

Analysis Of Factors Affecting Construction Workforce Performance In The RISHA (Healthy Simple Instant House) In Central Sulawesi

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ABSTRACT

How well the people making things do their jobs has a big impact on how successful the RISHA improvement project is. And whether these employees do well or poorly depends on several important things that need to be carefully looked at. So, this study aims to find out what things affect how well construction workers do their jobs at the RISHA development project. It also aims to find out which things have the biggest effect on how well they work. People at the RISHA development undertaking. This takes a look at using a purposive sampling technique with forty respondents. For information collection, the usage of questionnaire distribution and documentation techniques. records analysis the use of component evaluation techniques. The study shows that there are 4 things that affect how well construction workers do their jobs the RISHA development task in significant Sulawesi, the four elements are paintings device elements, gadget and fitness factors, fabric and K3 factors, and person/HR elements, wherein the impact generated from the 4 factors is 75.014% even as the ultimate 24.986% is encouraged by using elements that don't have a dominant effect on. in the meantime, the research outcomes also display that the work system issue has the most dominant effect on the performance of production people inside the RISHA improvement assignment in imperative Central Sulawesi, with the best change in price, which was 49,481%.

KEYWORDS: Performance, Construction, Creation Personne., Production

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I. INTRODUCTION

Natural disasters that hit human life not only claim lives, but also cause damage and destruction to physical aspects, including residential buildings of the Community, so in post-disaster handling, housing is one of the needs that must be met immediately (Gunarto et al., 2020). In responding to disasters, the provision of post-disaster housing is a good basis in a series of post-disaster recovery processes, thinking about that housing is one of the primary one human desires that need to be met for survival. The existence of put up-catastrophe housing impacts all components of families and community recovery (Saud et al., 2020). The existence of support in the form of adequate housing, followed by basic provisions, can guarantee Community security and catalyze livelihood opportunities and economic recovery (Kamaludin et al., 2025).

One of the programs for relocating settlements for Communities affected by disasters is the Development of Permanent Housing as a new permanent settlement area for disaster victims with achievement indicators being the construction of Huntap and environmental infrastructure and inhabited by Community recipients of assistance affected by disasters (Bahar et al., 2024). Fixing community housing for the long run is important. This will stop similar damage that earthquakes in the future could cause. Because of this, the Ministry of Public Works and Public Housing (PUPR) and the government of Sulawesi Province will use earthquake-resistant house generation, or RISHA. They will use it to rebuild many homes in Palu city, Sigi Regency, and Donggala Regency, areas that were hit hard by the earthquake and tsunami in Central Sulawesi. The simple, healthy, quick-build house machine, also known as RISHA for short, was made to make it easier and faster to put together housing for people in Palu, Sigi Regency, and Donggala Regency who were affected by earthquakes and tsunamis.

RISHA is a Residential Building Construction Technology with a Fabrication system for the Structure, Filler and Utilities components (Gunarto et al., 2020). The Structure component uses Reinforced Concrete material with a Dry Joint system. The upper frame is made of two parts: the Structure Panel Component and the Node. These parts can be used to build the frame of a building. Through technology (Tang, 2003), acceleration of the construction process and cost reduction through efficient use of building materials will ultimately be able to reduce costs, then through innovation of appropriate technology, where technology that is simple and in accordance with the needs and abilities of the community (Egbu & Lou, 2011), in the end the technology will be able to encourage the growth of new jobs in the industrial sector, especially small and medium industries. In order to synergize appropriate technology to encourage new jobs, R&D activities have been carried out to develop simple housing technology that can be worked on by workers and Small Businesses. These activities are in the form of simple housing technology development activities. Through the development of RISHA technology (simple healthy instant houses) (Fahraini Pratiwi et al., 2023).

