Assessment of Dust Emission and Working Conditions in the Bamboo and Wooden Furniture Industries in Malaysia

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A study was carried out to assess the dust emission and working conditions in the bamboo and rubberwood furniture manufacturing industries in Malaysia. The emission of wood dust arising from these industries was measured in each main work station in the mills. Meanwhile, a questionnaire-based survey was conducted among 5900 workers in 45 companies to obtain information on the occupational accidents that occurred in the mills. The data were collected, compiled, and analyzed using the SPSS package. The highest dust emission from the sanding operation resulted in respiratory ailments among workers. The occurrence of injuries particularly to the hand, wrist, fingers and forearm was due to the prevailing working conditions, safety climate and workers characteristics. The dust exposure levels and working conditions were much more severe in the bamboo furniture manufacturing industry. As a result, a review of existing of dust exposure levels in the woodworking industry is warranted.

Keywords: Furniture; Dust; Industrial accidents; Bamboo; Wood; Safety and health

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INTRODUCTION

The value-added wood products manufacturing sector is well-established in Malaysia. With assistance and support from the government, the industry has evolved into an impressive multi-billion dollar sector in this country (National Timber Policy 2009). Among all the sub-sectors, the furniture manufacturing industry has emerged as the fastest growing sub-sector, and its socioeconomic importance, both in terms of workforce employment and foreign exchange earnings, has increased significantly over the years (Ratnasingam *et al.* 2011b). In 2014, the furniture manufacturing sector contributed US$ 2.1 billion in export earnings while employing approximately 88,000 workers (Malaysian Furniture Council 2015).

Although solid wood has been the predominant raw material for the furniture industry in Malaysia, there are increasing amounts of other non-wood materials, such as bamboo and rattan, being used in the industry. It has been estimated that almost 35,000 m^3 of these materials were used in the Malaysian furniture manufacturing industry in 2014 (Malaysian Furniture Council 2015).

The large workforce in the furniture manufacturing industry is subjected to prevailing poor working conditions. The working environment in the industry is regarded

as a "3D environment," *i.e.*, dirty, dangerous, and degenerative. According to the National Institute of Occupational Safety and Health of Malaysia (NIOSH), the rate of industrial accidents, particularly in the wooden furniture manufacturing industry, is beyond the national average for the manufacturing sector in the country (Ratnasingam *et al*. 2011a).

Previous studies have shown that industrial accidents are closely related to the type of materials used, prevailing work environment, and tasks carried out (Cooper 2000; Clarke 2006; Das *et al*. 2008). Among the most important accident-causing factors are (1) prevailing environment (noisy, dusty, chemical exposure, and poor lighting), (2) nature of work (repetitive, shift work, fatigue, and physical workload), (3) handling (manual, machine, and postural stress), (4) ergonomics (work design and repetitive motions), (5) machine (machine-paced, operator-paced, dangerous tools, and machines), (6) training (formal training and on-the job training), (7) maintenance (poor maintenance culture, lack of supervision, poor housekeeping, and psychosocial environment), (8) plant layout (work flow and machine organization), (9) worker characteristics (gender, age, skill level, knowledge, and experience), and (10) safety climate (safety system and management commitment) and the risk posed by each of these factors may vary from factory to factory (Das *et al*. 2008; Holcroft and Punnett 2009).

Workers in such conditions have increased risk of respiratory diseases, asthma, and other ailments resulting from exposure to dust and other carcinogenic elements. Exposure to wood dust has been associated with several types of cancers, including cancer of the nasal cavity, lung, and gastrointestinal tract and Hodgkin's disease (Osman and Pala 2009; Ratnasingam and Scholz 2015). Rongo *et al.* (2004) stated that one possible factor was wood dust, which can further be contaminated as a result of the presence of microorganisms that produce or release toxins. The causes of these disease-causing wood dusts are usually different in various conditions, yet the symptoms are noticeably similar despite the environment.

