An Investigation on the Intralocality Differences in Health and Safety Implementation of Construction Industries

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Abstract

Generally, the status of health and safety in the construction sector is reported to be declining. Consequently, this indicates the necessity of developing an awareness and a comprehensive knowledge among the role of various stakeholders in their contribution to construction health and safety improvement. As part of the construction industry stakeholders, the role of localities is one of the factors to consider in the formation of construction health and safety knowledge and practice. Despite the plethora of construction health and safety studies found in the literature, there have been very few studies that have considered the association between localities and construction health and safety practices. In this paper, a Chi-square test of independence is used to investigate the dependence between the localities and their safety practices. Moreover, this study contributes to existing literature in such a way that it is the first to consider the relationship between intralocality and health and safety practices in the context of the construction industry. Furthermore, this study will be valuable for construction stakeholders in the formulation of a more unified and standardized health and safety practices and regulations. Alternatively, results reveal that a significant association exists between the localities and their construction health and safety practices. Furthermore, this suggests that in Cebu, Philippines, there is a varying and no fixed set of guidelines on safety and health currently in practice at the local level. Hence, in the aspect of policy-making, it is imperative to consider and come up with a cohesive and standardized set of regulations to improve the safety status in the construction sector.

Keywords: health and safety, construction industry, intralocality differences

1.0 Introduction

Generally, the present status of construction health and safety has been reported to be of low performance across different studies (Health and Safety Executive, 2018; Windapo & Jegede, 2013; Idoro, 2011). In countries with sufficient statistical data, for instance, Great Britain, fatalities in the construction sector covers 38% and is recorded to be the highest as compared to other sectors (i.e., 35% for other sectors; 29% for agriculture; 15% for both transport and storage, and manufacturing; and 12% for waste). On the other hand, the construction industry, particularly in Asia, is currently on an increasing trend and have been providing a significant number of employment opportunities for many laborers. Various construction sites, from large construction facilities to small ones, are generally seen in urban areas and towns. Construction workplaces are regarded as most hazardous where accidental incidences are present in any working setting (Mashwama, Aigbavboa, & Thwala, 2016). To a large extent, construction sites are complex and, at the same time, risky. Its complexity is reflected through its utilization of different equipment, contemporary methods of construction, and the interdisciplinary nature of its personnel (Debrah & Ofori, 2001).

In the Philippines, the construction industry employs 8.8% of the total workforce participation. Precisely, this is about 3.50 million workers among 40.30 million employed individuals across various industries (Philippine Statistics Authority, 2017). Injuries and fatalities from this sector rank sixth in the year 2015 and comprises 4% (2,155 incidents) of occupational injury and accident cases. While the current statistics presented may connote a lower value, this may also imply an understatement given the increasing trend of construction establishments being registered each year. In a larger scale, this sector employs 7% of the world's labor force and accounts to 30%–40% of industrial accidents (Sunindijo & Zou, 2012).

Construction site safety has long been considered crucial in the aspect of construction work (Teo & Ling, 2006; Al-Kaabi & Hadipriono, 2003; Leung & Chow, 2002). Safety is primarily developed through engineering programs, workforce training, and implementation of directives by close-compliance inspection (Laufer, 1987). More importantly, an effective safety management system is significant to reduce the high rate of occupational incidents and provide a more secure labor environment. In an attempt to decrease accidents, several advantages can be derived, such as improved productivity and decreased accidental spending from construction firms (Jaafar et al., 2017).