The settlement rehabilitation project through the construction of RISHA for disaster victims is a project that involves many parties in its implementation and costs a lot of money, of course in the implementation of this project good project management is needed, especially related to project workers, because the most influential aspect in completing a construction project is human resources (Zhao et al., 2016). Whether a production project succeeds or fails depends on how well the help is controlled. One factor that affects this is people, especially the workers (craftsmen and employees) who decide how productive the project will be. With dynamic capabilities in making better changes, human resources can be a determinant of the success of a project (Singh Bhatia & Awasthi, 2014). To finish a construction project on budget, with good quality, and on time, the people working on it must perform well and be productive. This statement is based on what we saw while watching the work being done in the field, namely the RISHA Development in Sigi Regency and Donggala Regency, it was found that the work conditions for the Construction of Simple Healthy Instant Houses (RISHA) sometimes experienced delays caused by factors such as workforce performance, therefore it is necessary to conduct a research analysis that affects the performance of workers on the RISHA (Simple Healthy Instant House) construction project in Central Sulawesi. How well construction workers do their jobs is very important for finishing a project. If workers don't know how well they are doing, they may not produce enough work. Performance is the result or achievement of work carried out by the project workers, the performance of these construction workers greatly determines the success of the development project with the RISHA concept. (Stern et al., n.d.)

The housing rehabilitation project through the construction of RISHA Helping people affected by disasters is a big project. Many people are involved, and it costs a lot of money. To do this project well, it needs to be managed carefully, especially the people working on it. The people involved are the most important part of finishing a construction project. The success or failure of a construction project depends on the effectiveness of resource management (Choudhary et al., 2012). One of the assets is the human thing, specifically the personnel (craftsmen and workers) who're the determinants of achieving productiveness degrees. With the dynamic ability to make higher changes, The work of human resources can decide how well a job is done. To complete a project on time, at the right cost, and with good quality, you need human resources who work well and produce good result. Based on the results of monitoring in the field at the work location, namely the RISHA Development in Sigi Regency and Donggala Regency, it was found that the work conditions for the Construction of Simple Healthy Instant Houses (RISHA) sometimes experienced delays caused by factors such as workforce performance, therefore it is necessary to conduct a research analysis that affects workforce performance on the RISHA (Simple Healthy Instant House) construction project in Central Sulawesi. (Becker et al., 2015; Fakunle, 2020)

How well construction workers do their jobs is key to finishing a project. When workers don't know how well they are doing, they don't produce as much. Performance is how well project workers do their jobs and what they achieve. The performance of these workers greatly affects how well a RISHA project succeeds. This is because performance shows how good or bad the workers are at their jobs, in terms of both quality and quantity. Of course, how well these workers perform depends on several important things that need to be carefully studied. Therefore, the service provider or often called the contractor must know what factors can affect the performance of the workforce so that they can improve the performance of the workforce. (Arantes & Ferreira, 2020)

This examine is based totally at the lifestyles of problems inside the implementation of creation tasks, especially in government work projects that often experience delays in the completion of work according to the contract time and frequent changes in skilled labor personnel, both from the position of foreman, head craftsman and craftsman which can result in delays in work progress in structural and non-structural parts of the paintings for you to have an impact at the performance of a organization or contractor. dedication of factors that have an effect on the overall performance of production workers inside the RISHA everlasting housing task (simple healthy instant houses) needs to be accommodated with an appropriate assessment method so that it can be

scientific input for project owners or companies in completing construction work. This study began by conducting a preliminary study which included an introduction to the study area, a literature review, identification of data and software used. From the preliminary study, it was continued with identification of problems to formulate problem formulations and determine research objectives, then data collection was carried out both from primary data and from secondary data, the next step was to select factors and sub-factors that influenced the performance of skilled workers in the construction sector (Sospeter et al., 2020)

II. METHODOLOGY

The type of research used in this thesis is descriptive research, namely research conducted by collecting data to test the researcher's questions or those related to current events (Lin et al., 2013; Van Tam et al., 2021). The primary motive of descriptive studies is to systematically describe the information and traits of the item or difficulty being studied precisely. This study uses several parameters as considerations in decision making. These parameters include labor condition factors, work system factors, environmental factors, equipment and material factors, security factors, occupational health and safety and supervision factors (Stifi & Luis Ponz-Tienda, 2014). Statistics collection contraptions are gear selected and utilized in statistics series sports so that facts collection sports turn out to be systematic and easy. The instrument used in this study is in the form of a questionnaire (Maccallum & Austin, 2000). The statistics accumulated within the observe might be used to answer the troubles which have been formulated and used as a basis for choice making. The questionnaire used in this study ambitions to find out a person's opinion about some thing this is arranged with open-ended questions or statements given to respondents to get responses. The design of the questionnaire that will be used in data collection is presented in table 1. as follows:

This validity test checks how valid a questionnaire is. Before doing the test, you need to check if the tool is valid. Validity shows how reliable a measuring tool is. A measuring tool or questionnaire is valid if the questions ask about what the questionnaire is supposed to measure. The validity check can be calculated using quantitative statistical evaluation the use of Statistical Product And service answer (SPSS) software program and Microsoft Office Excel. Once obtained, then compared with a 95% confidence level ($\alpha = 0.05$). An instrument is said to be valid if the correlation coefficient (pearson correlation) is positive, where $r_{count} > r_{table}$ Or the Sig (2-Tailed) value $< \alpha = 0.05$:

$r_{count} > r_{table}$: valid

$r_{count} < r_{table}$: Not Valid

Reliability check is the quantity to which the measurement results using the same item will produce the equal facts. Reliability check is way to check if a questionnaire is consistent, which shows how well it measures something. For example, if people fill out the questionnaire normally, the results should be the same each time. If the results are consistent, then the questionnaire is reliable. The reliability coefficient is a number that shows how reliable the questionnaire is. In this study, the Alpha Cronbach reliability coefficient is used to check the reliability of the questionnaire (Muhtar Kamaludin, 2024a, 2024b). Where if the Cronbach's alpha value > 0.60 it means that each thing being measured has reliable questions or indicators.

A surrogate variable is a variable that may high-quality constitute a thing. For example, factor 1 consists of variables X1, X2, and X3. Then the most representative of factor 1 is the variable that has the largest factor loading. If the highest factor loading in one factor is almost the same, for example $X1 = 0.905$ and $X2 = 0.904$, then the selection of the surrogate variable should be determined based on theory, namely which variable in theory can best represent the factor. Or another way is to use the Summated Scale.

Factor analysis is a way to look at how several things change together at the same time. Its goal is to make the connection between these things simpler by grouping them into fewer factors than the number of things being studied. This means that factor analysis can also explain how a test is set up (Suliyanto, 2005). So, essentially factor evaluation is used to organization numerous variables which have similarities/similarities to be made into one element, so that several attributes that affect one variable issue can be summarized into several predominant factors which might be fewer in wide variety. the steps in issue evaluation are as follows:

- a. Formulate the problem
- b. Create a correlation matrix

The factor analysis manner is based totally at the correlation matrix among one variable and some other, to attain a component evaluation in which all variables must be correlated. to check the accuracy of the element version, the statistical assessments used are the Barlett's test of sphericity and Kiser-Mayer-Olkin (KMO) to decide the adequacy of the pattern KMO value of 0.9 is very good.

- a. KMO value of 0.8 is good.
- b. KMO value of 0.7 is moderate/rather good

- c. KMO value of 0.6 is sufficient
- d. KMO value of 0.5 is lacking
- e. KMO value of <0.5 is rejected

III. RESULTS AND DISCUSSION

The dimension instrument for all variables on this study used a questionnaire or survey that changed into added/allotted at once to respondents so one can offer statements in keeping with the situations encountered within the discipline. in this have a look at, the author used 6 factors or variables with 23 sub-factors or signs symbolized "X" which might be suspected of influencing the performance of creation workers on building creation initiatives inside the Sigi Regency place which can be visible in table 1 below. so one can simplify these factors, and to obtain the consequences, this will help us see which things have the biggest effect on how well creative workers do their jobs, it can be done through a factor analysis process. However, before conducting factor analysis, the instruments used must first be tested through validity and reliability tests. s are as follows:

