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A STUDY ON LEVEL OF USAGE OF PERSONNEL PROTECTIVE EQUIPMENT'S AMONG THE BUILDING CONSTRUCTION WORKERS: A KNOWLEDGE DOMAIN

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Abstract:
Back Ground: PPE (Personal protective equipment) is equipment that will defend the workers against health and safety risks at work. Personal protective equipment or PPE is critical tokeep workersin the workplace safely to do work.
Objectives: To investigate the usage of Personnel Protective Equipments among the building construction workers among building construction workers.
Methods: The cross-sectional prospective study has employed. 360 building construction workers have been selected by using stratified sampling techniques.
Results: The KMO value is 0.672 and it greater than 0.5, and The Chi-square test value is 690.749 and it is significant at one percent level. Together three components have explained 56.141 percent of variations.
Conclusions: Personal protective equipment's (PPE) PPE is equipment that will protect workers against health or safety risks on the job. The finding is to reduce worker exposure to dangers when engineering and administrative controls are not possible.
Key Words: Building Construction Workers, Level of Usage of Personnel Protective Equipment's (PPE), Safety at Workplace.

1. Introduction:

The building construction industry hasbeen attained thehonour of being an unsafe or extremely risky industry because of the overly high deceleration of accidents and human death that take place on building construction sites. (Haupt, 2018). The usage of the personal protective equipment's has minimum requirements of which the purpose is to promote good practice in the construction to avoid the injuries and best use of the workforce. (Janocha & Smith 2010). The building construction industry has more death, injuries, physical damage of properties, risks and complexness than other industries due to the offensive figure of the occurring accidents and their fatal rate. (Ahmed, 2012). The building construction industry in India is highly inclined to hazards related to site activities and construction projects engage an ample number of workers. (Chandan Mehr, 2016). Personal protective equipment (PPE) refers to protective clothing, helmets, goggles, or other garments or equipment intentional to protect the wearer's body from injury or infection. (Edward Dickinson Bullard, 2017). Personal protective equipment (PPE) is equipment that will defend the workers against health and safety risks at work. It can include items such as safety helmets and hard hats, gloves, eye protection, high-visibility clothing, safety foot wear and safety harnesses. (PPE, 2016). The building construction workers are poor and vulnerable. There is no clearly and, expressed time limit/frame of work for them. They had to work on an average for about 10 hours/day. At times, they are prone to injuries and accidents. (Tiwary et al., 2012). The building construction site accidents may be grounds due to the factors such as the occurrence of building parts and masses of earth, falling of objects and pieces of work on workers, fall of persons from heights, ladders, and stairs, loading, unloading, and transportation of loads, working on machines andruinous with explosives. Every effort must be taken to bring up the level of awareness among the workers top use of the importance of personal protective equipment (PPE) at work sites. (Kanchana et al., 2015). It is urgently required to Implementation of required use of the personnel protective equipment's practices and effective training is important to reducing fatal injuries and construction accidents Comprehensive implementation of awareness of the use of the personnel protective equipment's and participation by workers in safety management and control are a critical part of a fundamental solution. (Chen & Tian, 2012). The awareness and usage of the personal protective equipment's in their working environment are important aspects to enhance the building construction site to better work the workers themselves. (HASSAN et al., 2007)

2. Review of Literature:

(Alcorn, 2020) The study revealed that important than equipment concerns to the personal protection of attribute responders and others at terrorist-incident sites. The study recommended that issues included launch effective organizational structures and practices on-site, risk assessment and communications, and PPE enforcement.

(Hecker & Gambatese, 2010) The study state standard-issue equipment that used was not designed to work in the types of environments presented by the incidents. The study state that helmet face shields and

goggles were intentional for impact and splash protection; some of the available hearing protection was designed for high impact noise such as sirens, not for the steady lower-frequency noise from heavy-duty equipment to which personnel were exposed.

(James McQuai, 2020) The study state that required personnel protection equipment (PPE) must be worn at all times when on construction The study revealed that at a minimum, each employee is required to wear a hard hat and safety glasses. The study recommended that all workers must wear shirts with sleeves, long work pants, and sturdy work shoes or boots when working on a construction or renovation site. The study suggested that sleeveless or tank top shirts, short pants, sweatpants, sneakers, sandals, and high-heeled or open-toed shoes are not permitted.

