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Predictive Model of Conservation Regulatory Compliance: Evidence from Thailand's National Park Visitors

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Abstract

This study aims to develop and test a predictive model for the relationship between cognitive and situational factors affecting conservation regulatory compliance by national park visitors. The sample included Thai visitors engaging in recreational activities and staying overnight in the representative national parks. The sample size was calculated using the software G* Power, and a questionnaire was used to collect data from 1,000 visitors. The model explained 61.50% of the variance in the dependent variable. A path analysis revealed a statistically significant effect of these factors on the intention to comply and regulatory compliance. In addition, media exposure was effective in moderating the relationship between intention to comply and regulatory compliance. Once confirmed, factors predictive of regulatory compliance can be utilized to develop persuasive message content for national park visitors and to suggest that authorities formulate a policy for publicizing park regulations; combined, these two approaches may encourage visitors to engage in appropriate behaviors and help maintain the national parks.

1. Introduction

National parks are protected areas intended to protect natural biodiversity, along with their underlying ecological structure and supporting environmental processes, and to promote education and recreation (Dudley, 2008). As such, national parks are an attractive setting for the growing demand for outdoor activities in natural environments. However, these activities have a significant environmental impact on the associated area. Examples of these impacts on parks and reserves include soil erosion and compaction, damage to vegetation, disturbance to wildlife, water pollution, increased fire frequency, vandalism and noise (Buckley, 1991). Recreational use of national parks has been issued in protected area management, as it is a factor in assessing environmental impact (McAvoy and Dustin, 1983).

Regulations are a common tourism and recreational management practice in protected areas (Manning, 2011). Common applications of regulations in outdoor recreation areas include group size limits, assigned campsites and/or travel itineraries, area closures, length of stay limitations, and restrictions or prohibitions on recreation activities and behaviors that have substantive resources and/or experiential impacts (Leung *et al*., 2018). Aside from the restrictions or prohibitions on recreation activities, regulations on park visitor behavior ensure safety and quality (Duzgunes and Demirel, 2016). Despite regulations being established by protected area authorities, one concern among protected area managers is compliance (Dudley, 2008). This issue has become an indicator of the efficiency of protected area management at the international level (Bragagnolo *et al*., 2016). For this reason, regulatory compliance is a key issue for protected area management effectiveness in most parts of the world.

Thailand's National parks are administered by the Department of National Parks, Wildlife and Plant Conservation (DNP) of the Ministry of Natural Resources and Environment (MNRE). At present, national parks are natural recreational areas popular amongst local visitors and foreign tourists. Currently, there are 132 national parks, including both terrestrial and marine national parks (DNP, 2018). The average number of visitors to national parks from 2001-2015 was approximately 13 million per annum (DNP, 2018). With this high level of visitor use, the DNP has to cope with the previously stated negative impacts caused by visitors; consequently, the DNP has set recreational regulations to serve as guidelines for recreational users. The importance of encouraging visitors to comply with regulations was emphasized in a study of the Thailand national park system, which found that Thai visitors who did not follow the regulations caused extensive damage (Jantowat *et al.*, 2011).

Tanakanjana and Haas (1996) first published research analyzing compliant and noncompliant behavior by users of protected areas, specifically analyzing nonconformance to national park regulations by local people. Several studies on the normative behaviors of park visitors followed (e.g. Charungphan, 2001; Jantowat *et al.*, 2011; Rueangsut, 2015). All previous research on compliance in Thailand national parks has largely focused on the violation or noncompliance of existing regulations, whereas studies focusing on regulatory compliant behaviors and their determinant factors are found to be lacking. Furthermore, all of the previous studies investigated only specific areas and involved comparative analysis; none of them provided an analysis in the form of predictive models.

The factors affecting regulatory compliance by protected area users were divided into two groups: cognitive factors and situational factors. Cognitive factors are internal factors that can encourage compliance by park users; these factors relate to an individual's cognition, knowledge, opinions, understanding and perception on the effects of compliance with conservation regulations. These effects include knowledge about and awareness of regulations, personal morality, perceived regulatory legitimacy, perceived injunctive norms, and media exposure. Situational factors, on the other hand, are temporary external situational conditions that trigger visitors' compliance with regulations. These factors have a direct connection with measures utilized by protected area authorities for user management, including legal sanctions, regulation enforcement, and persuasive communication.

