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Measuring the Internal Consistency and Reliability of the Hierarchy of Controls in Preventing Infectious Diseases on Construction Sites: The Kuder-Richardson (KR-20) and Cronbach's Alpha

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ABSTRACT

Before initiating data collection, it is customary to assess the validity and reliability of the formulated question or instrument in order to ensure the collection of high-quality data for research purposes. Consequently, this study aims to evaluate the internal consistency of the data through a systematic analysis procedure to test the reliability of the adapted questionnaire. The adapted questionnaire is assessed using Kuder-Richardson 20 (KR-20) and Cronbach's alpha coefficients. The study on reliability was conducted using a sample size of 30. The Kuder-Richardson 20 (KR-20) test consists of a questionnaire comprising six questions and five questions with 5-point Likert scales to calculate Cronbach's alpha. For this study, the reliability assessment of Kuder-Richardson 20 (KR-20) revealed a robust correlation of 0.73 (within the range of 0.70–0.89). However, Cronbach's Alpha analysis indicates that the reliability test for the designed questionnaire yielded an acceptable result (0.74), falling within the recommended range of 0.7 to 0.8. The results obtained from the study suggest that there is a significant correlation between the research instrument and the variables being measured. Hence, to ensure the successful implementation of preventative measures against infectious diseases at the designated site, it is imperative to conduct the questionnaire development process accurately and establish its reliability.

1. Introduction

The construction industry is regarded as the sector that makes the most outstanding and significant contribution to expanding the country's economy. The construction site is an area of land that serves as the setting for the various activities and projects that trained professionals carry out. Building construction and industrial construction are the two primary construction categories in general. This industry has long been facing issues with infectious diseases among site workers [1]

There have been many efforts to improve health and safety in the construction industry. Nevertheless, more workers are killed or hurt in construction sites due to construction activities and diseases than in any other industry [2,3]. Construction worker diseases and illnesses on site are

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divided into thirteen types. Based on S. and P. [4] study, site workers' illnesses can be caused by musculoskeletal disorders, ear and throat (ENT) problems, vibration, skin conditions, respiratory conditions, cardiovascular conditions, eye conditions, fever, injuries, CNS problems, urinary tract infections, psychosocial health problems, and infectious diseases. According to Samantha Brown and Raina D. Brooks [1] findings, construction workers are more likely to contract a disease than other industries. Construction workers' silicosis, asbestosis, and cancer are common illnesses [5], among other diseases and illnesses.

Numerous diseases could occur on construction sites, depending on the outbreak in a country or the globe. Olawuyi [3] supports this idea that the construction industry in Malaysia is one of the sectors hardest hit by the COVID-19 pandemic. And Malaysia has been reported with various kinds of illness. For instance, Malaysia has seven genera of infectious diseases: food and water-borne diseases, diseases with related vaccines, vector-borne diseases, tuberculosis/ leprosy, sexually transmitted infections, zoonosis, and surveillance [6]. More specifically, according to the Representative office for Malaysia [7], from 2016 to 2017, the ten most prevalent infectious diseases in Malaysia were dengue, hand, foot, and mouth disease, tuberculosis, leptospirosis, hepatitis B, HIV, Gonorrhea, hepatitis C, Malaria, and syphilis. These disease outbreaks will drastically influence the operation of construction activities. Pamidimukkala and Kermanshachi [8] emphasized that the COVID-19 pandemic has significantly impacted the construction industry and needs to improve workplace safety and well-being. Shafii *et al.,* [9] study also mentioned that Malaria, dengue, SARS, and COVID-19 are infectious diseases frequently associated with the construction sector. Therefore, this issue is highly connected to the infectious disease prevention approach.

Many different strategies can be used to prevent the spread of any disease on site. According to Ellwanger *et al.,* [10], diseases can be prevented by using fifteen methods, including vaccination, environmental hygiene, urbanization restriction, diagnosis and treatment, food hygiene, infectious disease surveillance, biodiversity-based disease prevention, etc. Or, based on the web page “How to Prevent Infectious Disease in the Workplace” [11], the hierarchy of control can help prevent infectious diseases at work. Hierarchy is a framework for assigning individuals or entities to various levels or ranks based on their relative significance [12]. Consequently, the hierarchy of controls for the workplace is strategically progressive to reduce the discovered hazards [13]. Furthermore, a well-planned prevention approach can significantly reduce the risk of site workers being infected with infectious diseases [14]. Therefore, this study intended to identify the questionnaire’s reliability based on the hierarchy of controls to prevent infectious diseases on-site.