(PPE is commonly used in construction sites, 2019) The study state that When it comes to PPE for construction workers, the first things that come to mind are a hard hat, a safety vest, and work boots, but building construction sites pose a danger that requires more protection and personal equipment. The study recommended that working from heights, falling objects, heavy machinery, traffic, chemicals and so much more are common danger construction workers will deal with every day.

(EHS Today Staff, 2001) The study state that complete personal protective equipment (PPE) program not only can be one of the easiest safety and health programs although can implement and maintain, but it also can be one of the most beneficial. The study found that PPE manufacturers understand the significance of developing and improving the design by making products more comfortable, fashionable and easier to use. The study revealed that the better it feels, looks and goes on, the more likely it is to be implemented.

(Vitharana, 2015) The study found that lack of awareness about site safety and dislike to wear Personal Protective Equipment (PPE) were identified as the main causes of poor safety practices in construction sites. The study revealed that major needs concerning the building construction industry are to enhance professionals' interests in active safety management and implementation of awareness programs, which must be developed and implemented among building construction workers. The study concludes that awareness of possible risk factors and knowledge to reduce these risk factors among workers and contractors will enhance site safety.

3. Research Methodology:

This is a cross-sectional prospective study. Various building construction industries situated in and around the north-east part of Mysore city were known building construction industries and 360 building construction workers have been selected by using stratified sampling techniques. Total coverage of workers in each selected unit was attempted (except those who were absenting themselves during the entire period of study). The interview scheduled was prepared, tested and validated. These subjects were the advice of the study protocol and the written consent of each subject for their voluntary participation was obtained. The interview schedule was administered individually, separately to each subject. Data collected employed in SPSS Software. Factor analysis was used to know the effective use of Personal protective equipment (PPE) among the building construction workers in the worksite.

4. Data Analysis & Interpretations:

Table 1: Level of Use of Personal Protective Equipment (In Numbers and Percentage)

Factors	Mean	Std. Deviation	Analysis N
Safety Gadgets	2.98	1.300	360
Head load Support	2.59	1.266	360
Head gloves	2.66	1.014	360
Shoes	3.69	1.000	360
Safety Nets	3.13	1.080	360
Safety belts	2.96	1.559	360
Helmets	3.09	1.292	360
Chine Gurds	3.61	1.277	360
Illmantive Jackets	2.84	1.330	360
Chest Guards	2.96	1.367	360

Source: Results are computed by using primary data

The scope for factors of the level of use of personnel protective equipment is presented in the above table. It has been found from the table that the highest score is found shoes and the lowest score was found for head load support. The standard deviation explains the inconsistency in the average score.

From the correlation matrix, it is found that the diagonal matrix is a unit matrix and gives a solution for factor analysis. The highest correlation coefficient value is found between Safety Gadgets and Head load Support, and the highest correlation coefficient value is also found between Safety Gadgets and chest Guards. It is also proven with many other factors that the correlation coefficient between the factors is other than zero.

Therefore, factor analysis is advisable for the present concept of the level of use of personnel protective equipment in building construction Industries.

Table 2: KMO and Bartlett's Test for Level of Use of Personal Protective Equipment

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.672
Bartlett's Test of Sphericity	Approx. Chi-Square	690.749
	df	45
	Sig.	.000

Source: Results are computed by using primary data

The Kaiser-Meyer-Olkin and Bartlett's tests were conducted to identify the adequacy of the sample for factor analysis of the level of use of personnel protective equipmentin building construction industries. The KMO value is 0.672 and it greater than 0.5. Hence, samples are adequate for factor analysis. The Chi-square test value is 690.749 and it is significant at one percent level. Therefore, there are strong relations among the factor in this analysis for identifying the factors jointly being use influences the level of use of personnel protective equipmentin building construction

Table3: Communalities for Level of Use of Personnel Protective Equipment

Factors	Initial	Extraction
Safety Gadgets	1.000	.681
Head load Support	1.000	.775
Head gloves	1.000	.542
Shoes	1.000	.305
Safety Nets	1.000	.631
Safety belts	1.000	.574
Helmets	1.000	.639
Chine Gurds	1.000	.350
Illmantive Jackets	1.000	.490
Chest Gurds	1.000	.627
Extraction Method: Principal Component Analysis.		

