Study of Influential Factors in Applying Occupational Health and Safety Management System on Construction Project (Case Study: Vida View Makassar Apartment)

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Abstract: ***Construction project is mostly reliable and troubled to accidents due to its requirement for heavy equipment. Thus, the any process of it shall meet with the safety regulations. Judging from that, it is necessary to carry out an analysis to acknowledge the most influence factors on the implementation of Occupational Health and Safety Management System at construction works, which in this case at Vida View Apartment Makassar. The required data consist of primary data that can be obtained directly through some questionnaires, the secondary data which is the location of the construction project. The method used for this research is SEM (Structural Equation Modeling) method by calculating the measurement of the outer model, inner model measurement by using SmartPLS application, and descriptive analysis. From this research, it can be obtained the relation between Occupational safety and health organization and the behavior and safety are as high as 3,148 and 0,152, operational to behavior and safety relation are as high as 2,371 and 0,417, regulation to behavior and safety are 2,250 and 0,204, commitment and Occupational safety and health policy to behavior and safety are as high as 2,115 and 2,367. These can be seen for the relation value < 1,96 which shows an insignificant effect.***

Keywords: ***Construction project, Occupational Health, Safety, SEM.***

I. INTRODUCTION

The development and economic growth in Indonesia is now increasingly rapid, especially the work in the construction sector is also increasing [1]. As is well known that the aspect which is a parameter of the success of a project is quality, cost, and work safety. Construction work is a job that is prone to accidents because it uses quite a lot of equipment, both sophisticated and manual [2]. In various types of activities, this equipment is carried out on land with limited area that causes high risk of accidents. Therefore, at the time of implementation it must be in accordance with the rules work safety that workers who work in a place must be secured from all events that could endanger themselves [3]. In accordance with the Republic of Indonesia Law No. 13 of 2003 concerning Employment article 86 states that every worker or laborer has the right to obtain protection for occupational safety and health, morals and morality and treatment that is in accordance with human dignity and values and religious values [4]. One of the efforts of occupational safety and health is to maintain work environment factors that are always within safe and healthy limits so that they do not cause illness or accidents due to work. The situation in the project location reflects the harsh character and the activity looks very complex and difficult to implement so that it requires excellent stamina from the workers who carry it out. But it cannot be denied that this construction work is a contributor to the high accident rate [5] The number of cases of work accidents and occupational diseases is very detrimental to many parties, especially the workforce concerned [6].

Occupational health and safety (K3) is not only the interests of workers but also the interests of the business world. Globally, the International Labor Organization (ILO) notes, every day there are about 6,000 fatal work accidents in the world [7]. In Indonesia alone, there are cases of accidents that are experienced every day by workers from every 100,000 workers and 30% of them occur in the construction sector [8].The main cause of work accidents is the low awareness of the importance of applying OSH in the industry and society [9]. So far, the application of OSH is often regarded as a cost or cost burden, not as an investment to prevent work accidents.

The basis for the implementation of these procedures is adjusted to international standards, namely Occupation Health and Safety Management System (OHSAS) 18001: 1999 which has similarities with the Occupation Health and Safety regulated in the Minister of Manpower Regulation Number: PER.05 / MEN / 1996 [10]. The implementation of the SMK3 has a good influence on both the company and the workforce, it can be seen from the number of workers who have experienced accidents or occupational diseases are still relatively low and do not have a significant influence on the execution of work.

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Thus, in this work, the factors that influence the successful implementation of Occupation Health and Safety Management System in construction projects in Makassar Apartment View were done.

II. METHODOLOGY

Research Location and Time

This research was carried out in the construction of Vida View Makassar Apartment, which is located on Jalan Topaz, Boulevard Panakkukang Makassar. This project was carried out by PT. Housing Development (Persero) Tbk. The entire research process was carried out in September 2016 - October 2016.

Research Designand Research Population

This type of research is observational research that is analytic with cross sectional design, because the risks and consequences or cases that occur in the object of research are measured or collected simultaneously and data collection for the dependent and independent variables is carried out together.

