sustainability

MDPI

Article

Analyzing the Risk of Safety Accidents: The Relative Risks of Migrant Workers in Construction Industry

Ji-Myong Kim [1], Kiyoung Son [2], Sang-Guk Yum [3] and Sungjin Ahn [1,*]

[1] Department of Architectural Engineering, Mokpo National University, Mokpo 58554, Korea; jimy@mokpo.ac.kr
[2] Department of Architectural Engineering, University of Ulsan, Ulsan 44610, Korea; sky9852111@ulsan.ac.kr
[3] Department of Civil Engineering and Engineering Mechanics, Columbia University, New York, NY 10027, USA; sy2509@columbia.edu
* Correspondence: sunahn@mokpo.ac.kr; Tel.: +82-61-450-2457

Received: 11 May 2020; Accepted: 2 July 2020; Published: 6 July 2020

Abstract: This study analyzed the relative risks of migrant workers, and identified risk factors based on quantitative data for the systematic safety management of migrant workers. Many studies have found that migrant workers are more vulnerable to safety accidents than non-migrant workers. Nevertheless, there are few quantitative studies of migrant workers' accident-risk in the construction industry, where safety accidents are most frequent. In addition, safety management for the identified accident risk factors has not been implemented systematically. To fill the gap, this study uses safety accident data from construction sites, from the +, for the methodical safety management of migrant workers. The t-test and multiple regression analysis methods are used to define the variance in non-migrant and migrant workers, and the risk indicators, respectively. The two analyses show that the results for migrant construction workers were 2.2% higher in safety accident severity than non-migrant workers, and significant factors are also different. This study's results will provide critical guidance for the safety management of migrant construction workers.

Keywords: migrant worker; safety management; *t*-test; multiple regression analysis

1. Occupational Safety of Migrant Workers

As the difference in the economic conditions between countries expands, the numbers of migrant workers are increasing worldwide because of differences in wage levels and labor shortages. These migrant workers are being investigated as among the most vulnerable members of migrant society [1,2]. Past research has revealed several reasons why migrant workers are vulnerable. First, there are cultural and language barriers. According to Son et al. (2013), migrant workers have different languages and cultures to the locals [3]. This lack of common understanding tends to increase their risk of accidents over that of non-migrant workers [4,5]. In addition, the lack of communication among migrant workers, which is due to the lack of language skills in migrant areas, makes them vulnerable to safety accidents [6,7]. Furthermore, differences in cultural backgrounds are essential considerations for the safety of construction sites, beyond language barriers. Lack of knowledge in cultural differences can affect communication on construction sites in a manner similar to language barriers. That is, cultural differences, e.g., uncertainty avoidance, power distance and collectivism, have a detrimental effect on construction site safety. The reason is that cultural differences act as a barrier to communication between migrant workers and supervisors on construction sites, which adversely affects the safety of construction sites [8,9]. Second, there is a lack of safety education. Cheng et al. (2013) found that migrant workers are vulnerable to safety accidents because of inadequate safety and health education [10]. This is one of the main causes of industrial accidents, and only a

limited number of migrant workers receive safety and health training. Owing to the language barriers, there is a poor understanding of any safety education given [11,12]. Therefore, migrant workers often work without adequate safety training or safety protection equipment; moreover, they often fail to complain about unsafe working conditions [13]. Third, the physical working conditions of migrant workers are often poor. Migrant workers around the world are concentrated in 3D (dirty, dangerous and demanding) jobs, such as outdoor construction, food service, agriculture, domestic work and manufacturing, which have lower public policy standards, or are out of the public eye [1]. In addition, these occupations require repetitive physical work, with greater injury and safety risks [14–16]. Migrants experience longer working hours than non-migrants in harsh and harmful environments, including working in noisy and dusty environments in uncomfortable postures, and their wages are also found to be low [17,18]. Furthermore, migrant workers are at risk of losing their jobs or being deported, resulting in governmental crackdowns, mental stress from forced eviction, digestive problems and insomnia [19]. Migrant workers are easily exposed to violence, abuse and human rights violations [20].

For these reasons, migrant workers are at a higher risk of safety accidents, even when performing the same job as ordinary workers [21]. For example, they were found to have higher job-related illnesses [22], injuries [23] and deaths [24] than non-migrant workers. Ronda (2012) analyzed migrant workers in 31 European countries through a survey, and found that there were more harmful job exposures compared with local workers. The reason was that migrant workers were exposed to strong vibrations, high temperatures and noise for long periods, and were on their feet more often than local workers. In addition, they often worked with unfavorable work schedules and contracts [25,26]. They are more likely to be employed in 3D industries, resulting in their chance of being fatally injured being 15% than at birth [27]. Moreover, migrant workers are more likely to enter non-regular work contracts than non-migrant workers, which adversely affects their health [2,28].