Despite the related safety and health issues in the furniture manufacturing industries, studies on these subjects are limited to wooden furniture manufacturing in Malaysia (Rampal and Nizam 2006; Ratnasingam *et al.* 2011a,b). Holcroft and Punnet (2009) have suggested that it is not possible to draw conclusions of similarity in the health and safety issues between furniture manufacturing industries, as different materials are used.

Maintaining a safe and healthy workplace is not only the concern of workers and companies but also national and global economies, the productivity and competitiveness of which play a vital role on safe working environments. In fact, the International Labour Organisation (ILO) considers occupational health and safety (OHS) issues to be very significant, to which this organization has allocated approximately 80% of its standards and instruments either completely or partially (Mitchual *et al.* 2015).

Therefore, a comparative study on the working conditions in the bamboo and wooden furniture manufacturing industries was carried out. This study evaluated the following: (1) dust exposure levels in the bamboo and wooden furniture manufacturing industries; (2) types of occupational accidents that occurred; (3) risk factors in the furniture manufacturing industries; and (4) the wastage and carbon footprint of the bamboo and furniture manufacturing industries. This study will also assist in improving the working conditions in these industries, especially to boost the productivity and serve as a benchmark for future studies.

METHODOLOGY

Introduction

The evaluation of the working conditions for this study was carried out in 45 large furniture manufacturing industries in Malaysia, of which 30 were wood and 15 were bamboo furniture manufacturing companies. The predominant materials used in these mills were bamboo (*Gigantochloa scortechinii*) and solid rubberwood (*Hevea brasiliensis*). The selection of these companies was based on two criteria. The first criterion was its size, number of workers, and annual turnover. The furniture companies considered in this study were large, with more than 100 employees and an annual turnover in excess of US$ 10 million. The identity of the companies was obtained from the Malaysian Furniture Council (MFC). Meanwhile, the second criterion was the number of occupational accidents reported to the National Institute of Occupational Health and Safety (NIOSH) on an annual basis.

Target Respondents

The target respondents for this study were the workers from the selected furniture manufacturing industries comprising of different nationalities, age, and sex. The workers involved in the survey were those exposed to wood dust directly. A total of 6750 workers were expected to be involved in this survey, but only 5900 workers (87.41% response rate) participated in this study with the consent of the respective mill managers. 4000 workers were from wood furniture manufacturing industries, while the remaining was from the bamboo furniture manufacturing industries.

Experimental Design

Assessment of wood dust emission

The first part of the study involved the dust emission assessment in the bamboo and wooden furniture manufacturing industries in every work station in the mills. Sampling periods of 8 h were used in each of the work stations to determine the time-weighted average (TWA) value of dust concentration. The dust emissions were measured using a micro-orifice uniform deposit impactor (MOUDI, Model 100-NR, MSP Corporation, Minnesota, USA), which had a ten-stage rotating impactor with membrane filters to separate dust particles into different sizes. The particle sizes were measured by operating the instrument at three litres of air flow rate and pressure drop across the stage. By weighing the impaction stage before and after sampling, the particle size distribution of airborne dust was determined, as described by Marple *et al.* (1991).

Questionnaire-based survey

A four-part questionnaire-based survey was used to gather information on the manufacturing factory's characteristics, workers' demographics, health and safety practices, and opinions/ perceptions of employers and employees about the prevailing occupational health and safety issues. The questionnaire was developed after discussions with industrial health and safety experts to ensure that it represented the entire spectrum of workforce-related factors that could possibly affect workers' health and safety.

The first part of the questionnaire was related to workers' background, which was segregated in accordance to gender, nationality, age, and origin of workers. The next part of the questionnaire assessed the rate of occupational accidents that occurred in these mills during the five years from 2008 to 2012 (inclusive). Data was collected that accounted for

the type of injuries, work experience, and several other factors that may resulted in the injuries. This secondary data were compiled from the records at the respective mills and verified against the data reported by NIOSH.