Primary data in this study are data collected directly from the object of research. That is data obtained from respondents through the results of the questionnaire submitted by the researcher. This study secondary data obtained from the company that can be seen by company documentation, reference books, and other information related to research.

Data Collection, Research Variables and Data Analysis Method

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Independent variables are variables that cause the dependent variable will appear. The independent variables in this study are Regulation, Commitment and Policy, OHS Organization, and Operations.

Data analysis techniques using Structural Equation Modeling (SEM) to describe the relationship between the latent variable and the indicator (outer model) and to describe the relationship between latent variables (inner model) assisted by using the SmartPLS version 3.0M3 application.

III. RESULT AND DISCUSSION

Table 1 shows the cross loading factor loading. From the Table 1, it can be seen that the construct correlation of K3 commitment and policy with its indicators (ko1, ko2, ko3, ko5, ko4, ko6, ko7) is greater than the correlation of K3 commitment and policy indicators (ko1, ko2, ko3, ko4, ko5, ko6, ko7) with other constructs. The construct correlation of the survivors condition with the indicators (ks1, ks2, ks3.ks4) is greater than the correlation of the condition of the survivors condition (ks1, ks2, ks3.ks4). Operational construct correlation with the indicators (op1, op2, op3) is greater than the correlation of operational indicators (op1, op2, op3) with other constructs. The construct correlation of K3 organization with its indicators (or1, or2) is greater than the correlation of organizational indicators K3 (or1, or2) with other constructs. Safe behavior construct correlation with the indicators (ps1, ps2, ps3, ps4, ps5, ps6) is greater than correlation safe behavior indicator (ps1, ps2, ps3, ps4, ps5, ps6) with other constructs.

Table. 1 Cross Loading (Factor Loading)

	Commitments and Policies	Safe Condition	Operational	Organization	Safe Behavior	Regulation
ko1	0.681	0.362	0.425	0.551	0.521	0.550
ko2	0.520	0.377	0.157	0.468	0.316	0.216
ko3	0.681	0.525	0.389	0.305	0.468	0.304
ko4	0.833	0.683	0.428	0.560	0.750	0.498
ko5	0.636	0.387	0.372	0.221	0.290	0.118
ko6	0.755	0.466	0.361	0.701	0.781	0.639
ko7	0.717	0.249	0.500	0.412	0.471	0.323
ks1	0.480	0.674	0.137	0.087	0.207	0.124
ks2	0.576	0.832	0.268	0.588	0.643	0.473
ks3	0.419	0.768	0.302	0.282	0.548	0.310
ks4	0.375	0.575	0.069	0.388	0.476	0.286
op1	0.469	0.259	0.780	0.217	0.370	0.030
op2	0.527	0.274	0.936	0.360	0.617	0.364
op3	0.237	0.085	0.664	0.253	0.293	0.321
or1	0.721	0.376	0.325	0.892	0.748	0.631
or2	0.513	0.498	0.308	0.899	0.703	0.566
ps1	0.543	0.486	0.429	0.648	0.787	0.494
ps2	0.625	0.551	0.575	0.635	0.873	0.540
ps3	0.713	0.548	0.511	0.697	0.795	0.558

ps4	0.650	0.536	0.280	0.718	0.820	0.746
ps5	0.582	0.522	0.301	0.408	0.593	0.454
ps6	0.600	0.473	0.548	0.649	0.800	0.612
re1	0.626	0.529	0.278	0.634	0.755	0.962
re2	0.287	0.038	0.253	0.517	0.415	0.744

From the Table 2, it can be seen from the output of Cronbach's Alpha for constructs of K3 commitment and policy of 0.823, construct of safe condition 0.681, operational construct 0.721, construct of K3 organization 0.753, construct of survivors behavior 0.871, and construct of 0.695. The output of Composite Reliability for construct commitment and K3 policy is 0.865, construct of safe condition is 0.807, operational construct is 0.840, construct of K3 organization is 0.890, and construct of behavior is 0.904, and construct is 0.848. So it can be concluded that the construct of K3 commitment and policy, safe behavior, operational, organization, conditions safe, and regulation has good reliability. It is said that a reliable construct, then the Cronbach's Alpha value must be> 0.6 and the Composite Reliability value must be> 0.7.