In addition, accumulating evidence suggests that 'intention to comply' is considered a sufficient predictor of environmentally responsible behavior, including regulatory compliance in protected areas (Jett *et al.*, 2013; Montes *et al.*, 2018; Vagias *et al.*, 2014). In the proposed predictive model, 'intention to comply' played a role as a mediator between cognitive factors, situation factors, and regulatory compliance. While little is known about the effects of media exposure in explaining park visitors' behavior, this study investigates the effectiveness of media exposure in predicting a park user's intention to act and comply with regulations. This leads to the notion that media exposure can play a moderating role in the relationships between the intention to comply and actual regulatory compliance. This study aimed to develop a proposed predictive model for regulatory compliance and investigated the influence of cognitive and situational factors on regulatory compliance by visitors in Thailand's national parks. The findings from this study may have implications for improving visitors' regulatory compliance, resulting in more appropriate behavior and improved environmental conservation.

2. Conceptual Model and Hypotheses Development

The conceptual model of this study is based on cognitive and situational factors involving ten predictor factors, as illustrated in Figure 1.

In this empirical research, ten hypotheses were constructed to achieve the objectives of this study.

H1: Knowledge of regulations has a positive effect on the intention to comply.

H2: Awareness of regulations has a positive effect on the intention to comply.

H3: Personal morality has a positive effect on the intention to comply.

H4: Perceived injunctive norms have a positive effect on the intention to comply.

H5: Perceived regulatory legitimacy has a positive effect on the intention to comply.

H6: Regulatory enforcement has a positive effect on the intention to comply.

H7: Legal sanctions have a positive effect on the intention to comply.

H8. Persuasive communication has a positive effect on the intention to comply.

H9: Intention to comply has a positive effect on regulatory compliance.

H10: Media exposure moderates the relationship between intention to comply and regulatory compliance.

3. Methodology

The study area comprised five national parks - Chae Son National Park, Khao Yai National Park, Kaeng Krachan National Park, Nam Tok Phlio National Park, and Khao Luang National Park; these parks were selected in a systematic manner based on three factors: (1) issues of regulatory compliance by park visitors; (2) number of park visitors; and (3) diversity of recreational activities. The study population consisted of park visitors who used the parks for recreational purposes. The sample size was determined using the program G*Power 3 (Faul *et al.*, 2007). Based on its calculations, the minimum sample size for the predictive model analysis equated to 350 samples. As this research covered nationwide data, the determined number of participants was 1,000 participants, with 200 in each of the five areas. The convenience sampling technique was utilized to collect data in the respective study areas from both weekends and weekdays.