2. Safety Climate of the Construction Industry

2.1. Status of Industrial Accidents among Korean Construction Workers

In 2018, the number of casualties increased by 1768 (7.15%) in the construction industry, compared with the previous year, and the total number of industrial accidents in the construction industry was the second highest in 2018, at 6486 (29.16%). The major causes of accidents in the construction industry were collapse, pinching, crushing, hitting objects, flipping and bumping, accounting for 8741 (31.57%) out of the total 27,686 accidents. The highest level of death in the in the distribution map of deaths by industry was in the construction industry, at 26.61% [29].

2.2. Status of Safety Management in the Construction Industry in Korea

When comparing the industrial accident rate and death fatality rate in 2017, it was found that Korea's industrial accident rate was 0.84%, which was lower than the UK and the US, at 2.62% and 3.04%, respectively. However, Korea had a relatively higher death toll at 1.9‰, compared to 0.16‰ in the UK and 0.95‰ in the US [29]. In other words, the industrial accident rate in Korea appeared to conflict with the disaster distribution of the Heinrich Pyramid, where the incidence rate increased in the order of serious, minor, and injury-causing accidents. The reason for this phenomenon is that many accidents are covered up, so they are not reported properly. To prevent safety accidents, analysis through accurate data collection is necessary.

The accident rate and death rates in the construction industry in 2017 were 0.84% and 1.90‰, respectively, compared with 0.48% and 1.05‰ in the domestic industry, respectively, the construction industry's rates being 1.75 times and 1.81 times higher, thereby making it the most dangerous industry.

One reason for this is that more high-rise buildings are being constructed, and the number of deaths and permanent obstacles in high-rise buildings is high, resulting in higher accident rates compared with other industries [30]. Owing to the nature of construction work, many work activities

are performed outside. Consequently, there is a high risk of accidents due to heavy work in the hot sun or rain. In addition, heavy work, including that involving roofs, ladders and scaffolding, increases the risk of accidents. Moreover, the use of hazardous machinery, equipment, tools and heavy materials increases the risks to workers' safety and health [31].

To prevent industrial accidents, the Ministry of Employment and Labor and the Safety and Health Agency have been compulsorily conducting basic safety and health education for construction workers since 2012. However, to date, there has been no significant change in the industrial accident rate. In the current construction occupational safety and health system, safety management cost estimate standards and safety manager appointment systems are in place to prevent industrial accidents. Because the costs and manpower are set according to the size of the construction cost at the site, the system is inevitably vulnerable to inadequate safety accidents prevention at sites where the construction cost is low. In addition, the safety management cost is calculated by multiplying the construction cost by a certain rate and the successful bid rate, so many cases do not reflect the site's specificity.

2.3. Migrant Workers in the Construction Industry

There is a shortage of new manpower, and the existing manpower in the Korean construction industry is aging. This gap is filled with an influx of migrant workers. In particular, in the case of civil works on sites in mountainous and remote areas, the manpower shortage is getting worse. Thus, the influx of migrant workers is essential [32]. The total quantity of migrant workers in 2017 was 10.1% of all construction workers; by industry type, this is 29.0% of civil engineering, 62.3% of construction, and 8.8% of plant work. By job category, the proportion of migrant workers was high in all jobs except welders. In particular, it was found that many foreigners flowed in for so-called hard work and low-wage work, such as steelwork and rebar [32].

Consequently, as seen in many previous studies, the construction industry has higher safety accident and mortality rates than other industries. Furthermore, migrant workers in the construction industry (migrant workers are generally more vulnerable than non-immigrant workers) are the most vulnerable working class.

The New Oxford American Dictionary has defined the word "culture" as the "customs, arts, social institutions, and achievements of a particular nation, people, or other social group," in other words, "the attitudes and behavior characteristic of a particular social group" [33]. Culture is also defined as "the set of attitudes, values, beliefs, and behaviors shared by a group of people, communicated from one generation to the next" [34]. The common sentiment of such various definitions is that culture is what is shared within certain social groups, and it has great influence on how one communicates with others.

Recent construction sites in Korea have witnessed and experienced the significance of the term, and concept, of culture. That is, a number of construction sites in Korea are now hiring workers of a variety of backgrounds, in terms of languages, nationalities and culture. Consequently, for the construction sites in Korea, in which a variety of cultures in the employment setting [35] exist, strategies that embrace such diversity in culture and background are strongly called for, in order to establish more productive and efficient workforce management [36].