Table. 2 Cronbach's Alpha and Composite Reliability

	Cronbach's Alpha	Composite Reliability
Commitments and Policies	0.823	0.865
Safe Condition	0.681	0.807
Operational	0.721	0.840
Organization	0.753	0.890
Safe Behavior	0.871	0.904
Regulation	0.695	0.848

Based on the output in Table 3 can be concluded as follows:

1. Path parameter coefficients obtained from the relationship between regulations with a condition of safe conditions of 0.048 with a T-statistic value of 0.204 (<1.96) at a significance level of α = 0.05. This shows that there is a significant but not significant influence between regulation and safe conditions.
2. Path parameter coefficients obtained from the relationship between regulation and survivor behavior variables of 0.257 with a T-statistic value of 2.250 (> 1.96) at a significance level of α = 0.05. This shows that there is a significant influence between regulation and safe behavior.
3. Path parameter coefficients obtained from the relationship between commitment and K3 policy with a variable of safe condition is 0.656 with a T-statistic value of 2.367 (> 1.96) at a significance level of α = 0.05. This shows that there is a significant influence between K3 commitment and policy and safe conditions.
4. The path parameter coefficient obtained from the relationship between commitment and K3 policy with the survivor behavior variable is 0, 262 with the Tstatistik value 2.115 (> 1.96) at the significance level α = 0.05. This shows that there is a significant influence between K3 commitment and policy with safe behavior.
5. Path parameter coefficients obtained from the relationship between operations with a safe condition variable of -0.108 with a T-statistic value of 0.417 (<1.96) at a significance level of α = 0.05. This shows that there is an effect but not significant between operations with safe conditions.
6. Path parameter coefficient obtained from the relationship between operations with a variable of safe behavior of 0.214 with a T-statistic value of 2.371 (> 1.96) at a significance level of α = 0.05. This shows that there is a significant influence between operations and safe behavior.
7. Path parameter coefficients obtained from the relationship between K3 organization with a condition of safe conditions of 0.045 with a T-statistic value of 0.152 (<1.96) at a significance level of α = 0.05. This shows that there is an influence but not significant between K3 organizations with safe conditions.
8. Path parameter coefficients obtained from the relationship between K3 organization and the survivor behavior variable of 0.382 with a T-statistic value of 3.148 (> 1.96) at a significance level of α = 0.05. This shows that there is a significant influence between OSH organizations with safe behavior.

Table. 3 Path Coefficient

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-Statistics	P Values
Commitments and Policies > Safe Condition	0.656	0.644	0.277	2.367	0.018
Commitments and Policies> Safe Behavior	0.262	0.272	0.124	2.115	0.035
Operational > Safe Condition	-0.108	-0.088	0.259	0.417	0.677
Operational > Safe Behavior	0.214	0.220	0.090	2.371	0.018
Organization > Safe Condition	0.045	0.022	0.295	0.152	0.879
Organization > Safe Behavior	0.382	0.378	0.121	3.148	0.002
Regulation > Safe Condition	0.048	0.109	0.234	0.204	0.839
Regulation > Safe Behavior	0.257	0.258	0.114	2.250	0.025

The volume of material waste in this study is estimated based on respondents' answers to the questionnaires that have been provided or based on their work experience during the building project development process. In this study eight types of waste were determined from consumable materials namely concrete, reinforcing iron, cement, sand, broken stone, light brick, ceramics, mortar, and one type of non-consumable material, wood.Respondents' responses and responses to both the supervision level and the implementing level regarding the volume of waste material are presented in the form of a table. Based on Table 4, it can be seen the tendency of respondents in choosing the quantity of waste for each material. Consumable materials are: concrete, cement, sand, broken stone and mortar the amount of waste volume is between 0-5% of the total material procurement with the percentage of respondents respectively 67.65%, 70.59%, 70.59%, 76, 47% and 58.82%. Iron, light brick and ceramic materials have a waste volume between 6-10%, with the percentage of respondents respectively 55.88%, 58.82% and 55.88%. Wood material which is a non-consumable material provides the highest waste value, which is between 11-15% with the percentage of respondents at 61.76%.