Tabel. 1. Factor Identification Results

No	Variabel	SubFactor/Indicator		Symbol
1	Labor Condition Factors(X1)	1	Education	X1.1
		2	Experience	X1.2
		3	Age of workforce	X1.3
		4	Skills/competence	X1.4
		5	Work motivation	X1.5
2	Work System Factors (X2)	6	Working methods	X2.1
		7	Fulfillment of workers' rights	X2.2
		8	Overtime intensity	X2.3
		9	Facilities	X2.4
		10	Cooperation	X2.5
		11	Division of labor	X2.6
		12	Job changes	X2.7
3	Environmental factors(X3)	13	Weather changes	X3.1
		14	Physical conditions of the field	X3.1
4	Equipment and material factors(X4)	15	Work equipment	X4.1
		16	Quality of materials	X4.2
		17	Availability of materials	X4.3
5	Occupational safety, health and security factors(X5)	18	Health	X5.1
		19	Work safety equipment	X5.2
		20	understanding HSO	X5.3
6	Supervision factors(X6)	21	Inspection	X6.1
		22	Workforce guidance	X6.2
		23	Project leadership	X6.3

Factor analysis always tries to make fewer groups than the number of things being looked at. The way to decide how many groups to use in this study is based on eigenvalues, how the data is spread out, and scree plots. Groups can be made from parts that have eigenvalues bigger than 1. The eigenvalues are always arranged from largest to smallest. To know how many groups were made from the results, look at the table

Table 2. Factor Extraction Results

Component	Total Variance Explained					
	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.422	49.481	49.481	7.422	49.481	49.481
2	1.409	9.390	58.871	1.409	9.390	58.871
3	1.279	8.526	67.397	1.279	8.526	67.397
4	1.142	7.617	75.013	1.142	7.617	75.013
5	.714	4.763	79.776			
6	.680	4.535	84.311			
7	.603	4.023	88.334			
8	.507	3.383	91.717			
9	.363	2.417	94.134			
10	.244	1.627	95.761			
11	.204	1.363	97.124			
12	.151	1.007	98.131			
13	.129	.858	98.989			
14	.089	.594	99.583			
15	.063	.417	100.000			

Extraction Method: Principal Component Analysis.

The Variance table above shows that 15 sub-factors were used to create four elements. Each element has an eigenvalue greater than 1. Element 1 has an eigenvalue of 7.422, with a Variance of 49.481%. Element 2 has an eigenvalue of 1.409, with a Variance of 9.390%. Element 3 has an eigenvalue of 1.279, with a Variance of 8.526%. Component 4 has an eigenvalue of 1.142, with a Variance of 7.617%. The eigenvalue shows how important each factor is in figuring out the variance of the 15 sub-factors that were looked at. If all the variables are added together, the total is 15, which is the same as the number of variables. The total variance from the 15 sub-factors that were grouped into four factors shows how much the four factors affected the results: $49.481\% + 9.390\% + 8.526\% + 7.617\% = 75.014\%$. The amount of variance that can be explained by the four new factors shows how much these factors affect the performance of construction workers in the Huntap project in Central Sulawesi. After the total variance is calculated, it shows the total effect produced by the four factors. is 75.014% whilst the ultimate 24.986% is prompted with the aid of factors that don't have a dominant have an impact on. Then, further to the desk above, the element extraction on this study can also be seen within the following Scree Plot image.