Source: Results are computed by using primary data

The communalities for the factor of commonalities for the level of use of personnel protective equipment has calculated and found that the initial value the factors are one and extraction factors are other than zero. It indicates that each factor individually and jointly contributes to determining communalities level of use of personnel protective equipment. Accordingly, the present factor analysis of the communalities for the level of use of personnel protective equipment will identify at least one component which represents more than one factor.

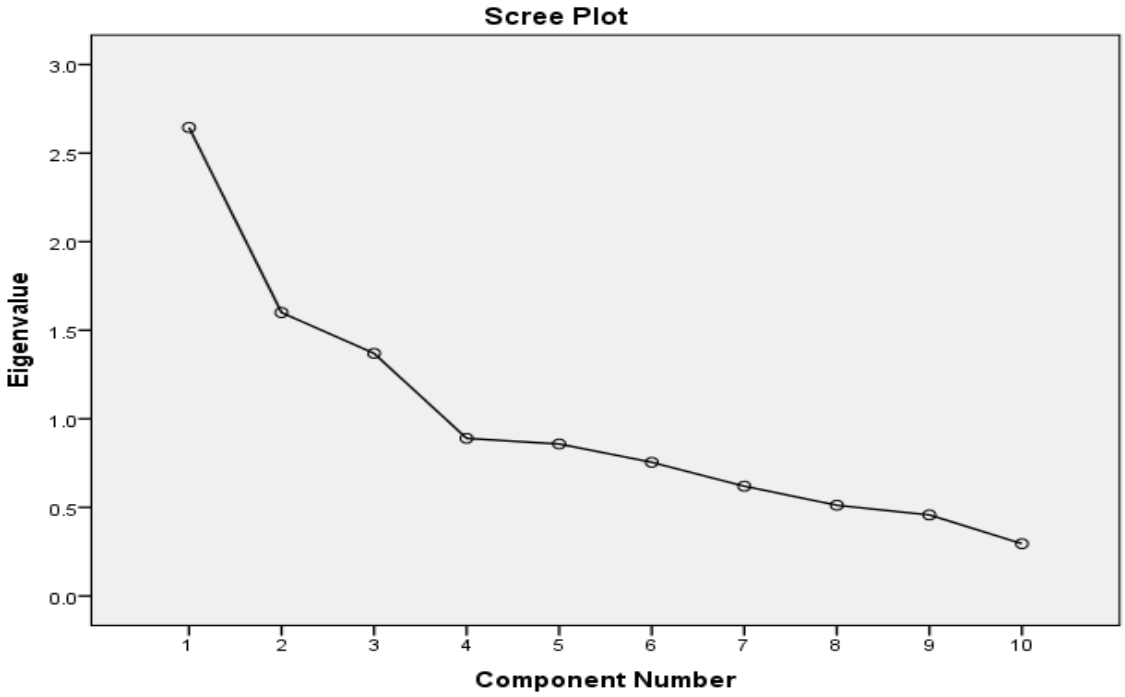
Table4: Total Variance Explained for Factors of Use of Personal Protective Equipment (In Numbers and Percentage)

Component	Extraction Sum of Squared Lodgings		
	Total	% of Variance	Cumulative %
1	2.645	26.449	26.449
2	1.600	15.999	42.447
3	1.369	13.694	56.141
4	.890	8.899	65.040
5	.858	8.579	73.618
6	.755	7.545	81.164
7	.619	6.194	87.358
8	.512	5.119	92.477
9	.457	4.574	97.051
10	.295	2.949	100.000
Extraction Method: Principal Component Analysis.			