Despite the considerable importance of construction safety, this practice continues to be undervalued in most construction firms. Interestingly, despite efforts on improving the current state of safety in this sector, it is found out that the implementation of safety management systems appears to be of low contribution (Teo & Ling, 2006). For instance, the Occupational Safety Department, Ministry of Manpower (MOM) in Singapore has implemented safety management systems and auditing for about ten years yet found an insignificant improvement in its safety standard. This scenario is opposite to the shipbuilding sector, which underwent substantial improvement in its safety performance succeeding its safety management system and audit application (Teo & Ling, 2006). This decreased improvement in safety can be attributed to a lenient administrating body and an insufficient standard policy for safety evaluations and audit. In the Philippines, the Department of Labor and Employment (DOLE) revealed that in the year 2016, accredited occupational safety and health (OSH) practitioners in the construction industry equate to 544 individuals. Subsequently, PSA (2018) declared that the estimated number of establishments engaged in the construction industry in the year 2016 is 986. From this, it can be argued, however, that a significant disparity exists between the ratio of OSH personnel and the number of construction firms. Accordingly, few scholars have proved the significant relation between safety program implementation and enhanced construction safety performance (Jaselskis, Anderson, & Russell, 1996; Tam & Fung, 1998). Likewise, Jaselskis et al. (1996) emphasized the importance of construction safety representatives as an essential factor in the improvement of safety performance. Hence, the need to produce more accredited OSH practitioners and consultants in the construction sector is imperative. Similarly, a study by Al-Kaabi & Hadipriono (2003) asserted that contractors in the United Arab Emirates (UAE) have all agreed of the absence of government agency and safety personnel with regard to the inspection of construction sites for safety.

Moreover, the insufficiency of standard procedure regarding safety audit may also contribute to the low performance in construction safety implementation. For instance, in Singapore, it has been found out that various safety auditing organizations employ different sets of audit procedures grounded on the generalized guidelines from the Singapore Code of Practice on Construction Safety Management System (CP79). Additionally, the manual is found to have no stipulated standard instructions and no standard checklists for safety level inspections of safety management systems. Further, audit checklists differ across construction firms. Meanwhile, audit companies lower their service bids to gain more safety auditing contracts from various construction firms, hence, resulting in a decreased quality on safety audits (Teo & Ling, 2006). In the Philippines, it has been provisioned that regular audits will be performed annually (DOLE, 2016). However, cases of occupational accidents, illnesses, or other dangerous occurrences are continuing to rise in number. From this, it can be argued that the mode of scheduled inspection is not sufficient enough to compensate the problem of improved safety performance on construction sites. Accordingly, this is evidenced by Singapore's practice on biannual audit, further revealing that with the country's current audit scheduling, improvement is still minimal (Teo & Ling, 2006).

In the construction sector, stakeholders are essential for a project's success. Specifically, regarding health and safety, different groups are required to be involved in accomplishing an improvement. In achieving project success, stakeholders' outlooks and expected outcomes must be fulfilled (Chan & Oppong, 2017). Through this, stakeholders in the construction industry will get to know each of their roles towards the improvement of health and safety and the corresponding implications of their involvement (Umeokafor, 2018). It is also particularly essential to create awareness and common understanding among stakeholders regarding the role of contractors in health and safety enhancement (Idoro, 2011). Moreover, a study by Idoro (2011) asserts that among various stakeholders, contractors play a significant role in the execution and influence of health and safety practices in construction firms.

In extant literature, various scholars have taken into consideration the role and implication of multiple stakeholders in health and safety research. More importantly, in specific, Umeokafor (2016) has asserted the influence of communities or localities in health and safety regulation in construction firms. However, there have been little studies in the literature that investigate the involvement of communities in health and safety practices in the context of the construction industry. Most of the studies focus on the generalized areas of stakeholder management, risk management, and stakeholder perception (e.g., risk, stakeholder power, sustainable construction strategies, and cost-related factors) to mention a few. For instance, Chmutina & Rose (2018) assessed the level of perception and awareness among construction stakeholders in Nepal regarding their knowledge of hazards and disaster risk reduction measures. Alternatively, a study by Mok, Shen, and Yang (2015) conducted a systematic review of stakeholder management in mega-construction projects. The study was intended to improve the domain on stakeholder theory due to its prospect to improve and manage balance among stakeholder interests in compound project environments. Additionally, Mashwama, Aigbavboa, and Thwala (2016) investigated the effects and cost of disputes in Swaziland (South Africa) construction projects. Generally, while these studies were successful in their investigation on stakeholder management, these do not provide sufficient findings on the association of intralocality differences about the community's health and safety programs.