A self-administered questionnaire consisting of twelve sections was developed. Section A contains questions pertaining to visitor travel patterns. Section B intends to gather visitors' practices in regulatory compliance. Section C to K, respectively, aims to investigate factors predicting regulatory compliance. Section L contains questions pertaining to sociodemographic information. Most of items were measured on a four to six-point summated rating scale, whilst visitors' practices in regulatory compliance (as well as knowledge on regulations) were binary answers 0 or 1. The questionnaires were tested
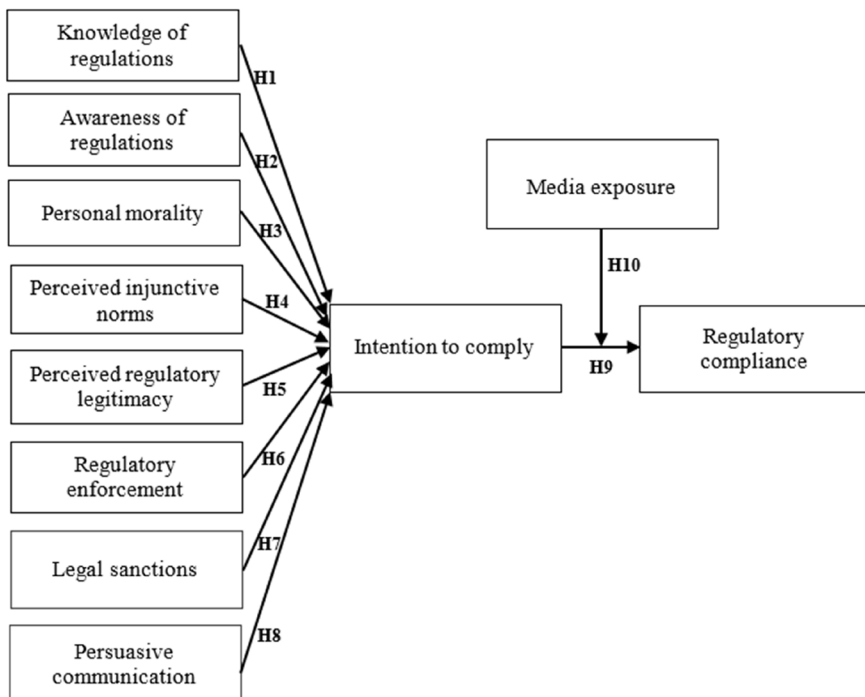

Figure 1. Conceptual model of conservation regulatory compliance

with experts in order to ensure content validity. A pilot test of the survey was completed and the reliability of items in the questionnaire was estimated using the Cronbach's alpha method; the reliability for summated rating scale was greater than 0.7, which indicated that the questionnaire was reliable.

The descriptive analysis undertaken in this research involved descriptive statistics to detail frequencies, mean values, and percentages of visitor characteristics, national park visit behavior, regulatory compliance, and predictor factors related to regulatory compliance using SPSS software. With regard to the analysis of the independent variables' influence on the dependent variable, path model analysis was conducted using AMOS software. The statistical criteria were as follows: (1) The chi-square must have a *p*-value greater than 0.05, (2) the RMSEA must be lower than 0.05, (3) the GFI must be greater than 0.95, and (4) lastly, the AGFI must be greater than 0.95 (Kline, 2005). In addition, moderation analysis (media exposure) was carried out by means of regression analysis using SPSS software.

4. Results and Discussion

4.1 Regulatory compliance and related factors

Table 1 indicates the visitors' regulatory compliance. Generally, visitors complied with the conservation regulations at a high level (70.2 %). The results of the regulatory compliance survey, through 20 question items, found that visitors' top three positive practices included: separating waste and disposing of it in separate bins provided (71.0 %), putting waste into a bag and disposing of it outside the national park area (67.7 %), and avoiding the use of plastic bottles or plastic bags as food containers (57.8 %). Visitors' top three negative practices included: buying food packed in Styrofoam containers for a picnic (32.4 %), making noise during walks along natural trails (28.5 %), and taking cooking utensils outside of the campsite for convenience (23.0 %).

The aforementioned study results demonstrated that visitors separated waste before disposing of it or brought waste out of the national park for disposal. This might result from the fact that the DNP previously developed campaigns to aid environmental conservation in the national parks and used social media as a PR channel for the campaigns; furthermore, national parks established environmental campaign projects under the DNP's policies, for example, the Returning the Trash Project, the Green National Park Project, and the Waste-to-Gift Project, in which park visitors were invited to participate in these activities. In addition, various national parks communicated with visitors via signage to encourage them to be aware of the benefits of waste separation.

The study also found that visitors frequently took Styrofoam containers into the national parks even though the park authority had previously imposed regulations forbidding Styrofoam use adding legal penalties for violation. This finding is due to the fact that most visitors often purchase food packed in Styrofoam containers from local shops outside of the national parks before entry. This could be described as "situationism", which is a psychological theory emphasizing that human behavior is influenced by external, situational factors rather than internal traits or motivations (Bowers, 1973). As a result, the national park authority should encourage local shop owners to comply with the DNP's Styrofoam container-free policy.

