

		JS	OC	OCBO	OCBI	IRB
SC	<i>b</i>	1.057	0.497	0.431	0.440	0.564
	<i>SE_b</i>	0.099	0.101	0.077	0.073	0.092
	β	.733***	.444***	.491***	.517***	.526***
	R^2	.537	.197	.241	.267	.277
	ΔR^2	.532	.189	.233	.260	.269

Notes. *** $p < .001$; JS—job satisfaction, OC—organizational commitment, OCBO—organizational citizenship behavior beneficial to organization, OCBI—organizational citizenship behavior beneficial to individual, IRB—in-role behavior; *b*—unstandardized coefficient, *SE_b*—standard error, β —regression coefficient, ΔR^2 —adjusted R^2 .

For the mediating test for JS, first from the upper part of Table 5, it was found that JS was significantly related to OCBO ($\beta = .589$, $p < .001$), OCBI ($\beta = .630$, $p < .001$), and IRB ($\beta = .692$, $p < .001$). Therefore, we accepted hypotheses H2-1, H2-2, and H2-3. Moreover, based upon the result from Table 4, the first and second step of the TP was found to be satisfied. Therefore, JS as a mediator was put into the mediating test procedure. On the one hand, with the SC controlled it was found from the lower part of Table 5 that JS was significantly related to OCBO ($\beta = .496$, $p < .001$), OCBI ($\beta = .542$, $p < .001$), and IRB ($\beta = .662$, $p < .001$). On the other hand, it was found that when JS was controlled, SC did not show a significant link to OCB. This result met the requirement by TP

TABLE 5. Mediating Tests for Job Satisfaction (JS)

		OCBO	OCBI	IRB
JS	<i>b</i>	0.358	0.372	0.515
	<i>SE_b</i>	0.049	0.046	0.054
	β	.589***	.630***	.692***
	R^2	.347	.397	.479
	ΔR^2	.341	.391	.474
JS	<i>b</i>	0.301	0.320	0.493
	<i>SE_b</i>	0.072	0.068	0.080
	β	.496***	.542***	.662***
SC	<i>b</i>	.112	.102	.044
	<i>SE_b</i>	.105	.098	.115
	β	.128	.119	.041
	R^2	.355	.403	.480
	ΔR^2	.342	.391	.469

Notes. *** $p < .001$; OCBO—organizational citizenship behavior beneficial to organization, OCBI—organizational citizenship behavior beneficial to individual, IRB—in-role behavior, SC—safety climate; *b*—unstandardized coefficient, *SE_b*—standard error, β —regression coefficient, ΔR^2 —adjusted R^2 .

TABLE 6. Mediating Tests for Organizational Commitment (OC)

		OCBO	OCBI	IRB
OC	<i>b</i>	0.375	0.400	0.509
	<i>SE_b</i>	0.069	0.065	0.082
	β	.479***	.525***	.530***
	R^2	.229	.276	.281
	ΔR^2	.221	.268	.274
OC	<i>b</i>	0.254	0.280	0.355
	<i>SE_b</i>	0.073	0.068	0.085
	β	.325***	.368***	.370***
SC	<i>b</i>	.304	.301	.388
	<i>SE_b</i>	.081	.076	.095
	β	0.347***	0.353***	0.362***
	R^2	.326	.376	.386
	ΔR^2	.312	.363	.374
z scores		2.878	3.145	3.147

Notes. *** $p < .001$; OCBO—organizational citizenship behavior beneficial to organization, OCBI—organizational citizenship behavior beneficial to individual, IRB—in-role behavior, SC—safety climate; *b*—unstandardized coefficient, *SE_b*—standard error, β —regression coefficient, ΔR^2 —adjusted R^2 .

However, to verify this result more appropriately, we examined the *z* scores. The *z* scores were 2.878 and $p < .01$ for OCBO, 3.145 and $p < .01$ for OCBI, and 3.147 and $p < .01$ for IRB. Therefore, we accepted hypotheses H4-4, H4-5, and H4-6, implying that OC was likely to have a significant mediating effect on the relationship between SC and OCB. When comparing the value of β in Table 6 with that in Table 4 for OCBO, OCBI, and IRB, it was found that the decreasing rate was about 29.4%. This implied that although not obviously insignificant, the OC would have about 30% mediating effect on the relationship between SC and OCB.

5. DISCUSSION

This research has presented an examination of the relationship between SC and OCB for companies who have received OHSAS 18000 certification. The effect of WA acting as the relationship mediator was also investigated. The two main research findings are (a) SC is a significant predictor of OCB, and (b) WA is a significant mediator that has impact on the relationship

between SC and OCB. This finding is noteworthy because early studies were likely to focus on the ergonomic effect, without placing suitable emphasis on the psychological effect of SC on OCB. Importantly, this study is of value because of the empirical evidence that draws attention to the significant roles played by the psychological effect.