The third part of the questionnaire examined the place of accidents and the associated risk factors in the respective mills, which were evaluated based on a total of 20 variables (Tables 1 and 2), based on previous studies by Zhou *et al.* (2009), Holcroft and Punnett (2009), and Ratnasingam *et al.* (2011b). These variables were rated based on Likert's five-point rating scale, where a higher rating indicated a stronger positive opinion (Morgan *et al.* 2004).

Table 1. Six-Factor Solution for Risk Factors in the Bamboo Furniture Manufacturing Industry

Variables	Loading of factors					
	1	2	3	4	5	6
Dust exposure	0.57	0.16	0.08	0.11	0.10	0.31
Insufficient lighting	0.61	0.10	0.24	0.27	-0.08	0.31
Stressful posture	0.25	0.62	-0.04	0.97	-0.04	0.09
Physically taxing work	0.40	0.61	0.21	0.17	0.09	0.14
Repetitive work	0.07	0.76	0.46	0.06	0.19	-0.05
Poor ergonomics	0.32	0.52	0.35	0.17	0.06	0.22
Manual handling	0.29	0.35	0.81	0.08	0.04	-0.26
Dangerous tools and machines	0.16	0.39	0.69	0.08	0.07	-0.21
Poor maintenance	0.32	0.11	0.65	0.45	-0.09	0.05
Poor work flow	0.09	0.59	0.09	0.56	0.15	0.17
Poor machine organization	0.37	0.79	0.28	0.64	-0.07	-0.15
Improper technology	0.47	0.08	0.26	0.59	0.41	0.05
Poor housekeeping	0.24	0.09	0.16	0.74	-0.07	-0.05
Lack of safety work culture	0.06	-0.07	0.47	0.08	0.52	0.67
Lack of training	0.35	0.08	0.59	0.08	0.59	-0.04
Age	-0.17	0.08	0.07	0.01	0.57	-0.38
Gender	0.14	0.09	0.22	-0.09	0.66	-0.07
Years at work	0.52	-0.21	0.24	0.12	0.76	0.20
Insufficient safety precautions	0.39	-0.32	0.39	0.17	0.34	0.61
Insufficient information	-0.22	0.33	0.52	0.21	0.47	0.73

Data Collection

The data of the dust emissions were collected from January 2014 to December 2014 with the assistance of the respective mill managers. The questionnaires were distributed to the workers in the selected factories by the respective mill manager and collected in sealed envelopes one week later.

Data Analysis

The data were compiled and analyzed using the statistical package for the social sciences (SPSS; IBM, USA). The mean and standard deviations for each of the variables, namely wood dust and occupational accidents, were computed. Pearson Product Moment Correlation Coefficient observed the relationship between the dust contribution and respiratory ailments among the workers. A t-test and analysis of variance (ANOVA) were applied in this analysis to determine the differences occupational accidents between the

means of groups of gender, nationality, age, and origin of workers. The statistically significant level was set at $p < 0.05$. Factor analysis simplified the large number of risk factors of occupational accidents variables into fewer new factors in a compact manner.

Table 2. Six-Factor Solution for Risk Factors in the Wooden Furniture Manufacturing Industry

Variables	Loading of factors					
	1	2	3	4	5	6
Dust exposure	0.55	0.14	0.05	0.07	0.08	0.29
Insufficient lighting	0.54	0.08	0.22	0.24	-0.05	0.27
Stressful posture	0.20	0.59	-0.01	0.95	-0.01	0.06
Physically taxing work	0.35	0.58	0.18	0.12	0.05	0.11
Repetitive work	0.04	0.72	0.44	0.02	0.16	-0.04
Poor ergonomics	0.29	0.48	0.31	0.15	0.04	0.20
Manual handling	0.26	0.31	0.76	0.07	0.01	-0.20
Dangerous tools and machines	0.11	0.36	0.67	0.04	0.03	-0.17
Poor maintenance	0.25	0.06	0.59	0.40	-0.06	0.02
Poor work flow	0.05	0.54	0.07	0.53	0.12	0.15
Poor machine organization	0.34	0.74	0.25	0.60	-0.05	-0.13
Improper technology	0.44	0.02	0.20	0.54	0.38	0.02
Poor housekeeping	0.18	0.04	0.10	0.69	-0.05	-0.03
Lack of safety work culture	0.01	-0.04	0.40	0.06	0.47	0.62
Lack of training	0.30	0.05	0.52	0.07	0.56	-0.03
Age	-0.14	0.05	0.03	0.01	0.51	-0.34
Gender	0.10	0.07	0.18	-0.07	0.63	-0.05
Years at work	0.49	-0.24	0.18	0.08	0.70	0.16
Insufficient safety precautions	0.33	-0.28	0.31	0.10	0.27	0.57
Insufficient information	-0.17	0.24	0.45	0.18	0.40	0.67