Overall, the study showed that both cognitive and situational factors play an important role in encouraging regulatory compliance. The study has allowed us to identify that visitors intended to comply with park regulations at a high level (Mean=5.20; S.D.=0.75). Table 2 showed that park visitors had awareness of regulations at a high level (Mean=5.23; S.D.=0.76); had personal morality at a high level (Mean=5.17; S.D.=0.67); perceived injunctive norms at a high level (Mean=5.06; S.D.=0.87); perceived media exposure at a high level (Mean=4.74; S.D.= 0.93); perceived legal sanctions at a moderate level (Mean=4.48; S.D.= 1.02); had knowledge of regulations at a moderate level (Mean=8.20; S.D.=2.19); perceived regulatory legitimacy at a moderate level (Mean=3.48; S.D.=1.13); perceived persuasive communication at a moderate level (Mean=2.88; S.D. = 0.76); and perceived regulatory enforcement at a moderate level (Mean=2.87; S.D.= 0.76).

Table 1. Practice on conservation regulatory

No.	Items	Done it. %	Never done it. %
1	Buying food packed in styrofoam containers for a picnic.	32.4	67.6
2	Taking selfie photos and making noise during walks along natural trails.	28.5	71.5
3	Eating and drinking alcoholic beverages as part of a group party.	22.5	77.5
4	Taking cooking utensils outside of the campsite for convenience.	23.0	77.0
5	Setting up a tent outside a designated campsite for privacy.	20.2	79.8
6	Washing containers and utensils beside the campsite.	20.0	80.0
7	Feeding wild animals or fish in water bodies for fun.	17.3	82.7
8	Playing music, singing, and playing the guitar at the campsite.	16.4	83.6
9	Using chemicals for repelling ants or other insects at the campsite.	15.5	84.5
10	Going off-trail hiking to get closer to natural surroundings.	13.8	86.2
11	Using dried branches or twigs to make a fire for cooking or creating a boisterous atmosphere.	11.6	88.4
12	Bringing pets to expose them to natural surroundings.	9.5	90.5
13	Bringing a weapon for protection in case of unexpected incidents.	8.2	91.8
14	Picking beautiful flowers, leaves, stones, or forest products as souvenirs.	8.0	92.0
15	Disposing of food waste or other waste in a spot that is not a trash bin because the bin is placed too far away.	7.4	92.6
16	Engraving a tree to symbolize your visit.	6.2	93.8
17	Separating waste and disposing of it in separate bins provided.	71.0	29.0
18	Putting waste into a bag and disposing of it outside the national park area.	67.7	32.3
19	Avoiding using plastic bottles or plastic bags as food containers.	57.8	42..2
20	Bringing food containers made with natural materials.	49.5	50.5

Table 2. Factors associated with regulatory compliance

Variable	Mean	Standard deviation	Interpret
Awareness of regulations (ARC)	5.23	0.76	High
Intention to comply (INC)	5.20	0.75	High
Personal morality (PMR)	5.17	0.67	High
Perceived injunctive norms (ISN)	5.06	0.87	High
Media exposure (MES)	4.74	0.93	High
Perceived legal sanctions (LST)	4.48	1.02	Moderate
Knowledge of regulations (KPR)	8.20	2.19	Moderate
Perceived regulatory legitimacy (LEG)	3.48	1.13	Moderate
Perceived persuasive communication (PER)	2.88	0.76	Moderate
Perceived regulatory enforcement (REN)	2.87	0.76	Moderate

4.2 Path model analysis of regulatory compliance

To examine the path coefficient (beta), path model analysis shows the direct effect of an independent variable on a dependent variable in the path model. Generally, standardized coefficients with absolute values less than .10 may indicate a "small" effect size; values around .30 indicate a "medium" effect size; and values exceeding 0.50 or more are considered to have a "large" effect size (Kline, 2005). Results in Table 3 revealed that the predictor factors (i.e., knowledge of regulations, awareness of regulations, personal morality, perceived injunctive norms, perceived regulatory legitimacy, regulatory enforcement, legal sanctions, and persuasive communication) had small and medium sized effects on intention to comply. The intention to comply had a medium sized effect on regulatory compliance.