Moreover, the research findings suggest acceptance of the contention that SC is significantly related to WA, including JS and OC. This implies that SC in fact gives significant impetus to WA for companies in Taiwan who have received OHSAS 18000. This is consistent with the suggestions by Hayes et al. [9], Räsänen, Laitinen, and Rasa [10], and Guastello [46] that workplace safety would affect JS, and implies that SC examination is a useful predictive tool in discovering employees' awareness of the way that safety is being implemented. It is generally believed that when organizations pay more attention to improving the working environment, risk avoidance, safety condition, and safety management systems, their employees feel that overall SC is better, and in consequence their JS is relatively higher. For the effect of SC on OC, the result is quite close to Meyer and Allen's [36] argument that affective commitment is the antecedent of safety-related behaviors. Moreover, our research has adopted OC as a mediator in social exchange relationship between employees and organizations to disclose its effectiveness, and received a positive result. This result implies that when organizations are willing to improve safety conditions by obtaining OHSAS 18000 certification and/or establishing their OSH MS, their employees will perceive improved SC, and then will have more emotional belonging and identification with their organization. We therefore have two suggestions. One is that companies which have not yet received OHSAS 18000 certification should pay more attention to the establishment of OSH MS in order to enhance their employees' WA towards JS and OC. Another is that as operation processes become increasingly complex and the awareness of workers' welfare increases, SC of companies'

operations will become more important. By enhancing SC, a company can reduce unfavorable psychological effects, and thus increase benefits for both their employees and themselves.

Regarding the mediating effect, in addition, unlike other research that adopted safety commitment as a mediator to examine the social exchange relationship between SC and OCB [40], this research utilized both JS and OC to explore their influence. The results were quite consistent with the suggestions in previous studies that OC and JS were the main antecedents in shaping positive SC, and in consequence positive OCB [7, 47]. Comparing these two elements, it was found that JS had a stronger impact than OC. For this, we contacted our participants (operators and supervisors) by e-mail to see if we could find possible reasons. We found that OC was more likely to be discontinuous due to top management turnover. It is important that obtaining OHSAS 18000 or introducing an OSH MS can be a focal mechanism by which employees come to believe that their company is continuously willing to support their safety needs and wants, and thereafter can help in forming positive SC. However, policies, safety programs, and continuous management support are also crucial to maintain SC toward a positive organizational climate [15]. Our suggestion is that companies should regard safety presentation as a continuing goal. In support of this, they should watch for unsafe aspects of the work environment and seek to change employees' unsafe behavior at all organizational levels, not merely focus on the improvement of employees' WA and safety perceptions. However, this is not to ignore the importance of SC perception, rather to strengthen the continuation of SC improvement.

Furthermore, the research findings described here have obvious implications for OSH MS consultants and government agencies responsible for promoting OSH MS in industries. It is our advice that OSH MS consultants should firstly aim at firms whose management perceives the importance of SC and should act to build up the OSH MS awareness of management. With a better understanding of OSH MS and its potential

benefits, companies may be more perceptive towards OHSAS 18000 registration. Government agencies responsible for promoting acceptance of OHSAS 18000 should try harder to raise the visibility of OSH MS and OHSAS 18000; they can encourage OSH MS and OHSAS 18000 seminars and training programs by providing financial support, especially designed for top management of those companies who have not yet received certification. More importantly, the significance of organizational support and communication—two essential components of overall company climate—has been disclosed with the idea that affirmative SC is more likely to perform well in an environment that can benefit both employers and employees via a positive social exchange relationship.

6. CONCLUSION

This paper has briefly highlighted the importance of OSH, OSH MS, OHSAS 18000, SC, WA, and OCB in organizational performance. A research model containing research hypotheses, participants, and measures has been presented. The data analysis results in this study statistically confirmed the impact of SC on OCB. WA, which is a mediator, was used to examine the psychological effect on the relationship between SC and OCB. The results indicated that SC was a significant predictor of OCB and their relationship was significantly influenced by WA. We suggest to OSH MS and OHSAS 18000 researchers, consultants, and government agencies that the psychological effect that is represented by WA in our research is significant for the influence of OCB, and therefore to the performance of safety management systems. Although our study so far has revealed some information about the relationships among SC, WA, and OCB, it is believed that there still exist a number of variables that differ in their impact on the performance of safety management systems. For example, as suggested by Pun and Hui [3], safety organizational behavior, which is an extension of safety OCB, would have an important impact on organization performance. In addition, this research did not consider

participants from those companies who have not yet received certification, but may have adopted other safety management systems. Their opinions and expectations would also be valuable. Moreover, it should consider both directions for variables when causal relationships are considered. In this research, SC is regarded as the independent variable while OCB is the dependent one. However, the situation may also exist that OCB plays an important role in shaping SC. In consequence it would be valuable to disclose reverse relationships and their implications among the variables defined in this research.

It has been seen that many firms in different countries have legislated OSH regulations to protect workers from workplace hazards. Those regulations stipulate that firms must establish a safety environment as a safety management system. According to a report by the Taiwan Council of Labor Affairs, 422 workers died in 2000, 369 in 2001, 334 in 2002, 325 in 2003, 308 in 2004, and 161 in the first half of 2005 [48]. Although it has been seen that both Taiwan government and industries have made much effort to reduce occupational hazard, many workers have died because of unsafe workplaces and unsafe work behavior. Since the goal to ensure workers' safety at all times and all places can be reached by implementing a safety management system, it should be an indisputable and permanent policy that companies must implement.

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