RESULTS AND DISCUSSION

The results of this study are presented in three parts: (1) dust exposure levels; (2) types of occupational accidents; and (3) occupational accident risk factors.

Determination of Dust Exposure Level

Dust exposure by job category

As reported previously by Ratnasingam and Bennet (2009), dust emission level is often related to the thickness of the chips produced during the machining operation. Generally, the chips produced were varied in terms of quantity, dimension, and shape (Rogozinski *et al*. 2015). Several factors may influence the different form of chips. Fisher *et al.* (2005) reported that the main factor affecting chip production was the wood species and machining parameters. In other reports, Ratnasingam *et al.* (2009) and Rogozinski *et al*. (2015) pointed out that wood material, processing technology, and wood material influence the variation of chips produced.

Inevitably, in this study, the routing and sanding operations in furniture mills produce chips of the lowest thickness, resulting in high levels of dust emission. A similar finding was also reported by Khan and Bhuiyan (2013). Sanding operations produced wood

waste in the form of wood dust only. Rogozinski *et al*. (2015) described that the amount of wood dust generated during the sanding operation depended on the wood material, as well as the direction and speed of the sanding process. Table 3 shows the average dust emission levels at the various machining centers in the bamboo and wooden furniture manufacturing industries. The findings from this study show that the routing and sanding operations warrant special attention by the safety personnel in the respective mills to ensure acceptable working conditions (Ratnasingam and Bennet 2009).

Table 3. Characteristics of Dust Emission and Incidence of Respiratory Ailments in the Bamboo and Wooden Furniture Manufacturing Industries

Job category	Average dust concentration (mg/m^3)		Incidence of respiratory ailments among workers (no. of cases per 100 workers/year)	
	Bamboo	Wooden	Bamboo	Wooden
Cross-cut	31	28	0	0
Surface planer	30	26	0	0
Moulder	0	30	0	0
Narrow band-saw	27	24	0	0
Router	76	53	8	2
Borer / Drill	24	20	0	0
Mortiser	0	20	0	0
Tenoner	0	20	0	0
Sander / Grinding	109	79	14	5

Correlation between dust exposure and respiratory ailments

An investigation was carried out to determine the relationship between the dust exposure and the number of cases of respiratory ailments among the workers. Figure 1 shows a positive and linear relationship of scatter plots between dust exposure and the number of cases of respiratory ailments in both the bamboo and wooden furniture manufacturing industries. A strong statistical correlation based on Pearson product moment correlation was obtained [$r = 0.986$ (bamboo), $r = 0.973$ (wooden), $p < 0.05$], suggesting that as dust concentration increases, so does the number of cases of respiratory ailments.