Cultural differences can lead to a decline in productivity and efficiency. Furthermore, national cultural diversity causes low morale, low quality of work, workplace conflict, and stress-related illnesses [37]. Previous studies have commonly pointed out such unsafe conditions, unsafe behaviors, and unsafe task methods or sequencing as the cause of safety accidents. [38–40]. In these circumstances, project managers need to be knowledgeable and skilled regarding diversity management, in order to effectively lead their multi-cultural workforce and to prevent safety accidents.

3. Aim and Framework of the Study

The previous papers and statistics have shown that migrant workers are more vulnerable to safety accidents than non-migrant workers. Nevertheless, there are few quantitative studies on the risk

of accidents among migrant workers in the construction industry, where safety accidents are most frequent. In addition, safety management based on accident risk factors has not been implemented systematically. In order to mitigate the differences between migrant workers and non-immigrant workers, there is a desperate need to accommodate them through the improvement and development of new safety management strategies and tools. In the absence of these new strategies and tools, it is difficult to overcome problems such as delays in construction due to safety accidents, excess safety budgets, and high mortality rates. Consequently, the ultimate goal of the study is to provide a better understanding of construction safety management through the development of risk factors that can affect the safety of construction sites for migrant workers. Accordingly, this study analyzes the relative risks of migrant workers residing in Korea and identifies risk factors, based on quantitative data, for the systematic safety management of migrant workers. To achieve this study's goal, the following procedures were conducted. First, safety accident data from construction sites were collected from the Korea Occupational Safety and Health Agency (KOSHA). Second, the difference between the safety accident risk of non-immigrant workers and that of migrant workers was statistically proven using the t-test. Third, by using multiple regression analysis, the significant factors affecting migrant construction workers and safety accidents were examined.

4. Data Collection

This study used data from Korea Occupational Safety and Health Agency (KOSHA)'s accidental injuries (excluding deaths) at construction sites in Korea from 10 years, between 2010 and 2019. KOSHA is a quasi-government agency under the Ministry of Employment and Labor, established in 1987 under the Korea Occupational Safety and Health Agency Act, enabling workers to work safely and healthily, and helping employers prevent accidents. Its main tasks are related to industrial safety, such as research and development, distribution of industrial accident prevention technologies, and occupational safety and health training. The data comprise accident details, such as the construction progress rate at the time of the accident, construction scale, accident type, nationality of the victim of the accident, date and time of the accident, number of days of treatment for the accident, day of the accident, time of the accident, site address and accident summary. The number of treatment days was used as a dependent variable to quantify the severity of accidental injuries.

5. Analysis

5.1. T-Test

This study used the t-test to analyze the dissimilarities between the two categories, i.e., non-migrant and migrant workers. If there are differences between the two categories in the days of treatment, it would be possible to account logically for the difference in risk management and risk, between non-migrant and migrant workers, when carrying out construction management on future construction sites.

Table 1 shows the t-test results. The p-value of 0.014 is smaller than 0.05, which verifies that the days of treatment for non-migrant and migrant workers are significantly different. The mean value signifies that migrant workers have 2.2% more treatment days than non-migrant workers.

Table 1. Results of the t-test.

Nationality	N	Mean	Standard Deviation	t	*p*.
Non-migrant	1671	95.13	37.36	−0.701	0.014
Migrant	95	97.88	35.16		

5.2. Multiple Regression Analysis

This study adopted a multiple regression analysis to describe the relationship between the dependent variable (days of treatments) and independent variables. The variables are listed as shown in Table 2. The dependent variable is the days of treatment, which is the number of days, including the total number of medication days, listed in the medical billing statement, to quantify accident severity.

Table 2. Clarification of the variables.

Variables	Indicator	Explanation	Unit
Dependent	Days of treatment	The number of days, including the total number of medication days, listed in the medical billing statement	Days
Independent	Progress rate	Construction site process rate in case of accident	%
	Construction scale	Construction scale by construction amount based on the Korea Occupational Safety and Health Act	0: Large construction site (over KRW 12 billion) 1: Small–medium construction site (less than KRW 12 billion)
	Classification of Occupations	Occupation classification using Korean Standard Statistical Classification	1: Equipment, machine operating and assembling worker 2: Professionals and related workers 3: Craft and related trades workers 4: Manager 5: Elementary workers
	Day of the week	Day of the week of accident	1: Monday 2: Tuesday 3: Sunday 4: Wednesday 5: Friday 6: Saturday 7: Thursday
	Accident time	Time of accident occurrence	1: Dawn (0–6) 2: Evening and night (18–24) 3: Afternoon (13−18) 4: Morning (6−12)
	Employment	Employment types	0: Regular workers 1: Irregular workers

The progress rate represents the construction site's progress rate at the time of an accident; the accepted progress rate reflects the degree of risk of the construction project. Many studies found that the progress rate and the risk amount have a significant relationship, since the progress rate increases as the complexity of the construction project and risk amount increase [41,42].