A questionnaire for a survey is one of the most extensive data collection methods utilized by quantitative researchers to get data from respondents. Before proceeding to the next level of analysis, it is crucial to assess the accuracy and consistency of feedback. This study step is known as testing the instrument’s reliability. Typically, a questionnaire should be tested before proceeding with the data collection. There are various methods to test the questionnaire’s reliability [15]. This study’s internal consistency reliability is most suitable based on the designed questionnaire. Kuder-Richardson 20 (KR-20) is suitable for testing the questionnaire with binary variables or calculating dichotomous numbers [16]. For example, YES or No are the binary variables. Based on Abdulghani *et al.,* [17], if the Correlation of KR-20 is high, for example, 0.90, it shows that the test is homogeneous.

In this study, Kuder-Richardson 20 (KR-20) is for the knowledge subscale, Formula 20 (KR-20), a particular case of Cronbach’s for dichotomous response alternatives, was employed; values 0.70 were deemed acceptable [18]. The acceptable score of the KR-20 of minimum or more than 0.70 is also supported by Vrotsou *et al.,* [19], and Gómez-Rodríguez *et al.,* [20]. According to Taber [21], Cronbach’s Alpha is vital for a researcher to consider the study purpose and quality while selecting an existing instrument or constructing a new one. Cronbach’s alpha coefficient is a typical statistic used in quantitative research to measure the internal consistency of a concept with the Likert scale, either 5-point or 7-point. The minimum acceptable value for Cronbach's Alpha is 0.7 from the previous study [21-26]. Finally, Hajjar's [27] study supported that the reliability test affects test reproducibility, consistency, and performance. Hence, a reliability test is essential to determine the consistency of the questionnaire.

2. Literature Review

2.1 Hierarchy of Controls to Prevent Infectious Diseases on Construction Sites

The hierarchy of control is one of the strategies that apply to the prevention of infectious diseases and is utilized by the construction industry on-site in the event of a disease outbreak. Typically, the theory consists of five levels. Level 1 represents elimination; Level 2 represents substitution; Level 3 represents engineering controls; Level 4 represents administrative controls; and Level 5 represents personal protective equipment (PPE) [28]. The efficacy of this method was demonstrated by Assessment *et al.,* [29], who examined the factors associated with occupational respiratory health complaints in the Lusaka district and the levels of respirable dust exposure.

According to the control hierarchy, engineering control was more effective than administrative control and PPE control [14]. Engineering controls include setting up high-efficiency air filters, increasing workplace ventilation rates, and erecting physical barriers. Also, according to a review by Ammad *et al.,* [30], Personal Protective Equipment (PPE) is necessary for safe working practices. Additionally, the significance of a control hierarchy was mentioned in the "Construction Work" [31], which supported that this theory is crucial to preventing infectious diseases on-site. According to the findings of these studies, the hierarchy of control can be utilized to investigate methods for preventing infectious diseases on construction sites. Such five levels can be used to help categorize all of the relevant methods and effectively collect data.

In addition, for this investigation, a reliability test needs to be conducted to validate the questionnaire designed based on the five levels of the Hierarchy of Controls. Reliability test refers to consistency across multiple testing occasions, test editions, or raters scoring test-takers responses [32]. Therefore, internal consistency reliability has been applied to test the reliability of the questionnaire.

2.2 Internal Consistency Reliability for Questionnaire

According to Farahiyah Akmal Mat Nawi *et al.,* [33], internal consistency reliability was described by Green, Lissitz, and Mulaik (1977) that this method is required for evaluating the survey tool and demonstrates the degree of interrelationship between the items, while homogeneous refers to the internal consistency of a group of items. Therefore, internal consistency is necessary but insufficient for homogeneous. Internal consistency reliability is the degree to which the items on a questionnaire or scale measure the same concept consistently [27]. In other words, it evaluates the degree to which the questionnaire's items are interconnected and provides dependable and consistent results. Several statistical methods are used to evaluate internal consistency reliability.

Based on Middleton [34], two common strategies to evaluate internal consistency reliability are average inter-item correlation and split-half reliability. Inter-item correlation measures the same construct by calculating the correlation between all possible pairs of items and then averaging. It consists of Cronbach's Alpha [35]. Otherwise, split-half reliability is a method used to assess the internal consistency of a scale by correlating responses from two randomly divided halves [36].

Surucu and Maslakci [37] study considered that the alpha reliability coefficient is the superior choice for evaluating an organization's internal consistency.