An analysis of the direct effects of these predictor factors found that the factors with the highest positive direct effect on the intention to comply consisted of persuasive communication (0.321), followed by perceived regulatory legitimacy (0.178), personal morality (0.161), awareness of regulations (0.153), perceived injunctive norms (0.092), and regulatory enforcement (0.095), respectively. This analysis demonstrated that these six factors had a positive direct effect on the intention to comply. These results indicated that H2, H3, H4, H5, H6, and H8 were relatively accepted. There were two factors that had a negative direct effect on the intention to comply – legal sanctions (-0.124) and knowledge of regulations (-0.067). These factors had a direct effect on the intention to comply, but in the opposite direction. Therefore, the hypotheses H1 and H7 were rejected. In addition, the results found that the intention to comply had a positive direct effect on compliant behavior (0.496), which suggested that the intention to comply had a positive direct effect on compliance behavior. Thus, H9 was accepted.

Table 3. Standardized regression weights of path model

Parameter (path)	Standardized estimate (beta)	Critical ratio	*p*-value
KPR ⟶ INC	-0.067	-2.735	.001
ARC ⟶ INC	0.153	4.763	.006
PMR ⟶ INC	0.161	5.137	.001
ISN ⟶ INC	0.092	3.023	.001
LEG ⟶ INC	0.178	6.876	.002
REN ⟶ INC	0.095	2854	.001
LST ⟶ INC	-0.124	-4.678	.004
PER ⟶ INC	0.321	9.542	.001
INC ⟶ RCB	0.496	11.298	.001

Based on the statistics, the relationships between predictor variable, intention to comply, and regulation compliance behavior provide a relatively good fit to the data and verify the convergent validity of the measures ($\chi2 = 17.33$, p = 0.06, df = 10, GFI = 0.99, AGFI = 0.98, CFI = 0.99, SRMR = 0.00, RMSEA = 0.02). This finding indicates that the results are relatively accepted due to the relative chi-square being less than 2.0 based on Kline's (2005) recommendations. The squared multiple correlations (R^2) of the cognitive factors, situational factors and intention to comply had an effect on regulatory compliance at the level of 61.50% ($R^2 = 0.615$). Therefore, all factors could jointly explain the variance of regulatory compliant behavior. The standardized regression weights of factors are illustrated in Table 3.

An indirect effect analysis suggested that all the independent variables had a statistically significant indirect effect on compliant behavior, which was an indirect effect on the intention to comply.

Table 4. Standardized direct, indirect and total effect of path model

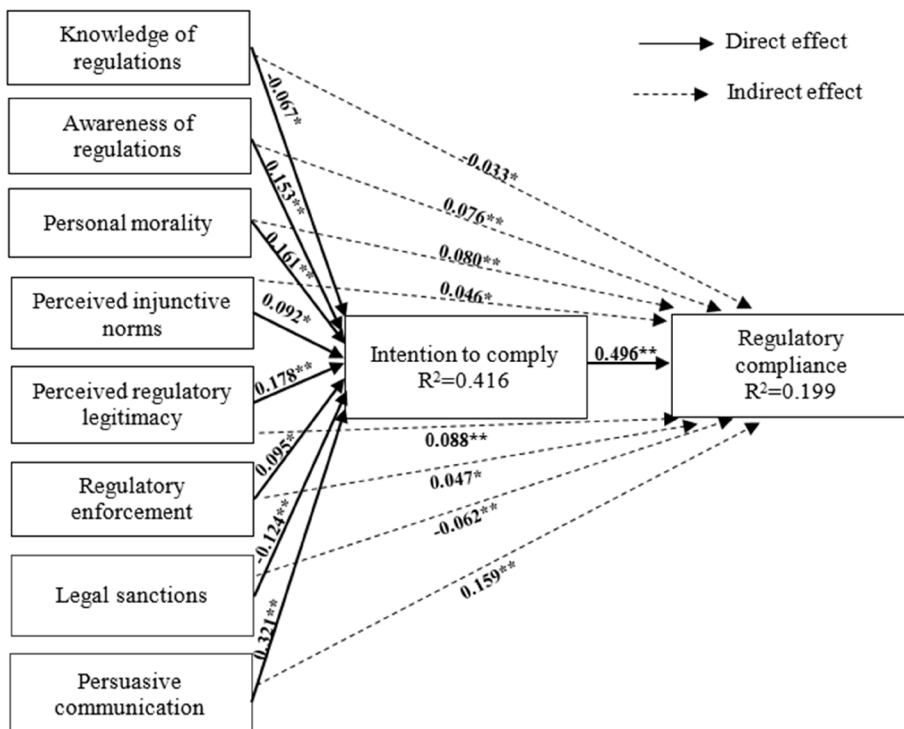| Variables	Intention to comply			Regulatory Compliance		
	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect	Total effect
KPR	-0.067	-	-	-	-0.033	-0.100
ARC	0.153	-	-	-	0.076	0.229
PMR	0.161	-	-	-	0.080	0.241
ISN	0.092	-	-	-	0.046	0.138
LEG	0.178	-	-	-	0.088	0.266
REN	0.095	-	-	-	0.047	0.142
LST	-0.124	-	-	-	-0.062	-0.186
PER	0.321	-	-	-	0.159	0.480
INC	-	-	-	0.496	-	0.496