The construction scale by construction amount is based on the Korea Occupational Safety and Health Act. It is a well-known indicator of the risk amount because the risk and building scale have a statistically significant association [43,44]. Furthermore, small–medium construction sites are relatively vulnerable to accidents [45]. In this study, according to the construction scale prescribed by the Korea Occupational Safety and Health Act, more than KRW 12 billion won was defined as a large-scale construction site, and less than KRW 12 billion won as a small- or medium-sized construction site.

The classification of occupations is based on the Korean standard. The occupational classification, according to the Korean Standard Occupational Classification, is for classifying and counting occupational information obtained through employment-related statistical surveys, such as economically active population surveys, population and housing surveys, regional employment

surveys, and various administrative data. In addition, it aims to characterize hazards in the health field according to the job, and provide guidelines for comprehensive management of similar jobs [46]. To ensure the consistency and comparability of statistical data, the International Labor Organization's International Standard Classification of Occupations was established to internationally compare and use domestic statistics from various types of job information, and thus, it was applied to the risk assessment of construction workers.

The variables, day of the week, and accident time are adopted to show the risks associated with the construction site's working conditions.

Construction workers are exposed to direct risks depending on the working environments at the construction site. Construction work is characterized by continuously changing work content and intensity, by time or day of the week. Therefore, identifying the time and day of the week when accidents occur most often is helpful for preventing accidents [47,48]. For example, construction safety accidents occur during work-intensive hours, which are concentrated in the middle of the morning and early in the afternoon. Therefore, it can be said that the accident incidence rate is high in a period with a large amount of work, but the difference in the incidence rate, according to task difficulty by period, can be represented. Therefore, in this study, the time zone was divided into four units (morning, afternoon, evening and night, and dawn), which were, along with the day of the week, used as variables.

The employment is divided into two groups, i.e., regular workers and irregular workers. Migrant workers have less regular employment contracts than non-migrant workers, which has a negative impact on migrant workers [2,28]. According to a study by Lim (2015), approximately 89.5% of workers in the construction industry were irregular workers, with less than six months of experience. Owing to the nature of the construction industry, it is necessary to move the site on a team-by-team basis, and the head of the workgroup tends to consider the construction schedule to be more important than safety. Moreover, the shorter the construction period, the more workers move, the less safety management supervision, and the higher the number of safety accidents among non-regular construction workers [49]. Thus, employment patterns can also be a significant indicator of safety accident risk. Descriptive statistics of the independent variables and dependent variable are presented in Table 3.

Table 3. Descriptive statistics of the variables.

Category	Non-Migrant			Migrant		
	n	Mean	Standard Deviation	n	Mean	Standard Deviation
Dependent Variable						
Days of treatment	1671	95.13	37.36	95	97.88	35.16
Independent Variables						
Progress rate	1671	51.78	26.74	95	54.30	24.16
Cost of construction	1671	1.32	0.60	95	1.67	0.78
Classification of occupations	1671	3.76	0.98	95	4.15	0.97
Day of the week	1671	4.04	2.05	95	3.78	2.06
Accident time	1671	3.44	0.60	95	3.62	0.48
Employment	1671	0.89	0.31	95	0.93	0.25

Table 4 shows the regression analysis summary. The dependent variable, days of treatment, is transformed by a natural log. The non-migrant worker's model is statistically significant (F-value > 1). The adjusted R-square value of 0.314 denotes that this relationship is clarified with a 31.4% margin of variance. The migrant's model is statistically significant since the *p*-value is less than 0.05. The adjusted R-square value of 0.392 designates that this relationship is explained with a 39.2% margin of variance.

Table 4. Results of the regression analysis.

Variables	Non-Migrant				Migrant			
	Coeficient	Beta Coeficient	$p > \|z\|$	VIF	Coeficient	Beta Coeficient	$p > \|z\|$	VIF
Constant	4.276		0.000		4.231		0.000	
Progress rate	−0.001	−0.054	0.053 *	1.045	0.002	0.142	0.216	1.148
Cost of construction	0.075	0.082	0.003 *	1.050	0.011	0.028	0.814	1.230
Classification of occupations	0.030	0.053	0.050 *	1.008	0.043	0.136	0.221	1.083
Day of the week	0.003	0.010	0.715	1.000	0.034	0.225	0.045 *	1.085
Accident time	0.050	0.052	0.057 *	1.006	−0.098	−0.151	0.175	1.081
Employment	−0.155	−0.062	0.022 *	1.003	0.290	0.178	0.102	1.034
F		4.182				2.375		
Adj-R^2		0.314				0.392		

Note: * $p < 0.10$, independent variable is significant at the 0.01 level.