For this study, Kuder-Richardson 20 (KR-20) and Cronbach's Alpha are used to evaluate the reliability of the developed question. According to Naah *et al.,* [38], calculating dichotomous numbers or test results, such as 0 or 1, can be accomplished using the Kuder Richardson either KR-20 or KR-21 formula. For instance, it's often used when dealing with questionnaires with binary response options, such as true/false questions or yes/no questions. KR-20 determines how effectively the questionnaire's item ratings are made. Otherwise, the KR-21 formula simplifies the KR-20 formula as complications arise. Formula KR-21 estimates internal consistency reliability by relating all test items to the actual test [39].

KR-21 is more directly to test the internal consistency. However, the researchers strongly support the KR-20 because the KR-21 doesn't need to know the scores for each test item or question. Instead, it only needs to know the test-overall taker's mark or score [40]. However, this study aims to evaluate the internal consistency of the data through a systematic analysis procedure to test the reliability of the adapted questionnaire. So, the researcher required the scores for each question and considered that the KR-20 is better than the KR-21. This idea was supported by the research conducted by D'Sa [41], whereby the Diabetes Numeracy Test was developed and tested as a scale to measure the mathematical skills of individuals with diabetes. Internal consistency (KR-20 = 0.95) showed that this 43-item DNT was reliable. Hence, KR-20 is better than KR-21 because KR-21 thinks all items have the "same" difficulty level, and the results are not detailed enough for the internal-consistency reliability test for the designed questionnaire.

Therefore, KR-20 is particularly useful for this study due to the designed questionnaire with binary responses and the need to assess the instrument's reliability. However, if the question has more than two response options or includes a mix of item types (e.g., Likert scale items), Cronbach's alpha or other appropriate reliability measures might be more suitable. The detailed analysis for KR-20 is as follows in Table 1. Cronbach (1951) made this analysis work for any scoring method [32]. Therefore, Cronbach's Alpha (α) is used to test the questionnaire with Likert scales [42]. The reliability of a set of items, measurements, or ratings can be calculated using Cronbach's alpha. It provides a coefficient ranging from 0 to 1, with higher values indicating a higher level of internal consistency. The closer the alpha value is to 1, the more accurately the survey items measure the same construct [43]. The comprehensive evaluation of Cronbach's alpha is presented in Table 2. These two methods are suitable for the questionnaire reliability test.

In conclusion, internal consistency reliability is crucial to the reliability of research survey instruments and questionnaires. Bujang, Omar, and Baharum [23] emphasize the importance of assessing questionnaire item interrelationships to determine how well they measure the same concept. This reliability boosts research credibility and study validity. KR-20 and Cronbach's Alpha are applied depending on the research context, questionnaire type, and measurement goals. Researchers must match their evaluation method to the questionnaire's characteristics to ensure accurate and reliable results. Internal consistency reliability evaluation is a research methodology cornerstone. Scholars and empirical studies help researchers create reliable instruments by analyzing questionnaire items and their interrelationships. This allows researchers to draw valid conclusions and contribute meaningfully to their fields. These methods must be carefully considered and applied to maintain the integrity and validity of scholarly investigations as research evolves.

3. Methodology

A quantitative method will be utilized to collect and analyze the information gathered from all respondents. The researcher developed the questionnaire and tested its reliability before data collection. Based on the designed questionnaire, two types of reliability tests, Kuder-Richarson 20 (KR-20) and Cronbach's Alpha, were applied to test the reliability of the question. This study consists of 2 domains that tested the reliability.

3.1 Sample Size of Internal Consistency Reliability

Kuder Richardson 20 (KR-20) is for the binary variable question. Six questions designed in the questionnaire are multiple-choice (YES or NO), so KR-20 is suitable to test these questions' reliability. Otherwise, it has five questions with Likert scales, which should be tested with Cronbach Alpha. For this study, the sample size to test the questionnaire's reliability is 30 for KR-20 and Cronbach's Alpha. The number of both reliability tests is 30 for this study was based on the Gendler *et al.,* [44] study, KR-20. The minimum sample size for the required stability coefficient was 20. Pilot testing required a minimum of 30 respondents as the sample to determine the reliability using Cronbach's alpha, considering the high correlations across scale components [23,33]. Hence, 30 respondents are the most suitable for this reliability pilot study.