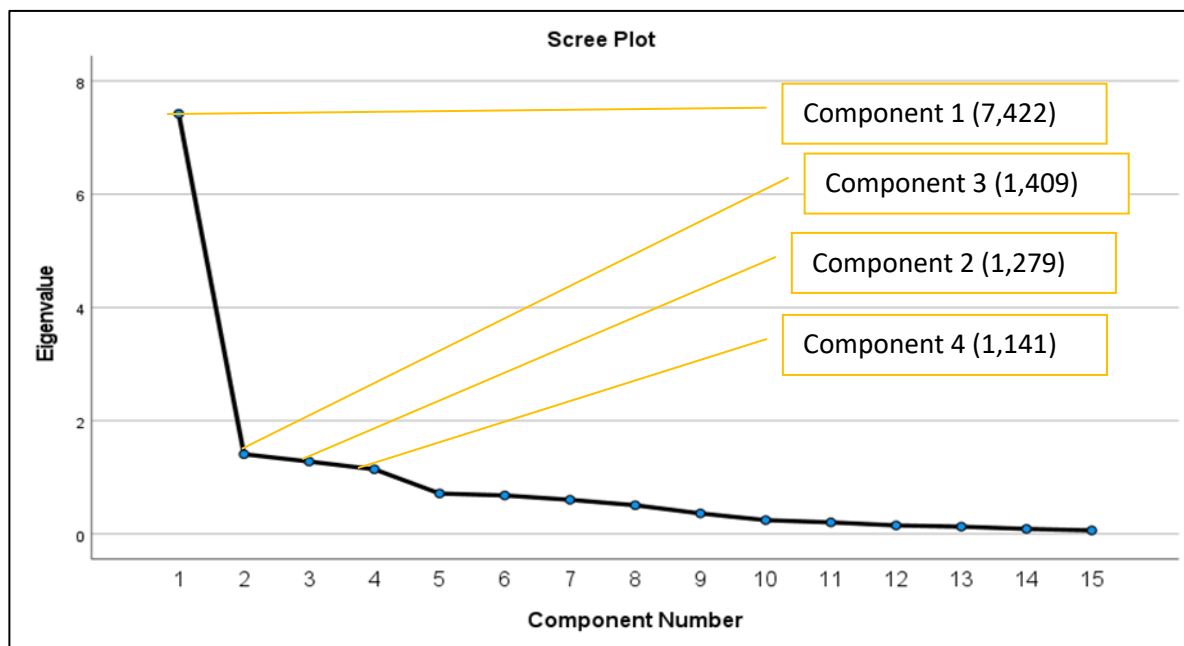


Figure 1 Scree Plot

Thenext degree is to determine several items which might be maximum Each phase has something that is most important, and you can see this by looking at the evaluation results on the issue Matrix. The Matrix shows how each small part that was studied is spread across the four parts that were created. with the aid of reading the weighting elements, it's miles excellent that allows you to remedy which matters get an area with which factors by way of searching on the significance of the weighting elements for each object against the 4 elements which are shaped. more information may be seen in table three 3

Table 3. Component Matrix

Component Matrix ^a				
	Component			
	1	2	3	4
X1.1	.756	-.284	-.165	.286
X1.2	.686	.208	-.275	-.513
X1.3	.541	-.226	.561	.295
X1.4	.753	.145	-.285	-.398
X2.1	.750	-.296		.111
X2.2	.902	-.257	-.168	.136
X2.3	.571	-.112	-.442	.166
X2.5	.775	-.340	-.201	
X4.1	.615		.434	-.409
X4.3	.577	.467	.227	.375
X5.1	.653		.380	-.296
X5.2	.689	.442		.137
X5.3	.629	.663		.174
X6.1	.697	-.248	.342	-.168
X6.2	.852			.143

Component Matrix ^a				
	Component			
	1	2	3	4
Extraction Method: Principal Component Analysis.				
a. 4 components extracted.				

TheThe extraction effects from the evaluation system display that it's far very difficult to decide the dominant sub-issue or indicator with the very best cost that is included within the element due to the fact the correlation price produced is nearly the same for each object. As an answer, it is important to rotate the elements which might be predicted if you want to describe the distribution of every object to make it clearer and simpler to understand. in this observe, the rotation used is the varimax technique. The varimax rotation method aims to make each item mainly related to just one factor. It works by making the correlation of each item close to either 1 or 0 for each factor. This makes it easier to see which items are most important. In this study, the rotation method is used to get factors with clear loading elements that are easy to understand. The rotation matrix element (rotated component matrix) is a correlation matrix that shows how the variables are distributed in a clearer and more accurate way than the element matrix. More details are in table 4:

Table 4. Rotated Component Matrix Result

Rotated Component Matrix ^a				
	Component			
	1	2	3	4
X1.1	.815	.218	.220	
X1.2	.284	.243	.219	.815
X1.3	.337	.656	.263	-.362
X1.4	.405	.245	.247	.736
X2.1	.702	.370	.150	.104
X2.2	.846	.330	.244	.206
X2.3	.681		.185	.236
X2.5	.768	.308		.262
X4.1		.755	.215	.350
X4.3	.181	.228	.809	
X5.1	.207	.731	.154	.255
X5.2	.321	.118	.699	.304
X5.3	.122	.132	.877	.256
X6.1	.382	.721		.140
X6.2	.594	.330	.492	.219
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization. ^a				
Rotation converged in 7 iterations.				