As such, it is essential to investigate the influence of communities regarding their generalized health and safety practices in the construction sector, taking into consideration the poor health and safety regulatory setting and policies of developing countries (Idoro, 2011). Such will give an insight into the strategies and policies to be implemented by various stakeholders to improve construction health and safety programs. This study attempts to fill such gap by examining the association between communities on which construction sites are located and the safety programs and practices they employ at the local level. A case study was performed in three cities of Cebu—Mandaue City, Cebu City, and Talisay City. Accordingly, the three cities were chosen based on city class type and urbanization rate. Consequently, such a high urbanization rate will lead to more infrastructure and construction activities. Survey questionnaires were distributed to six respondents from Talisay City, eight respondents from Mandaue City, and fifty-six respondents from Cebu City. In general, one representative each from United Architects of the Philippines, Philippine Institute of Civil Engineers, and Cebu Contractors Association was chosen to participate in the study. Additionally, three contractors from Talisay City, five contractors from Mandaue City, and fifty-three contractors from Cebu City had also taken part in the survey research. Moreover, this paper will contribute to the nascent field of health and safety management in the context of geographic location or intralocation differences in construction safety and health practices.

The remaining sections of this paper present the methods of the study, including the research instruments and statistical analysis used for the interpretation of data (section 2). In section 3, the case study is elaborated as to the research environment, respondents, and sampling technique employed. Finally, sections 4 and 5 present the study's results and discussion and conclusion respectively.

2.0 Methodology

In this study, unstructured interviews and a survey were performed to sufficiently gather the required data. Furthermore, in the research respondents section, a qualification requirement for both experts and contractors are elaborated to ensure the aptness of their selection. Meanwhile, on the instrument section, a discussion on the development of the survey questionnaire is expounded. Finally, in the last section, an overview of the Chi-square method in the context of this study is explained, specifying what variables are examined.

2.1. Research Respondents

The research respondents (i.e., experts and contractors) were mainly chosen based on a purposive and a snowball sampling technique. As a result, various stakeholders from nongovernmental organizations, consultants, and client organizations were regarded as expert respondents (Umeokafor, 2018). Specifically, expert respondents such as those accredited members from the United Architects of the Philippines (UAP), Philippine Institute of Civil Engineers (PICE), Cebu Contractors Association (CCA) took part in the survey. More importantly, the UAP, PICE, and CCA were the chosen organizations from where experts were obtained due to the interdisciplinary nature of these organizations. Accredited members from these firms can sufficiently recommend qualified contractors for the study. The experts were then subjected to an unstructured interview and were considered as key informants for the recommendation of the required and qualified contractors (Umeokafor, 2018). The criteria for the expert respondents were that they must be involved in the development, qualification, and/ or audit of safety and health practices at least on the local level and must have a rigorous exposure in the construction industry of at least eight years. They must also have a working affiliation with the qualified contractors actively engaged in construction-related projects. Moreover, for the contractors, they must be duly licensed, completely accredited by authorizing government units (i.e., DOLE, Department of Public Works and Highways, Department of Trade and Industry, Construction Industry Authority of the Philippines, and the Philippine Regulation Commission), and must have at least eight years of operational experience as a contractor (Umeokafor, 2018). Furthermore, an implementation of a health and safety system must be present, and it must adhere to the stipulations, according to the DOLE- Bureau of Working Conditions OSH Standards manual.