3.2 Research Instrument

This study employs the KR-20 calculation theory to determine the reliability of actual and false questionnaires administered before the start of a questionnaire survey. Reliability coefficient theory can simplify test score distribution, making studying it fascinating. Before a researcher can assign a score to an existing test, it must be separated into two groups: those who scored correctly and those who scored wrongly. The test score variance indirectly estimates random error variances. This is suitable to apply for this study in which the designed questionnaire for question options are YES or NO.

Table 1
Example of correlation coefficient interpretation

Range Coefficient of Correlation	Interpretation
0.00 – 0.10	Negligible Correlation
0.10 – 0.39	Weak Correlation
0.40 – 0.69	Moderate Correlation
0.70 – 0.89	Strong Correlation
0.90 – 1.00	Very strong Correlation

Table 1 shows a favourable correlation coefficient of 1.00, while 0.00 is the lowest [38,39,44]. Based on Table 1, the best value is the relative test close to 1, such as the KR-20 validity test results of 0.70 to 0.89. Table 1 shows a favourable correlation coefficient of 1.00, while 0.00 is the lowest. From the table, the best value is the relative test close to 1, such as the KR-20 validity test results of 0.70 to 0.89 [45]. Furthermore, scores were subjected to complete item analysis using reliability analysis of Excel to determine the variance and Kuder-Richardson (KR 20) to determine the internal consistency reliability by Equation (1) [39,46] as follows:

$$(KR - 20) = \left(\frac{K}{K-1}\right)\left(1 - \frac{\sum pq}{\sigma^2}\right) \quad (1)$$

Where K is the total number of questions, p is the proportion of yes answers, q is the proportion of no answers, $\sum pq$ is the sum of pq, and σ^2 is the total respondents variance.

3.3 Cronbach's alpha ($\boldsymbol{\sigma}$): Likert Scales

Based on the Farahiyah Akmal Mat Nawi *et al.,* [33], the purpose of evaluating the internal consistency of data is to evaluate the dependability of the respondent's input on a subject-evaluated survey instrument instrumentation or a rating that indicates the stability of the instruments. As a result, Cronbach's alpha is utilized to quantify the consistency of multiple objects, measurements, or ratings [21]. For this study, after conducting a pilot study with 30 respondents, the internal consistency coefficients of the items included in the questionnaire were calculated with the help of Cronbach's coefficient (α). Finally, the result will be analyzed using Excel. According to Tox [47], Cronbach's alpha tests determine the reliability of multiple-question Likert scale surveys. It indicates that the design you have created accurately measures the variable. The formula for Cronbach's Alpha is presented by Equation (2) as follows:

$$\alpha = \frac{K}{K-1}\left[1 - \frac{\sum s^2\, y}{s^2\, x}\right] \quad (2)$$

where K is the number of test item, $\sum s^2\, y$ is the sum of the item variance, and $s^2\, x$ is the variance of the total score.

Table 2 Tox [47] and Zach [48] illustrates how different Cronbach's Alpha values are typically interpreted. Based on Taber [21], a satisfactory level of internal consistency is indicated by Cronbach alpha scores of 0.7 or above. Also, Olaniyi's [49] study agreed that the range is from 0.70 to 0.90 or even higher due to the type of studies. Arifin [22] states that the coefficient must be at least 0.7 to be considered acceptable. Hence, we should have at least 0.7 for the Cronbach's Alpha test for reliability to ensure our designed questionnaire's reliability.

Table 2
Analysis of alpha Likert-scale questions

Cronbach's Alpha	Internal consistency
0.9 and above	Excellent
0.8 - 0.9	Good
0.7 - 0.8	Acceptable
0.6 - 0.7	Questionable
0.5 - 0.6	Poor
below 0.5	Unacceptable

3.4 Research Analysis

A survey questionnaire was designed by Kuder-Richardson 20 with six dichotomous variables questions in Table 3. The five (5) questions were incorporated with a 5-point Likert scale, as seen in Table 4. The surveys were presented with instructions for all responders to read the statements and select their responses based on the binary variables (YES or NO). Ordinal variables will be with a 5-

point Liked scale between 1 (strongly disagree) and 5 (strongly agree). Next, the questionnaire will be shared with the respondents via Google Forms. Then, the data were compiled for analysis with Excel. Both descriptive and internal consistency reliability analyses are included in the analysis. Initially, the researchers employed descriptive analysis to determine the frequency and proportion of the population's demographic background.