Factor loading shows how strongly statements are related to the components or factors that are created. From this, we can learn that the highest correlation value in each factor (component) means that the sub-factor is part of that factor.. For example, as seen in table 4.17 above, for example, in sub-factor X1.1 it has a correlation of 0.815 with factor group (component) 1, a correlation of 0.218 with factor group 2, a correlation of 0.220 with factor group 3 and 0.000 with factor group 4, so that X1.1 is included in factor group 1, because factor (component) 1 has the highest loading value of 0.815. This factor has a variance value of 32.694%, which is the

highest. This makes it the most important and strongest factor compared to the others. This is closely related to the sub-factors that make it up, such as.

Quality human resources are human resources who understand science and have the ability and skills in a field. As human resources, the first step to improve and enhance the quality of oneself is to take education, namely formal education carried out in school. Education is no longer foreign to our ears, because as early as possible we have known it. In the world of work, education can help someone carry out their duties and responsibilities more competently. Likewise for the workers of the RISHA construction project in Central Sulawesi, employees with education will possess a wider perspective to be proactive, create new ideas, and subsequently affect outcomes. The higher the level of education of a worker, at that time he will have broader information or understanding and be supported by the work experience he has, so that workers are proficient in the work they are engaged in and know more

As we know that construction work is a complex job and the volume of work is quite large with a specified time limit. However, along with the development of the era, construction work is increasingly facilitated with several fairly practical work methods, because it is supported by equipment and construction materials that make it easier for workers to handle their work, so that the work can be completed quickly.

In the RISHA construction project in Central Sulawesi, workers can work faster. Accelerated construction has the advantage of accelerating construction, this is possible because through precast technology it is possible to carry out parallel activities so that time will automatically be reduced. In addition to being economical, this one house can be built in a faster time because there is no need to bother mixing cement and building construction, so the work method tends to be practical. In its implementation, the construction of a RISHA house measuring 3x3 meters only requires 3 people with a work time of 24 hours. So that with this kind of work method, it can help the performance of the workforce in completing the project.



Figure 2. Practical working method in RISHA construction by connecting concrete panels using bolts

For a RISHA construction project in Central Sulawesi to succeed, it relies heavily on how well the people involved do their jobs. This includes the construction workers, who are very important because they are the ones who actually build the project. To make sure these workers do their jobs well, they need to be watched closely, which helps to ensure their work follows the plan. This kind of careful watching is key to preventing problems that could hurt the company, like mistakes in how they build things, weak spots in their methods, and any issues they face while working, so that their work can be kept under control.

Occupational Safety and Health (K3) Equipment is one aspect that really needs to be considered in the increasingly developing industrial world today, especially for companies in the construction industry. Considering that K3 is one of the mandatory views that must be met by every construction company in supporting every implementation of its activities, because with the implementation of K3, the implementers are relied on to limit the number of work accidents in the construction world in particular, to create a protected and healthy working environment in the workplace. One effort to implement K3 is to prepare K3 equipment, where in its development this kind of equipment is very much needed so that the workplace becomes safer from the risk of work accidents that befall workers.

Consequently, inside the implementation of the RISHA development task in principal Sulawesi, K3 device in the form of private shielding device (PPE) is very a great ersonal protective equipment is used to keep workers safe. It is a type of safety equipment that people use to shield their bodies from possible dangers at

work. This equipment helps protect against accidents and job-related illnesses. It helps people stay productive at work., and the paintings might be completed on time

Work experience is the period that a person goes through to gain knowledge in the form of knowledge and everything related to attitudes in a particular activity or job. The facts show that so far the longer a person is involved in an activity or job, the more experience he or she will gain from the job. And vice versa, the shorter a person has done a particular job, the less experience he or she will get.