In the non-migrant worker's model, there are five significant variables: progress rate, cost of construction, classification of occupations, accident time, and employment. The day of the week is disqualified because the p-value is higher than 0.10. The Variance Inflation Factors (VIF) values range from 1.000 to 1.050. The VIF values signify that the variables have no critical multicollinearity. In the migrant worker's model, there is a significant variable: the day of the week. The other variables are excluded because the p-value is higher than 0.10. The VIF values range from 1.034 to 1.230. The VIF values illustrate that the variables have no serious multicollinearity.

6. Discussion

This study examined the relative risks of migrant workers in the construction industry in Korea, and defined risk factors, based on quantitative data, for the methodical safety management of migrant workers.

The *t*-test verifies that the days of treatment for non-migrant and migrant workers in the construction site are significantly different. The days of treatment statistic for migrant workers is 2.2% higher than the days of non-treatment statistic for migrant workers. This reinforces previous studies' conclusions that migrant workers at construction sites are more likely to suffer from safety accidents than non-migrant workers. This reinforces the previous studies' conclusions that migrant workers on construction sites are more likely to suffer from safety accidents than non-migrant workers [29–32]. Consequently, it is necessary to consider the relative risk to migrant workers for safety management at the construction site; furthermore, it is necessary to focus on migrant workers to reduce safety accidents.

The multiple regression analysis was conducted to identify the significant indicators among the independent variables. The models are statistically significant, which proves that the days of the treatment can be estimated by the independent variables. Safety accidents, and significant variables of non-migrant workers and migrant workers, were dissimilar. There are five important variables in the non-migrant worker model: progress rate, cost of construction, classification of occupations, accident time and employment. Conversely, the day of the week is the only important variable in the migrant worker's model. Migrant workers were found to be affected by safety accidents depending on their concentration and difficulty in understanding safety education. Thus, migrant workers need additional safety education and policies according to their experience and skill levels. In addition, this study provides further evidence that construction workers are exposed to direct risks depending on the working environment, i.e., day of the week, of the construction site [47,48]. The results of this study can be used by construction supervisors to develop strategies and tools for preventing accidents and reducing accident risk among migrant workers. In addition, the results of this study have real-world and theoretical implications, for the better understanding and improvement of construction safety and migrant construction workers.

Moreover, this shows that the two groups have different characteristics and need different forms of management as regards safety accidents. Consequently, significant indicators are not only an essential source of safety management for non-migrant and migrant workers in Korea, but also show that a different approach is needed for the two groups. For example, to reduce the occurrence of safety accidents for migrant workers, it is important to improve their working environments and prevent risk factors. However, it is also important to reduce the occurrence of safety accidents by providing adequate information, and understanding migrant workers' characteristics. This is because the provision of, and familiarity with, safety and health information can be more important for non-migrant workers, who have difficulties in fully understanding the safety and health information because of differences in language and culture [50]. As a way to solve this problem, Occupational Safety and Health Administration (OSHA) in the US has achieved great results by supporting coordinators for workers with diverse backgrounds working in small businesses, as well as for local unions, and other non-English-speaking workers who have difficulty communicating in Spanish or English [51]. In this manner, for the safety management of migrant workers, special government-wide safety management policies are needed.

Furthermore, to reduce the safety risk to migrant workers, it is necessary to combine technologies, such as big data, AI (Artificial Intelligence), IoT (Internet of Things), and ICT (Information & Communication Technology).

In the case of migrant workers, safety accident data can be concealed and manipulated owing to their disadvantaged status. To prevent this, it is essential to develop a system that can systematically collect transparent safety accident data. In addition, based on systematically collected data, it is necessary to establish an integrated safety management system that predicts and prevents an environment in which an accident may occur, or calculates the likelihood of an accident that fits the characteristics of a construction site. Finally, it is essential to create a safety climate of a new paradigm by managing the process of sharing and implementing decisions related to safety management made by the fourth industrial revolution.

7. Conclusions

Many previous studies have found that migrant workers are more vulnerable to safety accidents than non-migrant workers, but there have been few quantitative safety accident risk studies for migrant workers in the construction industry, where safety accidents are most frequent. Thus, to meet the demand, this study quantitatively analyzed the accident risks for migrant workers in the construction industry in Korea, where industrial accidents occur most, and investigated the factors affecting the risks of migrant workers. Through statistical analyses, factors affecting safety accidents of migrant workers were identified, and a method for effective safety management was proposed. These results constitute important reference materials for the safety management of migrant workers in construction companies, client organizations or contracts, and safety-related government agencies.