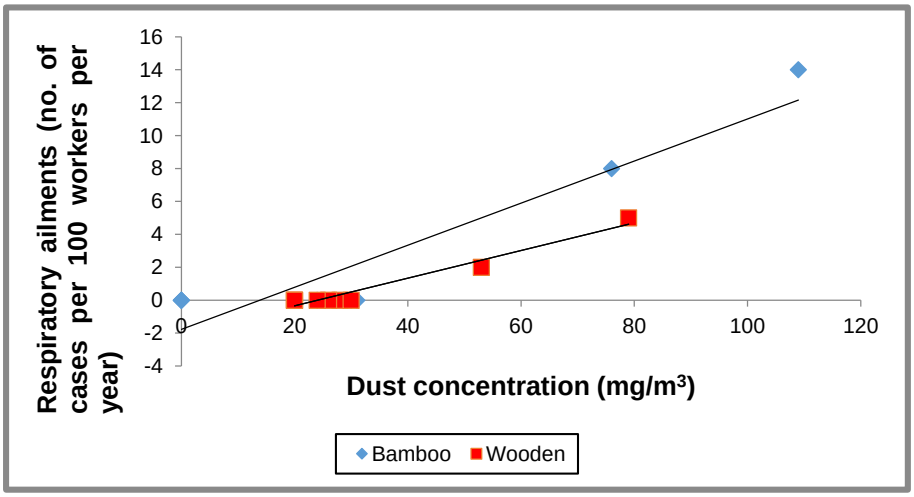

Fig. 1. Relationship between dust concentration and number of respiratory ailment cases in the bamboo and wooden furniture manufacturing industries

Wood dust particles are normally generated in different sizes. The distribution of dust particle sizes from the routing and sanding operations in the bamboo and wooden furniture manufacturing industries is shown in Table 4. It is apparent that bamboo produces a larger amount of finer dust particles compared to the solid wood, which is most likely due to the difference in the anatomical structure of these two materials (Menon *et al.* 2004; Wahab *et al.* 2009). Solid wood has a comparatively higher density than bamboo, and the higher amount of low-density components in the bamboo produces a relatively higher amount of finer dust particles during processing in mills (Ratnasingam and Scholz 2015).

Table 4. Dust Particle Size Distribution in the Bamboo and Wooden Furniture Manufacturing Industries

Machining process	Material types	% of dust particle size (µm)									
		18	15	12	10	8	5	3.2	1.8	1	0.56
Routing	Bamboo	56.0	10.0	8.0	6.0	4	3.9	4.0	4.1	1.5	2.5
	Wood	62.5	11.9	7.8	4.8	3	2.4	2.7	2.6	1.0	1.3
Sanding	Bamboo	41.5	13.7	20.5	6.1	4.5	3.3	3.0	2.9	2.5	2.0
	Wood	47	11	26.7	5.3	3.5	1.5	2.0	1.8	0.7	0.5

Occupational Accidents among Workers

The secondary data compiled from the factories show that the cuts and lacerations in workers' hands, wrists, fingers, and forearm were found to be the most frequent human anatomical sites for injury. The injuries in other anatomical parts were found to be less than 15% of the total injuries reported. The findings of this study are supported by several previous reports by Smith *et al.* (1994), Bazroy *et al.* (2003), Holocroft and Punnett (2009), and Ratnasingam *et al.* (2011a). This similarity can be explained by the manual nature of the job, especially in the machining operation section. It must also be recognized that the injury risk posed by different machines varies according to the type of material used for the machining operation (Ratnasingam *et al.* 2011b).

It appeared that the workers in both types of furniture industries did not follow the safety regulations. Most of the workers did not use the personal protective equipment to protect themselves from injuries. This factor could lead to occupational accidents among workers during the production activities. Similar observations were also noted from other studies that were carried out in the woodworking industries (Jerrie, 2012; Kwarne *et al*. 2014; Mitchual *et al*. 2015).

Workers background

The assessment of occupational accidents among workers in wood and bamboo furniture manufacturing industries were evaluated in terms of the workers' background, comprising gender, age, nationality, and origin of workers. The distribution frequency of these workers' background criteria is shown in Table 5.

The total number of male workers in this study was 5070, while the number of female workers was 830. Following an analysis of comparative study for occupational accidents rate between gender, a significant difference ($p < 0.05$) was observed. The study showed that male workers were more prone to be injured, compared to female workers. This is to be expected because of the higher number of male workers in this study, but as Jinadu (1990) suggested, male workers generally pay less attention during work, which may also lead to higher accident rates. In addition, female workers are usually given monotonous and repetitive tasks with lower accident risks.