Source: Results are computed by using primary data

The Total Eigen value for the factors of causes for accidentsand percentage of variance explained by each component has been estimated and presented in the above table. Based on the Eigen value; three components are extracted for causes for accidents**.** The first components explain 26.449 percent of variation in total variation explained by all the variables. The second components explain 15.999 percent of variations. The third component explains 13.694 percent of variations. To gather three components have explained 56.141percent of variations.

Graph 1: Scree Plot for Components of Use of Personal Protective Equipment



Identification of Factors in Components of Use of Personnel Protective Equipment:

Using varimax rotated components matrix of use of personnel protective equipment has identified the specific factors under each component for which values are greater than 0.7 (A factor loading approximately 0.7 is considered to be sufficient).

Table 5: Varimax Rotated Component Matrix for Use of Personal Protective Equipment (In Numbers and Percentage)

Factors	Component		
	1	2	3
Safety Gadgets	.739	.286	.230
Head load Support	.848	.112	.209
Head gloves	.287	.740	-.223
Shoes	.224	.432	.260
Safety Nets	.249	.150	.739
Safety belts	.177	-.229	.700
Helmets	-.313	.369	.636
Chine Gurds	-.015	.585	.089
Illmantive Jackets	-.052	.697	.031
Chest Gurds	.782	-.103	-.069
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

Source: Results are computed by using primary data

The principal component analysis (PCA) for factors of use of personnel protective equipment has performed and found that factors have shown their intuition for more than one component. Hence, the varimax rotation method has been performed and identified the specific factors for each component.

The PCA has identified the factors for all three components. At the same time, it is also confirmed that there is no overlapping of factors and components. The first and second components have identified two factors. The other components have identified only one factor. Head load Support and Chest Guards between workers are identified under component one. A Head glove is identified under component two.

5. Results and Discussions:

- The study observed that the highest score is found in shoes and the lowest score was found for head load support. The standard deviation explains the inconsistency in the average score.
- The study found that the highest correlation coefficient value is found between Safety Gadgets and Head load Support, and the highest correlation coefficient value is also found between Safety Gadgets and chest Guards.
- The KMO value is 0.672and it greater than 0.5. Hence, samples are adequate for factor analysis.
- The Chi-square test value is 690.749 and it is significant at one percent level. Therefore, there are strong relations among the factor in this analysis for identifying the factors jointly being use influences the level of use of personnel protective equipmentin building construction
- The study has found that the present factor analysis of the communalities for a level of use of personnel protective equipment will identify at least one component which represents more than one factor.
- The study discovered that based on the Eigen value; three components are extracted for causes for accidents. The first components explain 26.449 percent of variation in total variation explained by all the variables. The second components explain 15.999 percent of variations. The third component explains 13.694 percent of variations. To gather three components have explained 56.141 percent of variations.
- The principal component analysis (PCA) has identified the factors for all three components. At the same time, it is also confirmed that there is no overlapping of factors and components. The first and second components have identified two factors. The other components have identified only one factor. Head load Support and Chest Guards between workers are identified under component one. Hand gloves are identified under component two.

6. Suggestions:

- The builders or the contractor to ensure an adequate training programme for the workers in the work place.
- The building construction workers should practice the use of the Personnel Protective Equipments on the construction site.
- The builders the contractors should provide the Personnel Protecive Equitment's to the building construction workers to reduce the workload and increase the work capabilities.
- The supervisor should monitor the worker must use the personnel protective equitment's during working hours.
- The government should conduct a special drive safety program especially the use of the personnel protective equipment among the worker.

7. Conclusions:

The building construction industries are featured with the request of having to closely screen their safety management systems to decrease occupational hazards.PPE or Personal Protective Equipment's, helps prevent work situation on the job due to breath, absorption, irritants, or other prolonged contacts and reduces accidents, improves the health of your workers, and makes for a safer, secure work environment. Safety is a major issue for day workers and skilled labourers. Each year, accidents occur frequently in the building construction industry and frequently it is due to the absence of Personal Protective Equipment**.** Personal Protective Equipment's **(**PPE**)** is equipment that will protect workers against health or safety risks on the job. The finding is to reduce worker exposure to dangers when engineering and administrative controls are not possible.

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