This study selected its scope to reflect the recent changes in construction sites in Korea, in which many migrant workers, not only Koreans, with a variety of backgrounds, in terms of languages, nationalities and cultures, are found. More specifically, this study looked into the safety management of migrant workers, mainly from Southwest Asia and China. Therefore, in Korea and in countries with similar construction environments, the methodology and indicators developed in this study can be used to develop safety management strategies and tools for accommodating migrant construction workers. However, to apply the methodology from this study to other studies with different settings, e.g., different populations, environments of construction sites and cultures, additional research and verification is required, as the composition of the same variables can produce different results in other cultures. For example, fasting during the day in Ramadan had to be taken into account, as it could affect the worker's physical condition [52]. Further, it is indicated that the siesta in Spanish culture can affect the workers' performance [53]. In addition, in order to strengthen the results of this study in the future, verification through accident data from other countries is also necessary. Another point

to consider for more quantitatively systematic and robust studies in the future is that, because only the data of one KOSHA agency was collected and analyzed in this study, more in-depth analyses are needed, necessitating the collection of various data, such as data of longer period and/or from more sources, which is provided by several insurance companies or government agencies.

Author Contributions: Conceptualization, J.-M.K.; Data curation, S.A.; Funding acquisition, J.-M.K.; Investigation, K.S., S.-G.Y.; Methodology, J.-M.K., S.A.; Software, S.A., K.S.; Validation, K.S., S.-G.Y.; Writing—original draft, S.A.; Writing—review and editing, J.-M.K., S.-G.Y. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (NRF-2019R1F1A1058800)

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Quandt, S.A.; Arcury-Quandt, A.E.; Lawlor, E.J.; Carrillo, L.; Marín, A.J.; Grzywacz, J.G.; Arcury, T.A. 3-D jobs and health disparities: The health implications of latino chicken catchers' working conditions. *Am. J. Ind. Med.* **2013**, *56*, 206–215. [CrossRef] [PubMed]
2. Moyce, S.C.; Schenker, M. Migrant workers and their occupational health and safety. *Annu. Rev. Public Health* **2018**, *39*, 351–365. [CrossRef] [PubMed]
3. Son, K.S.; Yang, H.S.; Soares, C.G. Accidents of foreign workers at construction sites in Korea. *J. Asian Arch. Build.* **2013**, *12*, 197–203. [CrossRef]
4. Carangan, M.; Tham, K.Y.; Seow, E. Work-related injury sustained by foreign workers in Singapore. *Ann. Acad. Med. Singap.* **2004**, *33*, 209–213. [PubMed]
5. Ahonen, E.Q.; Benavides, F.G. Risk of fatal and non-fatal occupational injury in foreign workers in Spain. *J. Epidemiol. Commun. Health* **2006**, *60*, 424–426. [CrossRef]
6. Ceric, A. Communication risk in construction projects: Application of principal-agent theory. *Organ. Technol. Manag. Constr. Int. J.* **2012**, *4*, 522–533.
7. Guldenmund, F.; Cleal, B.; Mearns, K. An exploratory study of migrant workers and safety in three European countries. *Saf. Sci.* **2013**, *52*, 92–99. [CrossRef]
8. Al-Bayati, A.J.; Abudayyeh, O.; Albert, A. Managing Active Cultural Differences in U.S. Construction Workplaces: Perspectives from Non-Hispanic Workers. *J. Saf. Res.* **2018**, *66*, 1–8. [CrossRef] [PubMed]
9. Al-Bayati, A.J.; Abudayyeh, O.; Fredericks, T.; Butt, S. Managing Cultural Diversity at U.S. Construction Sites: Hispanic Workers' Perspectives. *J. Constr. Eng. Manag. ASCE* **2017**, *143*, 04017064. [CrossRef]
10. Cheng, C.W.; Wu, T.C. An investigation and analysis of major accidents involving foreign workers in Taiwan's manufacture and construction industries. *Saf. Sci.* **2013**, *57*, 223–235. [CrossRef]
11. O'Connor, T.; Loomis, D.; Runyan, C.; dal Santo, J.A.; Schulman, M. Adequacy of health and safety training among young Latino construction workers. *J. Occup. Environ. Med.* **2005**, *47*, 272–277. [CrossRef] [PubMed]
12. Shipp, E.M.; Cooper, S.P.; Burau, K.D.; Bolin, J.N. Pesticide safety training and access to field sanitation among migrant farmworker mothers from Starr County, Texas. *J. Agric. Saf. Health* **2005**, *11*, 51–60. [CrossRef] [PubMed]
13. Ahonen, E.Q. Occupational Health Challenges for Immigrant Workers. In *Oxford Research Encyclopedia of Global Public Health*; Oxford University Press: Oxford, UK, 2019.
14. Jayaraman, S.; Dropkin, J.; Siby, S.; Alston, L.R.; Markowitz, S. Dangerous dining: Health and safety in the New York city restaurant industry. *J. Occup. Environ. Med.* **2011**, *53*, 1418–1424. [CrossRef]
15. Siqueira, C.E.; Roche, A.G. Occupational health profile of Brazilian immigrant housecleaners in Massachusetts. *New Solut. A J. Environ. Occup. Health Policy* **2013**, *23*, 505–520. [CrossRef] [PubMed]
16. Neitzel, R.L.; Krenz, J.; de Castro, A.B. Safety and health hazard observations in Hmong farming operations. *J. Agromed.* **2014**, *19*, 130–149. [CrossRef] [PubMed]
17. Kim, C.; Seol, D.; Hong, S. A study on the health rights of migrant workers as human rights. *Community Sociol.* **2006**, *7*, 93–129.
18. Reid, A.; Schenker, M.B. Hired farmworkers in the US: Demographics, work organization, and services. *Am. J. Ind. Med.* **2016**, *59*, 644–655. [CrossRef]