Work experience provides a lot of mastery and work ability. Then limited work experience causes a lower level of talent and ability. Work experience is the basic capital for a worker to be involved in the work or business given to him. Experienced workers can quickly complete their responsibilities and work, because the work is something that is usually done, so that what is done can be known and felt clearly by the worker, as a result the work obtained can be completed easily. Likewise with the obstacles experienced when completing their work, a skilled person will easily handle the problem with the knowledge and mastery gained from their experience. While workers who only rely on their educational foundations and degrees are not really ready to carry out the tasks and work given to them quickly. They must be given preparation that requires a lot of investment and cost, on the grounds that the hypothesis obtained from the school bench is sometimes not the same as the facts in the field. So based on the understanding above, work enjoy significantly supports a person's performance, especially production people inside the RISHA development mission in significant Sulawesi, worker paintings enjoy will make it simpler to complete a product and the less skilled the worker is, the greater the employee's production capacity might be in completing a product. The higher the paintings experience that includes lengthy work intervals, software of statistics to paintings and desirable work techniques, the better the employee's overall performance.

Being a worker on the RISHA building project in Sulawesi means going through both good and bad times, and having different levels of skill at doing their jobs. Workers who are good at their jobs will learn more about what they do, so they can finish their work faster. This makes skilled workers very helpful

Talents also are a trademark this is no much less crucial that wishes interest. The term professional is usually used to explain someone's various tiers of ability. capabilities are someone's potential to do a process effortlessly and punctiliously. people who've capabilities can accelerate the success of the dreams of the sports achieved.

For the RISHA improvement undertaking in critical Sulawesi, staff capabilities are needed to support personnel overall performance, and produce paintings that has accurate nice as deliberate. With the competencies possessed by people, they will be able to finish the paintings properly and be capable of function numerous assisting tools in the work, so that the paintings can be completed in step with the time and excellent predicted

IV. CONCLUSION

There There are four factors these things affect how well the factory workers do their jobs in the RISHA development project in Central Sulawesi., the 4 factors include paintings gadget factors, equipment and fitness factors, cloth and OHS factors, and man or woman/HR factors, wherein the influence generated from the four elements is 75.014% while the final 24.986% is motivated by using factors that don't have a dominant influence. in the meantime, The study's results also show that the work system is the most important factor affecting how well construction workers perform on the RISHA development project in Central Sulawesi. It has the biggest impact on their performance of 49,481%.

REFERENCES

- [1]. Arantes, A., & Ferreira, L. M. D. F. (2020). Underlying causes and mitigation measures of delays in construction projects: An empirical study. *Journal of Financial Management of Property and Construction*, 25(2), 165–181. <https://doi.org/10.1108/JFMPC-03-2019-0029>
- [2]. Bahar, T., Kamaludin, T. M., & Stevany, G. (2024). "The Effect of Public Minibus Service Quality on User Satisfaction of Public Minibus Using SEM (Structural Equation Modeling) Method." In *International Journal of Research in Engineering and Science (IJRES) ISSN* (Vol. 12). www.ijres.org
- [3]. Becker, G., Barr, C., Gentleman, R., & Lawrence, M. (2015). *Enhancing reproducibility and collaboration via management of R package cohorts*. <http://arxiv.org/abs/1501.02284>
- [4]. Choudhary, M., Choudhary, M. A., & Mehmood, K. (2012). *Analysis of Causes of Success and Failure of Post Disaster ReconstructiProjects Causes of Success and Failure of Post Disaster Reconstruction Projects-A Case Study of Post 2005 Earthquake in Northern Pakistan* (Vol. 1, Issue 1). <https://www.researchgate.net/publication/264788112>
- [5]. Egbu, C., & Lou, E. (2011). *Association of Researchers in Construction Management*. www.em-dat.net
- [6]. Fahraini Pratiwi, N., Fahirah, :, Tutang, :, & Kamaludin, M. (2023). Study of Motivational Factors Affecting the Performance of Builders on Building Construction Projects in the Banggai Archipelago District. In *International Journal of Innovative Science and Research Technology* (Vol. 8, Issue 11). www.ijisrt.com
- [7]. Fakunle, F. F. (2020). *Major delays in construction projects: A global overview*. www.pmworllibrary.net