2.2. Instrument

This paper made use of a survey questionnaire to obtain data from respondents who are involved in the construction industry. The survey questionnaire is tailored and based on the Philippine Occupational Safety and Health (OSH) Standards, specifically under Rule 1410 on Construction Safety (DOLE, 2016). Furthermore, with the standard used as a reference, this aids the relevance of the items and sub-items considered in the questionnaire. Moreover, each of the items is tailored according to the stipulations provided in the standard and further serves as a method to ensure relevance of the items specified in the questionnaire. The contents of the survey questionnaire are only limited to and based on three major factors, namely, management commitment, compliance with in-house safety rules and regulations, and control of personal protective equipment (PPE). Given that these factors are based on the standards as specified in the DOLE (2016) manual, it is, however, deemed sufficient to adopt these three factors in the investigation of intralocality differences among the three cities considered in this study. The survey questionnaire is depicted in Table 1 as follows.

Table 1. *Sample Questionnaire*

Item	Status				
	NC	LC	C	WC	VWC
Management commitment					
1.Identification of key personnel for overall coordination					
2.Commitment of the organization to full compliance with all relevant health and safety legislation					
3. Health and safety performance, including a commitment to progressive development					
4. Involvement of employees as part of their obligation, the quality of their work environment, and active contribution to safety					
5. Effective arrangement for reviewing safety policy and management system at least once a year					

Item	Status				
	NC	LC	C	WC	VWC
6. Prompt surveillance of relevant input and revision from all employees for corrective action					
7. Prompt collection, review, and implementation of feedback from employees in all levels					
8. Presence of an organizational chart to show the names and position on training, human, and financial resources					
9.Identification of safety leaders among employees, including their health and safety responsibilities					
10. Arrangement or consultation, communication, and documentation of safety status for measuring performance					
11. Provision of competent safety operations control					
12. Attainment of a regular update on health and safety information, including changes to regulations, new codes of practice, newly identified hazards, and new work practices					
Compliance with in-house safety rules and regulations					
13. Regular review of health and safety training plan					
14. Implementation and accomplishment of workers' basic general safety training					
15. Implementation and accomplishment of workers' site-specific safety training					
16. Supervision of regular toolbox meetings to reinforce safety basics among workers					
17. The effectiveness of health and safety training monitored by checking the new skills applied					
18. Provision of a regular system audit to validate the effectiveness of health and safety policies, objectives, and plans					
19. Enforcement of inspection by safety officers and supervisors to carry out safety at regular intervals					
20. Prompt action and correction of safety audit callouts					
21. Completion of analysis on safety audit results					
22. Provision for safety bulletin board					
23. Display of accident statistics					
24. Distribution of safety signs and posters					
Control of personal protective equipment (PPE)					
26. Provision of an inventory system to ensure sufficient stock of PPE					
27. Stipulation of PPE specifications in safety plans					
28. Specification and implementation of issuance system, recording, and inspection of PPE					
29. Administration of training on the usage and maintenance of PPE					
30. Specifications on the monitoring procedures of PPE brought by subcontractors or workers					

Legend:

VWC- Very well complied *WC- Well complied* *C- Complied*
LC- Least complied *NC- Not complied*

2.3. Chi-Square Test for Independence

The chi-square test for independence is a nonparametric statistical test designed to analyze group differences when the dependent variable is measured at a nominal level (McHugh, 2013). It is a significant accomplishment in the early twentieth century statistics (Diaconis & Efron, 1985). In contrast to other statistical tests, the chi-square test can not only provide information on the significance of any observed differences but it also provides detailed information on exactly which categories account for any differences found (McHugh, 2013). More importantly, this method reveals to be appropriate in the context of this study as this sufficiently provides evidence of association or relationship between the practices among the three cities and localities considered, enabling a simple interpretation. The assumptions of the chi-square test are given as follows (McHugh, 2013).

1. The data in the k groups belong to the set of natural numbers, including zero, rather than percentages or some other transformations of data;
2. The levels of the variables are mutually exclusive;
3. Each subject contributes data to one and only one cell;
4. The study groups must be independent;
5. There are two variables, and both are measured as categories, usually at the nominal level; and
6. The value of the cell expected should be five or more, in at least 80% of the cells, and no cell should have an expected of less than one.