Table 5. Frequency Distributions of Worker Background

Workers' background		Frequency distribution (%)
Gender	Male	85.93
	Female	14.07
Age	15-20	1.97
	21-25	63.88
	26-30	34.15
Nationality	Malaysia	37.12
	Indonesia	6.90
	Bangladesh	33.05
	Myanmar	12.71
	Nepal	10.22
Origin of workers	Local	37.12
	Migrant	62.88

Local workers dominated the wood and bamboo furniture manufacturing industries, while workers from Indonesia were the lowest. The analysis of occupational accident rate between the workers' nationalities, which comprise Malaysia, Indonesia, Myanmar, Bangladesh, and Nepal, indicated that worker nationality did not significantly influence ($p > 0.05$) the rate of occupational accidents in the furniture manufacturing industries.

As shown in Table 5, the age of the workers involved in this study could be classified into three different age-classes. 63.88% of the workers were in the age-class of 21 to 25 years old, while 116 workers were in the age class of 15 to 20 years old. The remaining age group was between 26 and 30 years old. Similar to the workers' nationality analysis, workers' age-class did not significantly influence the occupational accidents rate ($p > 0.05$).

When compared between the local and migrant workers, the total number of local workers in this study was 25.76% less than the total migrants' workers. When comparing injuries between the local and migrant workers, it was found that the local workers were more prone to occupational accidents. The positive working attitude and the desire to ensure sustainable income may make the migrant workers more focused on work compared to their local counterparts. Ratnasingam *et al.* (2011a) suggested that the lack of training and the inherently low education level among the workers are other contributing factors.

Comparison of occupational accidents between bamboo and wooden furniture industry

As mentioned previously, cuts, lacerations, bruises, and sprains in the workers' hands and wrists were the most common occupational accidents that occurred in the furniture manufacturing industries. A comparison between the two types of furniture manufacturing industries reveals that the frequency of occupational accidents for every 1,000,000 h was higher in the bamboo furniture manufacturing industries compared with the wooden furniture manufacturing industries. As a result, these mills also suffered a higher loss of productive time.

The comparative incidence of occupational accidents in the bamboo and wooden furniture manufacturing industries is shown in Table 6. Generally, the average years of experience of workers in the bamboo furniture manufacturing industries is lower than in the wooden furniture manufacturing industries. This may explain the higher frequency of accidents/injuries in the bamboo furniture manufacturing industry.

Table 6. Average Occupational Accident Rates in Bamboo and Wooden Furniture Manufacturing Industries

Incidence of occupational accidents	Bamboo furniture manufacturing industries	Wooden furniture manufacturing industries
Frequency of accidents/injuries (per 1,000,000 h)	389	214
Average loss of productive time (hours) per year	164	89
Working experience (years)	4.5	4.8
Duration of work (hours) prior to accident	4 to 8	8
Last meal/time of food consumption	On time	On time
Sleep disturbances	Yes	Yes
Stress/family tension	Yes	Yes
Acute illness	No	No
On medication	No	No

The study also revealed that occupational accidents in both furniture manufacturing industries were more likely to take place during the second shift, 3 pm to 11 pm. Moreover, a higher incidence of occupational accidents appears to occur to workers during over-time or when working during the weekend. The statistical analysis of the time series between the working shifts reported a significant difference ($p < 0.05$). It must be highlighted that the "degree of tiredness," particularly because of insufficient food, sleep disturbances, and stress, often results in loss of concentration, which leads to an increase in the number of occupational accidents.

Risk Factors for Occupational Accidents

The factor analysis was used to reduce the variables to six main factors: (1) nature of work; (2) risky technology; (3) mill layout; (4) workers' characteristics; (5) safety climate in the mills; and (6) education level of workers. Although the risk factor analysis revealed six main factors, this study chose five factors only. The exclusion of one factor was the education level of workers because it had only two variables. On the other hand, the other variables for the other factors were quite constant: factor-1 (variables 3, 4, 5, 6), factor-2 (variables 7, 8, 9), factor-3 (variables 10, 11, 12, 13), factor-4 (variables 15, 16, 17, 18), and factor-5 (variables 14, 19, 20). Tables 7 and 8 summarize the correlation matrix of the occupational accident rates.