Table 3
Questions dichotomous variables

Q.	Items/ Questions with Yes or No
Q1.	Have you site workers infected with infectious diseases before this?
Q2.	Do you agree that the elimination level can prevent infectious diseases?
Q3.	Are you agree that the substitution level can prevent infectious diseases?
Q4.	Do you agree that engineering controls can prevent infectious diseases?
Q5.	Are you agree that the level of administrative control can prevent infectious diseases?
Q6.	Are you agree that PPE can prevent infectious diseases?

Table 4
Questions with Likert Scales

Q.	Items/ Questions with 5-point Likert Scales
Q1.	Reducing exposure to harmful construction materials and avoiding contact with animal vector diseases can prevent infectious diseases on construction sites.
Q2.	Sandstone grinding wheels (which cause severe respiratory sickness due to silica conversion to synthetic wheels like aluminium oxide) can prevent infectious diseases on construction sites.
Q3.	Designing and installing welfare facilities for site workers can prevent infectious diseases on construction sites.
Q4.	Providing specialized training on risks to site workers can prevent infectious diseases on construction sites.
Q5.	Personal protective equipment includes safety helmets, noise-reducing earmuffs, and gloves that can prevent infectious diseases on construction sites.

4. Results

4.1 Demographic Information

The demographic information of those who participated in the research is presented in Fig. 1 below. Of the overall population (30 respondents), there are 29 people, with a percentage of 96.67% not willing to write their company name, compared to only one respondent, 3.33%, who is willing to write his company name. There are 17 female respondents, which corresponds to 56.67 per cent, out of the total population of 30, whilst there are only 13 male respondents, which corresponds to 43.33 per cent (Fig. 2). The third item is assessing the race of the respondents (Fig. 3). The highest number of respondents are Chinese, consisting of 12 respondents, with 40% of all respondents, followed by Iban, 11 respondents (36.67%), and Malay respondents 7 people (23.33%). Then, the fourth item evaluates the respondent's age status (Fig. 4). The majority of 12 respondents (40%) are 26-35 years old, 9 respondents (30%) consist of 36–45 years old, 5 people (16.67%) with more than 45 years old, and 4 people (13.33%) are less than 25-year-old who answered the questionnaire.

Looking at education level (Fig. 5), 20 people (66.67%) are undergraduate holders based on the respondents' educational level, 6 respondents (20%) are master's degree holders, 2 of the respondents are upper secondary education. Only one person (3.33%) has obtained his Ph.D.; 24 respondents are Grade 1 and 3 for Grades 2 and 3 (Fig. 6). All of the respondents for this study work at private companies (Fig. 7). Finally, the final item identifies the respondent's location in a town or city. 11 respondents (36.67 of the total) were in Sarikei, 6 respondents (20% of the total) were from Meradong, 4 respondents (13.33%) from Sibu, 2 people (6.67%) respectively from Bintulu and Kuching, and 1 respondent (3.33%) respectively from Asajaya, Bau, Miri, Mukah, and Tatau (Fig. 8).