The chi-square statistic can be calculated using the equation below, given as:

$$\sum X_{i-j}^{2} = \frac{(O-E)^2}{E}$$

where O represents the observed frequency, and E represents the expected frequency.

In this paper, the chi-square test of independence is used to infer if the practices of the respondents depend on their locality. As such, the hypotheses of the test can be stated as follows:

H0: The two variables, (i) locality and (ii) practices, are independent.

H1: The two variables, (i) locality, and (ii) practices, are dependent.

As such, the result of the paper helps determine if a dependence between localities and practices between cities exists.

Case study

A case study was performed in three cities within Cebu, namely, Talisay, Mandaue, and Cebu City. Accordingly, the three cities were chosen based on city class type and urbanization rate. Consequently, such a high urbanization rate will lead to more infrastructure and construction activities. The case study conducted among the three cities shows to be appropriate due to the proliferation of various contractors in these areas. Moreover, a purposive and a snowball, non-probability sampling technique was used in the selection of the research respondents (Umeokafor, 2018). Primarily, snowball sampling enabled the expert respondents from the UAP, PICE, and CCA to recommend qualified and accredited contractors currently engaged in construction-related projects with an existing health and safety system (Suri, 2011). Furthermore, this sampling method aided in identifying the appropriate contractor to be considered due to the difficulty of distinguishing which among the significant number of accredited contractors from the three cities should be chosen (Umeokafor, 2018).

Generally, survey questionnaires were distributed to six respondents from Talisay City, eight respondents from Mandaue City, and fifty-six respondents from Cebu City. In each of these cities, one representative from United Architects of the Philippines (UAP), Philippine Institute of Civil Engineers (PICE), and Cebu Contractors Association (CCA) took part in the survey. Specifically, three contractors from Talisay City, five contractors from Mandaue City, and fifty-three contractors from Cebu City were selected based on the recommendation of the prior three respondents coming from UAP, PICE, and CCA of each city. Additionally, contractors from this study were chosen based on their experience in projects and their knowledge on construction health and safety practices.

3.0 Results and Discussion

By surveying the respondents from different localities regarding their health and safety practices, results treated using the Chi-square test and its implications are presented in this section. Table 2 shows the ratings among the respondents in the three cities of Talisay, Mandaue, and Cebu City. Specifically, each of the item, along with its degree of compliance (DE), frequency (F), and percent value (P), is shown. Moreover, the number of respondents (N) for each city is also indicated. To illustrate this, for instance, in the city of Talisay, item 1 under management commitment to safety has a DE of very well complied (VWC), having three respondents (F) in total who rated this item with a percentage value (P) equivalent of 50%. For this table, take note that the figures represent results with the highest percentage share, hence, considered as the final rating for each item.

Table 2. *Summary of results*

Item	Talisay			Mandaue			Cebu City		
	N= 6			N= 8			N= 56		
	DE	F	P	DE	F	P	DE	F	P
Management commitment to safety									
1.Identification of key personnel for overall coordination	VWC	3	50.00	C	3	37.50	C	26	46.42
2.Commitment on the organization to full compliance with all relevant health and safety legislation	VWC	4	66.66	WC	4	50.00	WC	22	39.28
3. Health and safety performance including a commitment to the progressive development	WC	3	50.00	C	3	37.50	WC	22	39.28
4. Involvement of employees as part of their obligation, the quality of their work environment and active contribution to safety	C	2	33.33	WC	3	37.50	WC	20	35.71
5. Effective arrangement for reviewing safety policy and management system at least once a year	WC	3	50.00	WC	3	37.50	WC	18	32.14
6. Prompt surveillance of relevant input and revision from all employees for corrective action	WC	2	33.33	C	3	37.50	WC	19	33.92
7. Prompt collection, review, and implementation of feedback from employees at all levels	C	3	50.00	WC	3	37.50	WC	21	37.50
8. Presence of an organizational chart to show the names and position on training, human and financial resources	WC	3	50.00	WC	3	37.50	WC	21	37.50
9.Identification of safety leaders among employees including their health and safety responsibilities	C	2	33.33	WC	4	50.00	WC	21	37.50