Table 7. Correlations Matrix among the Factors for the Bamboo Furniture Manufacturing Industry

Factors	1 Nature of works	2 Risk in technology	3 Mill layout	4 Workers characteristics	5 Safety climate in mill
1 - Nature of works	1.00	0.84	0.38	0.77	0.91
2 - Risk in technology	0.71	1.00	0.29	0.66	0.60
3 - Mill layout	0.58	0.41	1.00	0.29	0.65
4 - Workers characteristics	0.77	0.71	0.37	1.00	0.81
5 - Safety climate in mill	0.80	0.86	0.71	0.77	1.00

Table 8. Correlations Matrix among the Factors for the Wooden Furniture Manufacturing Industry

Factors	1 Nature of works	2 Risk in technology	3 Mill layout	4 Workers characteristics	5 Safety climate in mill
1 - Nature of works	1.00	0.81	0.44	0.71	0.88
2 - Risk in technology	0.65	1.00	0.25	0.59	0.63
3 - Mill layout	0.51	0.45	1.00	0.30	0.65
4 - Workers characteristics	0.74	0.70	0.31	1.00	0.85
5 - Safety climate in mill	0.85	0.87	0.65	0.79	1.00

Correlation coefficients of less than ±0.5 were excluded, as they indicated a weak relationship. The Kaiser-Meyer-Olkin test was used to test the adequacy of correlation matrix. In the present analysis, the Kaiser-Meyer-Olkin test showed an index value of 0.90 and the level of significance was less than 0.5 (Morgan *et al.* 2004), and therefore the result was suitable for factor analysis.

The Cronbach's alpha value ($p < 0.05$) for the five factors for the bamboo and wooden furniture manufacturing industries is presented in Table 9. According to Ho (2006), the satisfactory reliability level is at 0.80 factors. This finding indicated that the reliability level in factor-2 and factor-3 was considered low for both furniture manufacturing industries. When the factors were analyzed to identify their relationship, the findings showed a significant correspondence between the nature of work and worker characteristics, nature of work and safety climate in mills, and worker characteristics and safety climate for both the bamboo and wooden furniture manufacturing industries (Table 10). Previous studies have underlined the fact that prevailing working conditions, safety climate, and worker characteristics are highly correlated with the incidence of industrial accidents (Varonen and Mattila 2000; Smith *et al.* 2006; Baek *et al.* 2008; Holocroft and Punnet 2009).

Table 9. Correlation Coefficients of the Five Factors

Factors	Bamboo furniture manufacturing industries	Wooden furniture manufacturing industries
1 - Nature of works	0.86	0.83
2 - Risk in technology	0.73	0.68
3 - Mill layout	0.44	0.51
4 - Workers characteristics	0.85	0.86
5 - Safety climate in mill	0.91	0.93

CONCLUSIONS

1. This study assessed the dust exposure levels at different working stations in the bamboo and rubberwood furniture manufacturing industries. Both mills produced high levels of dust emission in the sanding and routing work stations, but the bamboo furniture manufacturing industry produced a higher proportion of finer dust particles, which increases its health risk.

2. The study also revealed that the workers did not follow the safety regulations in the furniture manufacturing industries, which resulted in safety and health issues. Therefore, the importance of safety and health must be impressed upon the workers prior to them starting on the factory shop floor. The mill management and supervisors also need to monitor the workers continuously to ensure that the workers follow the safety and health guidelines, which will minimize occupational accidents and other health issues among workers.
3. Workers' health and safety issues are often not seriously considered in the furniture manufacturing industries. Therefore, a review of the existing standards and legislations related to workers health and safety in the woodworking industry is necessary in order to improve the working conditions in the mills.

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