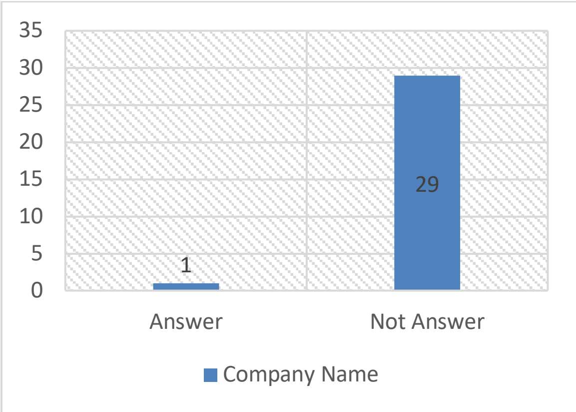

Fig. 1. Company Name

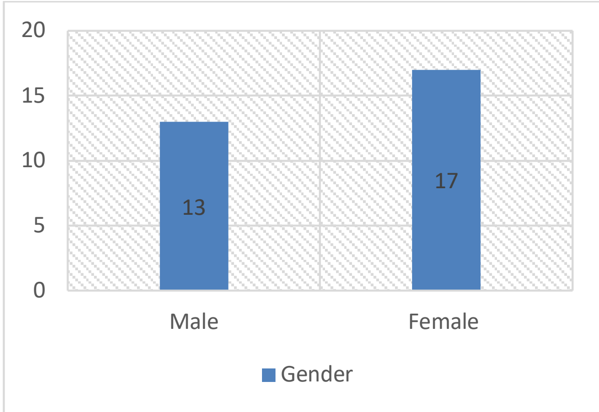

Fig. 2. Gender

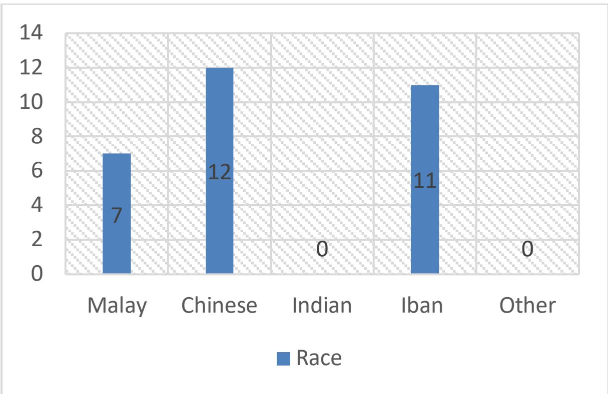

Fig. 3. Race

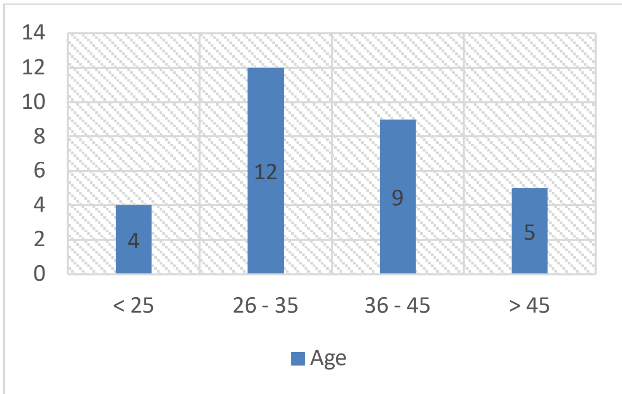

Fig. 4. Age

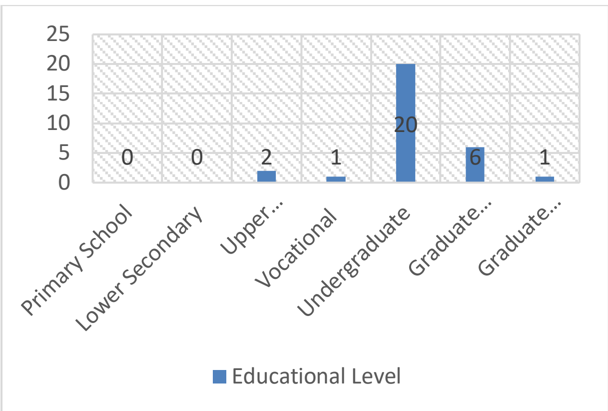

Fig. 5. Educational Level

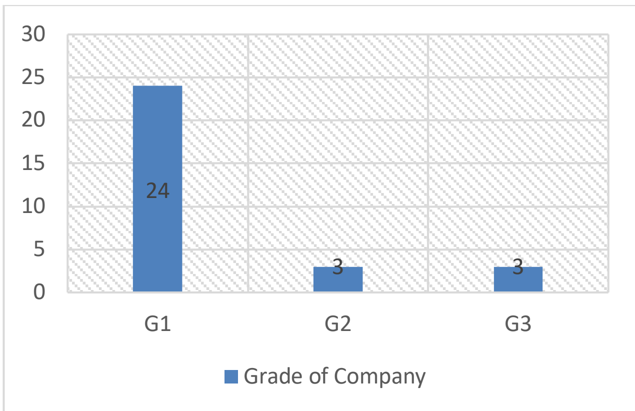

Fig. 6. Grade of Company

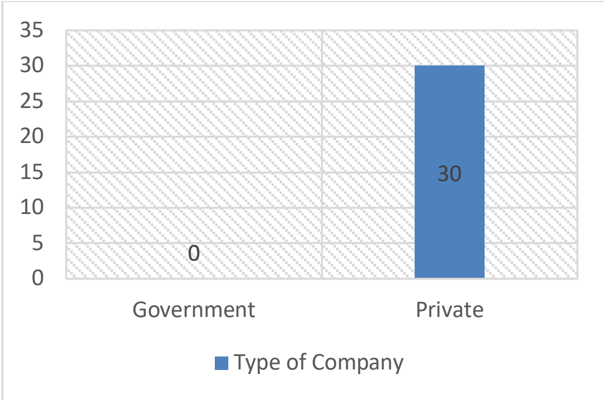

Fig. 7. Type of Company

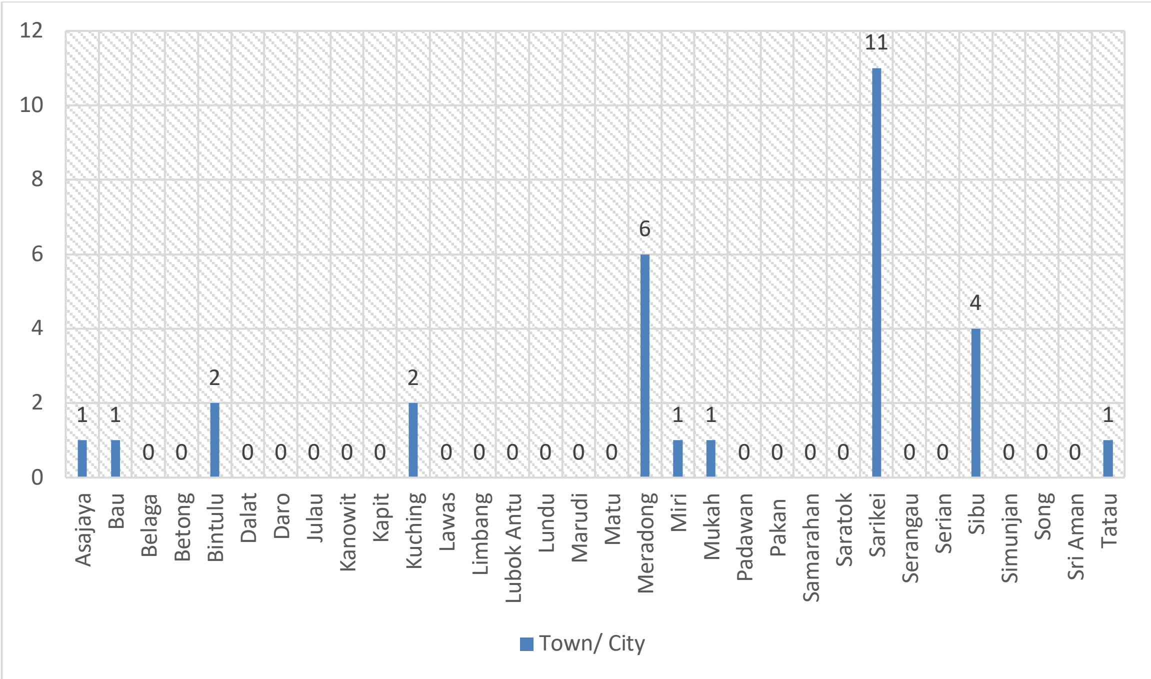

Fig. 8. Town/ City

4.2 Reliability Analysis on Kuder-Richardson 20 (KR-20)

The findings of the reliability analysis are summarised in Table 5 and Table 5, which present the consistency of this study. The reliability approach can determine the correlation value between the scores on each item. After this process, test items with high correlation values with the test index value are reliable, while those with low correlation values are unreliable and will be deleted. The method in question is called the internal consistency approach [38,39]. Based on Table 5 below, the Kuder-Richardson 20 (KR-20) value score is 0.73, which suggests a strong correlation for six (6) items, as ruled by *Naah et al.,* [38], Nugroho *et al.,* [39], Schober and Schwarte [45].

Table 5
The summary of reliability analysis on Kuder-Richardson 20 (KR-20)

Items	Results
K	6
$\sum pq$	0.09
σ^2	0.23
KR-20	0.73
Interpretation	Strong Correlation

4.3 Reliability Analysis on Cronbach's Alpha

Table 6 summarises the research construct's reliability analysis with Cronbach's Alpha. Cronbach's Alpha reliability method determines the correlation value between each item's scores. A Cronbach's alpha coefficient was generated to validate the data in the questionnaire [50,51]. Using this technique, items with high correlation values mean they have a strong correlation in terms of content. Test index scores will be highly reliable. In contrast, items with low correlation values will have low reliability and will be eliminated from the test. This is called Cronbach's coefficient (α) [21, 48]. According to Table 6 below, the Cronbach alpha value is 0.74, between 0.70 and 0.80, indicating acceptable, as specified by Tox [47] and Zach [48].