19. Shim, B.S. Formation and Transformation of Migrant Worker Policy—Analysis of Multiculturalist Policy in Korea. *Discourse* **2007**, *201*, 41–76.
20. ILO (Int. Labour Off.), Labour Migr. Branch, Int. Labour Off., Dep. Stat. *ILO Global Estimates on Migrant Workers: Results and Methodology. Special Focus on Migrant Domestic Workers*; ILO: Geneva, Switzerland, 2015.
21. Flynn, M.A. Safety and the diverse workforce. *Prof. Saf.* **2014**, *59*, 52–57.
22. Reid, A.; Merler, E.; Peters, S.; Jayasinghe, N.; Bressan, V.; Franklin, P.; Musk, A.W. Migration and work in postwar Australia: Mortality profile comparisons between Australian and Italian workers exposed to blue asbestos at Wittenoom. *Occup. Environ. Med.* **2018**, *75*, 29–36. [CrossRef]
23. Rubiales-Gutierrez, E.; Agudelo-Suarez, A.A.; López-Jacob, M.J.; Ronda-Perez, E. Differences in occupational accidents in Spain according to the worker's country of origin. *Salud Publica de Mexico* **2010**, *52*, 199–206. [PubMed]
24. López-Jacob, M.J.; Ahonen, E.; García, A.M.; Gil, A.; Benavides, F.G. Occupational injury in foreign workers by economic activity and autonomous community (Spain 2005). *Revista Espanola de Salud Publica* **2008**, *82*, 179–187. [CrossRef]
25. Ronda Pérez, E.; Benavides, F.G.; Levecque, K.; Love, J.G.; Felt, E.; Van Rossem, R. Differences in working conditions and employment arrangements among migrant and non-migrant workers in Europe. *Ethn. Health* **2012**, *17*, 563–577. [CrossRef] [PubMed]
26. Ronda-Pérez, E.; Gosslin, A.; Martínez, J.M.; Reid, A. Injury vulnerability in Spain. Examination of risk among migrant and native workers. *Saf. Sci.* **2019**, *115*, 36–41. [CrossRef]
27. Byler, C.G.; Robinson, W.C. Differences in patterns of mortality between foreign-born and native-born workers due to fatal occupational injury in the USA from 2003 to 2010. *J. Immigr. Minor. Health* **2018**, *20*, 26–32. [CrossRef]
28. Sousa, E.; Agudelo-Suárez, A.; Benavides, F.G.; Schenker, M.; García, A.M.; Benach, J.; Porthé, V. Immigration, work and health in Spain: The influence of legal status and employment contract on reported health indicators. *Int. J. Public Health* **2010**, *55*, 443–451. [CrossRef]
29. Korea Occupational Safety and Health Agency. 2018 Industrial Accident Status Analysis. 2018. Available online: http://www.kosha.or.kr/kosha/data/industrialAccidentStatus.do?mode=view&articleNo=410303&article.offset=0&articleLimit=10 (accessed on 5 July 2020).
30. Chong, H.Y.; Low, T.S. Accidents in Malaysian construction industry: Statistical data and court cases. *Int. J. Occup. Saf. Ergon.* **2014**, *20*, 503–513. [CrossRef]
31. Zerguine, H.; Tamrin, S.B.M.; Jalaludin, J. Prevalence, source and severity of work-related injuries among "foreign" construction workers in a large Malaysian organisation: A cross-sectional study. *Ind. Health* **2018**, *56*, 264–273. [CrossRef]
32. Na, Y.; Choi, E. A Study on Estimating the Appropriate Size of Foreign Workers in the Construction Industry in 2018. CERIK, Issue Focus. 2017. Available online: http://www.cerik.re.kr/report/issue/detail/2060 (accessed on 5 July 2020).
33. McKean, E. *The New Oxford American Dictionary*; Oxford University Press: New York, NY, USA, 2005.
34. Matsumoto, D.R. *Culture and Modern Life*; Thomson Brooks: Washington, DC, USA; Cole Publishing Co.: Washington, DC, USA; Cengage Learning: Washington, DC, USA, 1997; p. 5.
35. Cox, T., Jr. *Creating the Multicultural Organization: A Strategy for Capturing the Power of Diversity*; Jossey-Bass: San Francisco, CA, USA, 2001.
36. Shen, J.; Chandra, A.; D'Netto, B. Managing diversity through human resource management: An international perspective and conceptual framework. *Int. J. Human Resour. Manage.* **2009**, *20*, 235–251. [CrossRef]
37. Steele, A.; Sodhi, D. Race, Ethnic Minorities and Construction Industry. In *Managing Diversity and Equality in Construction: Initiatives and Practice*; Taylor & Francis: London, UK, 2006; pp. 195–208.
38. Abdelhamid, T.S.; Everett, J.G. Identifying root causes of construction accidents. *J. Constr. Eng. Manag. ASCE* **2000**, *126*, 52–60. [CrossRef]
39. McClay, R.E. Toward a more universal model of loss incident causation. *Prof. Saf.* **1989**, *34*, 15–20.
40. Toole, T.M. Construction site safety roles. *J. Constr. Eng. Manag. ASCE* **2002**, *128*, 203–210. [CrossRef]
41. Nevada Department of Transportation. *Risk Management and Risk-based Cost Estimation Guidelines*; Nevada Department of Transport: Carson City, NV, USA, 2012.
42. Kim, J.M.; Kim, T.; Bae, J.; Son, K.; Ahn, S. Analysis of plant construction accidents and loss estimation using insurance loss records. *J. Asian Archit. Build.* **2019**, *18*, 507–516. [CrossRef]