10. Arrangement or consultation, communication and documentation of safety status for measuring performance	C	3	50.00	C	3	37.50	WC	17	30.35
11. Provision of competent safety operations control	WC	4	66.66	C	3	37.50	WC	19	33.92
12. Attainment of a regular update on health and safety information, including changes to regulations, new codes of practice, newly identified hazards and new work practices	WC	4	66.66	C	3	37.50	WC	18	32.14
Compliance with in-house safety rules and regulations									
13. Regular review of health and safety training plan	WC	2	33.33	C	3	37.50	WC	19	33.92
14. Implementation and accomplishment of workers basic general safety training	VWC	2	33.33	C	3	37.50	WC	19	33.92
15. Implementation and accomplishment of workers site-specific safety training	WC	3	50.00	C	3	37.50	WC	19	33.92
16. Supervision of regular toolbox meetings to reinforce safety basics among workers	WC	2	33.33	WC	3	37.50	WC	16	28.57
17. The effectiveness of health and safety training monitored by checking the new skills applied	WC	3	50.00	C	3	37.50	WC	18	32.14
18. Provision of a regular system audit to validate the effectiveness of health and safety policies, objectives, and plans	LC	4	66.66	C	3	37.50	WC	20	35.71
19. Enforcement of inspection by safety officers and supervisors to carry out safety at regular intervals	WC	3	50.00	C	3	37.50	WC	20	35.71
20. Prompt action and correction of safety audit callouts	C	5	83.33	WC	3	37.50	WC	18	32.14
21. Completion of analysis on safety audit results	WC	3	50.00	WC	3	37.50	WC	20	35.71
22. Provision for safety bulletin board	WC	3	50.00	LC	4	50.00	WC	20	35.71
23. Display of accident statistics	WC	3	50.00	C	3	37.50	WC	18	32.14
24. Distribution of safety signs and posters	WC	4	66.66	C	4	50.00	WC	21	37.50
25. Provision of safety incentives	VHC	5	83.33	LC	3	37.50	WC	18	32.14
Control of personal protective equipment (PPE)									
26. Provision of an inventory system to ensure sufficient stock of PPE	VWC	3	50.00	C	3	37.50	WC	20	37.71
27. Stipulation of PPE specifications in safety plans	C	2	33.33	C	5	62.50	WC	20	35.71
28. Specification and implementation of issuance system, recording, and inspection of PPE	C	2	33.33	C	4	50.00	WC	21	37.50
29. Administration of training on the usage and maintenance of PPE	WC	3	50.00	C	3	37.50	WC	18	32.14
30. Specifications on the monitoring procedures of PPE brought by subcontractors or workers	VWC	4	66.66	C	3	37.50	WC	22	39.28

Legend:

DE- Degree of compliance
F- Frequency
P- Percent value
N- Number of respondents (i.e., experts and contractors)

The results in table 2 can then be tested further for homogeneity using the chi-square for independence. As can be seen, table 3 summarizes the results of table 2 in a two-way table for further analysis as depicted below:

Table 3. *Two-way contingency table*

Degree of compliance	Talisay	Mandaue	Cebu City	**Row Total**
VWC	6	0	0	6
WC	17	9	29	65
C	6	19	1	26
LC	1	2	0	3
NC	0	0	0	0
Column Total	30	30	30	90

At an α=0.05 significance level, the Chi-square critical value for the two-way contingency table under the degree of freedom of 8 is x^2_{cv}=15.507. By calculation, the chi-square statistic is x^2=41.91. Since the test statistic $x^2 > x^2_{cv}$, we reject the null hypothesis of independence between variables. Hence, there is sufficient evidence to support the claim that the variables (i) locality and (ii) safety practices are dependent. The result implies that the safety practices at the different localities vary significantly, which suggests that a disparity between the cities in terms of their safety practices exists. As such, the findings may be due to the insufficient health and safety intervention from the government, further denoting a dysfunctional and a fragmented health and safety regulation in the Philippine construction industry (Umeokafor, 2018). In order to address the issue stakeholders, such as governments and policy makers, must make a move in unifying or standardizing the safety practices of the selected localities as well as those in others.