Table 6
The summary of reliability analysis on Cronbach's Alpha

Items	Results
K	5
$\sum s^2\, y$	3.96
$s^2\, x$	9.73
α	0.74
Internal Consistency	Acceptable

5. Discussion

The infectious disease prevention approach on construction sites has become essential with the outbreak of diseases worldwide and to prevent any infectious diseases easily transmitted on construction sites. The outcome of this study has provided insight into the questionnaire's reliability. A measuring device's reliability reveals its accuracy and precision level [52]. For this study, there is a discussion within the questionnaire's reliability about how the hierarchy of control theory can be used in infectious disease prevention on construction sites. During the Preliminary stage, the six dichotomous variables questions will be designed based on the related review of the previous study. The first dichotomous question is Q1 (Table 3). This question is intended to know whether respondent site workers have been infected with any diseases. The selected infectious disease options are based on the Representative office for Malaysia [7] report.

Question two is related to the preliminary level in the hierarchy of controls (Elimination) (Table 3). The most successful strategy for reducing workplace accidents is the elimination, though they may be challenging to implement in a formed work process [53]. Workers have to decide if avoiding biohazards is feasible for infectious diseases. If avoidance is not possible, decontaminating surfaces, things, and spaces in a hazardous workplace can prevent workers from contracting infectious pathogens. Construction employers should reduce the chance of the site worker's exposure to harmful construction materials and avoid contact with animal vector diseases to prevent infectious diseases on construction sites [54]. This question will be asked using the 5-point Likert scale under the elimination level.

In addition, if eliminating a disease is impossible, substitution is the next best option. Reducing exposure to hazardous construction materials is one of the actions under level two. The designed question for this study is Q3, with the Yes or No option (Table 3). The researcher wants to identify the respondents' agreement about the substitution level to prevent infectious diseases on construction sites [55]. The related example question under this level is “sandstone grinding wheels (which cause severe respiratory sickness due to silica conversion to synthetic wheels like aluminium oxide) can prevent infectious diseases on construction site” [54-57] with Likert scales.

The next question is related to engineering control. Engineering controls remove the hazard before it comes into contact with the worker. Question four was designed based on Su *et al.,* [53], Adepu *et al.,* [54], Q4: engineering controls (Table 3) with (dichotomous variables). On the other hand, Q3 (Table 4) uses the Likert scale. The hierarchy's fourth level is administrative control. Management and the chain of command can implement these measures to reduce the possibility of risk. The question for this level is Q5, the level of administrative control that can prevent infectious diseases (Table 3), and Q4 (Table 4) [54].

Finally, the risk control hierarchy's last layer is the personal protective equipment (PPE). This level is probably used to prevent workers from coming into direct contact with hazardous or unclean materials. The designed question for level 5 is Q6 (Table 3) and Q5 (Table 4) [58,59]. From the result of reliability testing above, it is known that designed questions with Yes or No achieved high reliability, which can be used for further data collection based on Table 5, which shows a strong relationship between Kuder-Richardson 20 (KR-20) values for the six items. This result shows that the research tool is good enough and reliable enough to measure the answer.

Furthermore, most of the references agreed that 0.73 showed high reliability based on the rule of thumb given. Therefore, it seems that, even though many authors follow a rule of thumb that says alpha should be at least greater than 0.7 for a measure to have a reasonable level of self-consistency, the trimmed reliability points were met in this study. Moreover, Cronbach’s Alpha test (Table 6) for this study was acceptable (0.74), which fulfilled the reliability test’s minimum requirement (0.7). Therefore, 6 binary variables and 5 Likert scale questions strongly correlate, achieving the minimum reliability requirement, meaning the questionnaire is reliable.

6. Conclusions

Estimating Kuder-Richardson 20 (KR-20) and Cronbach’s alpha is made more accessible with the help of the guidelines provided in this article. The Kuder-Richardson 20 (KR-20) and Cronbach’s alpha are two methods that are frequently used for evaluating reliability. These methods are employed to assess the internal reliability of the research instrument. In this study, the designed questionnaire for preventing infectious diseases on construction sites by the Hierarchy of Controls has achieved the minimum requirement (0.70) for KR-20 and Cronbach’s Alpha investigation. In quantitative research, determining the dependability of an instrument is an important topic that needs to be addressed by the researcher. Survey reliability is necessary to draw accurate conclusions from the survey data, ensure the integrity of the survey instrument, and support efficient strategic decision-making.

Consequently, the researcher will be able to produce a high-quality study, which will assist them in accomplishing the research goal by testing the validity and reliability of the designed questionnaire.

In that case, it proves that the data reliability of the questionnaire is relatively high, and the internal consistency of the questionnaire data is relatively high so that it can be used for subsequent modelling analysis. On the contrary, if the reliability and validity are not high, redesigning and distributing the questionnaire may be necessary.

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