Table. 4 Quantity of waste material based on supervisor view

No	Material	Quantity	Respondent Percentage
1	Concrete	0-5 %	(67,65%)
2	Iron	6-10 %	(55,88%)
3	Cement	0-5 %	(70,59%)
4	Sand	0-5 %	(70,59%)
5	Broken stone	0-5 %	(76,47%)
6	Light brick	6-10 %	(58,82%)
7	Ceramics	6-10 %	(55,88%)
8	Mortar	0-5 %	(58,82%)
9	Wood	11-15%	(61,76%)

Based on Table 5, it can be seen the tendency of respondents in choosing the quantity of waste for each material. Consumable materials are: concrete, cement, sand, crushed and mortar stones the amount of waste volume is between 0-5% of the total material procurement with the percentage of respondents in a row of 80.00%, 76.00%, 80.00%, 77.14%, and 73.33%. Iron, brick and ceramic materials have waste volumes between 6-10%, with the percentage of respondents being 65.00%, 80.00% and 70.00%. Wood material which is a non-consumable material provides the highest waste value which is between 11-15% with the percentage of respondents as much as 65.00%.

Table. 5 Quantity of waste materials based on the implementers view

No	Material	Quantity	Respondent Percentage
1	Concrete	0-5 %	(80,00%)
2	Iron	6-10 %	(65,00%)
3	Cement	0-5 %	(76,00%)
4	Sand	0-5 %	(80,00%)
5	Broken stone	0-5 %	(77,14%)
6	Light brick	6-10 %	(80,00%)
7	Ceramics	6-10 %	(70,00%)
8	Mortar	0-5%	(73,33%)
9	Wood	11-15 %	(65,00%)

The material waste causes in this study are divided into two parts, the first part of supervision is in the form of general factors that cause waste. The second part of the view of the implementers working in the field in the form of waste factors from each material based on their experience in the field. One way ANOVA test begins by formulating a hypothesis, with the hypothesis of:

H_0: There is no significant difference in the average of the variables because of differences in position, level of education and work experience. H_a: There are significant differences in the average of the variables because of differences in positions, levels of education and work experience. Testing criteria can be based on significance value or F value. If the significance value is> 0.05, Ho is accepted, and vice versa if the significance value is <0.05, then Ho is rejected or Ha is accepted, and if the F value counts ≤ F table then ho is accepted, otherwise if F counts> F table, then Ho is rejected. One way ANOVA test is only done to analyze the factors that cause material waste from the point of view of supervision, because to implement the causal factors of some material have different respondents. In table 6, one way ANOVA test results will be given. In table 6 it is seen that for the design, handling, workers, management, procurement / purchase groups, location conditions and external factors a significance value of> 0.05 thus Ho is accepted, or there is no significant difference in the average of the variables due to different positions, level of education and work experience.

The value of F table for group data based on position is 3.305 (for df 1 = 2 and df 2 = 31 (see attachment 6), and in table 21 it is seen that the F value for each factor is <3.305 thus Ho is accepted.

Table. 6 Test result of one way anova

Factors causing waste	Department		Level of Education		Work Experience	
	F.	Sig.	F.	Sig.	F.	Sig.
Design	1,147	0,375	2,529	0,096	2,529	0,096
Handling	1,862	0,103	0,085	0,918	0,085	0,918
Worker	1,487	0,206	1,981	0,155	1,981	0,155
Management	1,888	0,099	1,930	0,162	1,930	0,162
Procurement / Purchasing	2,099	0,067	0,573	0,569	0,573	0,569
Location Conditions	0,979	0,492	2,157	0,133	2,157	0,133
External factors	0,680	0,742	2,920	0,069	2,920	0,069

IV. CONCLUSION

In this work, the factors that influence the successful implementation of Occupation Health and Safety Management System in construction projects in Makassar Apartment View were done. Results has shown that there is significant influence between regulation and safe behavior, commitments and policies with safe conditions and safe behavior, a significant influence between operations and safe behavior, and finally there is significant influence between OSH organizations with safe behavior.

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