Given the results, construction health and safety practice has thus remained a challenge mainly because of its complex nature and characteristics. Alternatively, health and safety in a construction setting are primarily driven by tight collaboration among the government, policymakers, construction firms, contractors, subcontractors, construction personnel, and workers. Correspondingly, in the context of the Philippine construction industry, deviations of health and safety practices among geographic locations may be attributed to the insufficient and lenient enforcement of standards and regulations, which is crucial in the assessment of safety performance among different construction firms. Moreover, given the country's OSH standards generally collated in a manual approved by the DOLE with a joint effort from the Bureau of Working Conditions, there is a need to update the stipulated policies and regulations adequately and further elaborate and specify a set of standardized health and safety policies according to the type of industry. Interestingly, the OSH standard's latest revision was still in the year 1990, thereby denoting that policies must be tailored according to the needs and progress of the present society. More importantly, concerning the construction sector, it is a need to include and specify crucial safety management policy elements, such as (i) safety policy, (ii) safe work practices, (iii) safety training, (iv) group meetings, (v) incident investigation analysis, (vi) in-house safety rules and regulations, (vii) safety promotion, (viii) evaluation, selection, and control of subcontractors, (ix) safety inspections, (x) maintenance regimen for all machinery and equipment, (xi) hazard analysis, (xii) movement control and use of hazardous substances and chemicals, (xiii) emergency preparedness, and (xiv) occupational health programs (Teo & Ling, 2006). Among these elements, a comprehensive specification of guidelines as to how construction firms should organize and manage their sites to ensure personnel and public safety should be provided.

Additionally, there has to be a government regulatory body that should be responsible for the regular update, enforcement, and audit of legislation among various construction firms. In an effort to tailor the standardization of practices in the construction sector, a publicity and training program is imperative among all parties involved in the industry, from the lowest level to the top management. As such, it is also essential to provide more and rigorous training to safety officers and auditors to meet the increasing demand for regular audit and inspection processes (Leung & Chow, 2002). On the other hand, management commitment has a crucial position in the health and safety performance and understanding of a construction firm. Management commitment has been linked to safety behaviors and has decreased the severity of injury (Pousette, Larsson, & Törner, 2008). Alternatively, these suggestions aid in the unification and standardization of health and safety practices among construction firms.

4.0 Conclusion and Future Works

Primarily, the findings reveal the likelihood of geographic locations influencing construction health and safety practices based on the three cities investigated. On the other hand, the Chi-square test for independence reveals to be appropriate in the context of investigating the association or relationship between localities and safety practices. Essentially, this statistical method shows to be appropriate in the context of this study as this allows to sufficiently provide evidence of association or relationship between the practices among the three cities considered and the localities. Moreover, the Philippine construction industry faces many challenges and problems regarding health and safety. Considering the results of this study, possible mitigation of these health and safety concerns can be initiated by starting to develop a unified policy and regulatory framework at the local level. Moreover, in the development of health and safety policies, representatives of contractor companies should be involved, for instance, during consultation meetings, to achieve holistic input and suggestions. The practical implications that can be derived from the study include the consideration of geographic location in adequately addressing safety and health issues. As such, the Philippine construction industry has a significant need for a unified national system of standards and regulations to improve understanding of various construction sector stakeholders.

Given the significance of considering intracommunity differences regarding construction health and safety practices, it is thus recommended that the causative factors that bring about this disparity be taken into consideration. Future studies can make use of a robust methodology in determining these factors (e.g., DEMATEL, factor analysis, and interpretative structural modeling).

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