43. Kim, J.M.; Woods, P.K.; Park, Y.J.; Kim, T.; Son, K. Predicting hurricane wind loss by claim payout based on Hurricane Ike in Texas. *Geomat. Nat. Haz. Risk.* **2015**, *7*, 1513–1525. [CrossRef]
44. Ryu, H.; Son, K.; Kim, J.M. Loss Prediction Model for Building Construction Projects Using Insurance Claim Payout. *J. Asian Archit. Build.* **2016**, *15*, 441–446. [CrossRef]
45. Ahmed, S. Causes and Effects of Accident at Construction Site: A Study for the Construction Industry in Bangladesh. *Int. J. Civ. Eng. Technol.* **2019**, *10*, 18–40.
46. Kwon, S.C. Use of Frequency Analysis of Exposure of Hazards by Occupations: Findings from the Third and Fourth Korean Working Conditions Survey. *Soonchunhyang Med Sci.* **2019**, *25*, 37–45. [CrossRef]
47. Gambatese, J.A.; Behm, M.; Hinze, J.W. Viability of designing for construction worker safety. *J. Constr. Eng. Manag. ASCE* **2005**, *131*, 1029–1036. [CrossRef]
48. Cho, J. A study on the cause analysis and preventive measures for each type of disaster at the construction site. *J. Korea Saf. Manag. Sci.* **2012**, *14*, 7–13.
49. Lim, B. Comparison of occupational accidents according to the type of employment of safety and health managers. [Linked to public works] Korea Occupational Safety and Health Agency published data. 2015. Available online: http://oshri.kosha.or.kr/oshri/publication/researchReportSearch.do?mode=view&articleNo=63449&article.offset=0&articleLimit=10&srSearchVal=%EA%B3%A0%EC%9A%A9%ED%98%95%ED%83%9C (accessed on 5 July 2020).
50. Jung, J. A study on how to solve the safety and health familiarization problem of foreign workers (policy). [Linked to public works] Korea Occupational Safety and Health Agency published data. 2014. Available online: http://oshri.kosha.or.kr/oshri/publication/researchReportSearch.do?mode=view&articleNo=63325&attachNo (accessed on 5 July 2020).
51. Gleeson, S.; Bada, X. Institutionalizing a Binational Enforcement Strategy for Migrant Worker Rights. *Int. J. Comp. Lab. Law Ind. Relat.* **2019**, *35*, 255–277.
52. Bust, P.D.; Gibb, A.G.; Pink, S. Managing construction health and safety: Migrant workers and communicating safety messages. *Saf. Sci.* **2008**, *46*, 585–602. [CrossRef]
53. Lucas, R.A.; Epstein, Y.; Kjellstrom, T. Excessive occupational heat exposure: A significant ergonomic challenge and health risk for current and future workers. *Extrem Physiol. Med.* **2014**, *3*, 14. [CrossRef] [PubMed]