Figure 2. Diagram of the direct and indirect effects of path model.
Remark: * $p < 0.05$, ** $p < 0.01$

The variable with the greatest indirect positive effect was persuasive communication (0.159), followed by perceived regulatory legitimacy (0.088), personal morality (0.080), regulatory awareness (0.076), regulatory enforcement (0.047), and perceived injunctive norms (0.046). Knowledge of regulations (-0.033) and legal sanctioning had a negative indirect effect (-0.062). Considering the total value of the effects, the variables with the highest total value of effects on compliant behavior included the intention to comply (0.496) followed by persuasive communication (0.480), perceived regulatory legitimacy (0.266), personal morality (0.241), regulatory awareness (0.229), regulatory enforcement (0.142), perceived injunctive norms (0.138), knowledge of regulations (-0.100), and legal sanctions (-0.186), respectively as depicted in Table 4 and Figure 2.

However, knowledge of regulations was a predictive variable that had an inverse influence on the outcome variable. That is, visitors equipped with a higher level of knowledge about national park regulations were more likely to have a lower degree of regulatory compliance. This finding was consistent with past studies on legal compliance by Thai citizens, which demonstrated that knowledge of traffic rules had no influence on compliance (Darawong, 2001; Verapatanakul, 1997). This was also consistent with a study by Chalermkiat (1997), who found that passenger car users with a higher educational level violated traffic rules to a higher degree than their counterparts who had a lower educational level. It can be concluded that people with a higher level of national park regulation-related knowledge might not comply with regulations at a level consistent with their knowledge.

Furthermore, legal sanctioning was another predictive factor that showed an inverse relationship with compliance. The aim of legal sanctions is to create perceived severity, the possibility of being arrested, and the possibility of receiving immediate punishment. When people in society perceive the threat of legal sanctions, their inclination towards wrongful actions may be deterred (Blumstein and Nagin, 1977). This research project found that the perception of legal

sanctions by most of park visitors was at a high level, but their actual behavior was in opposition with these rules. It is possible that people did not perceive these sanctions as an actual threat, resulting in visitors having no fear of legal sanctions. This may also be derived from sociocultural factors. Chupikulchai *et al*. (1988) surveyed the beliefs of Thai families about the adoption of values of Thai society and their impact on socialization. Their study identified that most of the families acknowledged the sayings: "True Thais do what they pleased" and "Regulations are just words," which reflect acceptance of violating regulations and social rules. This was also consistent with previous research findings on nonconformance with national park regulations of local people by Tanakanjana and Haas (1996), who found that non-conformers did not value conformity. This should be taken into account by national park authorities.