- [8]. Gunarto, G. T., Kusuma, N. R., Arvanda, E., & Isaeni, H. (2020). An Analysis of Architectural Approach Towards the Efficiency of RISHA as Post-Disaster Housing Response in Indonesia. *IOP Conference Series: Earth and Environmental Science*, 452(1). <https://doi.org/10.1088/1755-1315/452/1/012029>
- [9]. Kamaludin, T. M., . N., Mallisa, H., & Ulmi Ulva, N. (2025). Identification of Risk Factors Affecting Performance in the Implementation of the Reconstruction of the Lindu Lake Access Road, Indonesia. *Engineering and Technology Journal*, 10(05). <https://doi.org/10.47191/etj/v10i05.59>
- [10]. Lin, B., Yu, Q., Li, Z., & Zhou, X. (2013). Research on parametric design method for energy efficiency of green building in architectural scheme phase. *Frontiers of Architectural Research*, 2(1), 11–22. <https://doi.org/10.1016/j.foar.2012.10.005>
- [11]. Maccallum, R. C., & Austin, J. T. (2000). APPLICATIONS OF STRUCTURAL EQUATION MODELING IN PSYCHOLOGICAL RESEARCH. In *Annu. Rev. Psychol* (Vol. 51).
- [12]. Muhtar Kamaludin, T. (2024a). Factor Analysis of Construction Discrepancy to Building Approval Documents (PBG). *Engineering and Technology Journal*, 2456–3358. <https://doi.org/10.47191/etj/v9i02.02>
- [13]. Muhtar Kamaludin, T. (2024b). Preparation Factor Analysis of Construction Labor Performance in Palu City, Indonesia. *International Journal of Engineering Research and Applications Wwww.Ijera.Com*, 14(2), 71–79. <https://doi.org/10.9790/9622-14027179>
- [14]. Saud, I. M., Asterina, E., & Trisha, G. F. (2020). Factors Affecting Capital Expenditure Allocation: Empirical Evidence from Regency/City Government in Indonesia. *Journal of Accounting and Investment*, 21(2). <https://doi.org/10.18196/jai.2102150>
- [15]. Singh Bhatia, M., & Awasthi, A. (2014). *Investigating Effectiveness of Quality Management Systems*. <https://www.researchgate.net/publication/275656904>
- [16]. , N. G., Rwelamila, P. D., & Gimbi, J. (2020). Critical success factors for managing post-disaster reconstruction projects: The case of Angola. *Construction Economics and Building*, 20(3), 37–55. <https://doi.org/10.5130/AJCEB.v20i3.7298>
- [17]. , P. C., Janda, K. B., Brown, M. A., Steg, L., Vine, E. L., & Lutzenhiser, L. (n.d.). *Opportunities and Insights for Reducing Fossil Fuel Consumption by Households and Organization*
- [18]. Stifi, A., & Luis Ponz-Tienda, J. (2014). *Labor Productivity in the Construction Industry-Factors Influencing the Spanish Construction Labor Productivity*. <https://www.researchgate.net/publication/267393245>
- [19]. Tang, S. L. . (2003). *Modern Construction Project Management, Second Edition*. Hong Kong University Press.
- [20]. Van Tam, N., Quoc Toan, N., Tuan Hai, D., & Le Dinh Quy, N. (2021). Critical factors affecting construction labor productivity: A comparison between perceptions of project managers and contractors. *Cogent Business and Management*, 8(1). <https://doi.org/10.1080/23311975.2020.1863303>
- [21]. Zhao, D., McCoy, A., & Du, J. (2016). An Empirical Study on the Energy Consumption in Residential Buildings after Adopting Green Building Standards. *Procedia Engineering*, 145, 766–773. <https://doi.org/10.1016/j.proeng.2016.04.100>