4.3 Moderation analysis of media exposure

The investigation of the moderation effect is applied to the hierarchical multiple regression analysis. This technique can identify if a moderator variable is a pure mod¬erator or a quasi-moderator. In this research, the moderator regression analysis involved testing the three models. In Model 1, an independent variable (INC) was tested to predict a dependent variable (RCB). In Model 2, an independent variable (INC) and moderator variable (MES) were tested in order to predict a dependent variable (RCB). The last model, Model 3, a full model, consisted of three terms – independent variable (INC), moderator variable (MES), and interaction term (INC x MES). These three terms were tested to predict a dependent variable (RCB). The equation used in the testing (Cohen *et al*., 2003) is $Y = b_0 + b_1X + b_2Z + b_3XZ$.

The analysis showed that in Model 1, the INC had a significant effect on RCB (β=0.44, t=15.87, $p < 0.01$). In Model 2, the INC had a significant effect on RCB (β=0.45, t=15.88, $p < 0.01$), while MES had no significant effect on RCB (β=0.02, t=15.87, $p > 0.05$). In Model 3, the INC had no significant effect on RCB

(β=0.08, t=0.54, $p > 0.05$), while MES had a significant effect on RCB (β=0.41, t=2.77 $p <$ 0.01), and the interaction term (INC x MES) had a significant effect on RCB (β=0.56, t=2.70, $p < 0.01$), as presented in Table 5.

It can be concluded that media exposure was a moderator variable because it had an interaction effect, in conjunction with the independent variable, on the dependent variable in Model 3. The coefficient of prediction (R^2) in Model 3 was found to be little greater than that in Model 1 and 2. Media exposure was classified as a quasi-moderator. That is, it had an effect on the relationship between the independent variables and the dependent variables (Sharma *et al.*, 1981). This can help to explain the fact that media exposure resulted in a change in the intention to comply and compliant behavior.

A conclusion can be drawn then that MES stimulated the size or direction of the positive relationship between INC and RCB, thereby H10 was accepted.

This study found that media exposure of visitors was the variable moderating the relationship between visitor intention to comply and actual regulatory compliance. This finding agreed with the behavior of information consumption among Thai people, who prefer to be exposed to media, especially online media. This was also in accordance with the results of consumer behavior studies, which indicated that media exposure was the variable moderating the relationship between the intention to comply and actual regulatory compliance (Bautista *et al.*, 2017; Sun, 2013).

5. Conclusion

The predictive model was consistent with the empirical data. We confirmed that essential predictors of regulatory compliant behavior consisted of persuasive communication and perceived regulatory legitimacy. This research has implications for improving visitors' regulatory compliance using persuasive communication strategies. First, national park authorities should develop persuasive message content in line with the cognitive processes underlying visitor behavior. For example, regulatory signs should include the reasoning behind them, which will stimulate the perceived legitimacy of regulations. Second, the development of message content for interpretation needs to include rational message appeals to stimulate regulatory awareness. Third, national park authorities should formulate public communication strategies that include normative behavior for national park visits. Fourth, visitors' knowledge and understanding of regulations and legal sanctions were not a positive predictive variable for regulation compliance. This finding should be considered in the formulation of measures to promote regulatory-related behaviors, which should instead be formulated based on sociocultural characteristics. Fifth, the DNP should train park officers in persuasive communication strategies, which they can apply to design communication to persuade visitors to comply with park regulations. Finally, the DNP as a policy maker should publicize national park-related news via social media to raise public awareness of compliance with park regulations.

Table 5. Testing the moderating role of media exposure

Independent variable	Model 1		Model 2		Model 3	
	β	t-value	β	t-value	β	t-value
Intention to Comply (INC)	0.44**	15.87	0.57**	15.88	0.08	0.54
Media Exposure (MES)			0.02	0.65	0.41**	2.77
INC × MES					0.56**	2.70
R^2	0.202		0.203		0.208	
Adjust R^2	0.201		0.200		0.205	
F	251.95		126.11		87.043	

Remark: ** $p<0.01$

Acknowledgement

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