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The effect of eye-hand coordination on self-confidence levels among indoor volleyball referees

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Abstract:

This study was aimed to examine the effect of eye-hand coordination on the self-confidence level of indoor volleyball referees in West Java, Indonesia. It applied descriptive research to describe the characteristics of a particular population in this case referees being studied. This study took place in two sports tournaments named PORDA (Regional Sports Week Competition) XIII and Kejurda qualifying rounds among volleyball clubs in West Java in October 2017. To achieve the objective of this study, a survey method with measurement techniques and test were applied. The population involved in this study were 22 referees assigned to lead games in PORDA XIII and Kejurda qualifying round among clubs in west java in 2018 and 2017 respectively. To obtain a sample, this study applied the total sampling technique where all respondents were examined.. Referees' self-confidence level was collected using questionnaire whereas eye-hand was measured using motor fitness test instrument. Motor fitness test required referees to throw the ball to the target or volleyball referee who acted as research respondent. When it came to data analysis, path analysis technique was used to both examine the relationship between research variables and measure the direct and indirect effect of one variable on another variable. The results show that referees' self- confidence level in this study for each indicator fell into the excellent category.

Their ability to perform motor test can be described as good. This study shows that there was a positive and significant effect of referees' eye-hand coordination ability on the level of their self-confidence level in carrying out their duties in leading a match.

Keywords: eye-hand coordination, referees, self-confidence level, volleyball

Introduction

Sport competition functions to measure the achievement of a particular sports coaching program. It happens to volleyball coaching program, a coach will prioritize the competition for the objectives of coaching. Since competition measures every aspect in sport, the athletes should exhibit their strength, ability, creativity and enthusiasm. Sport competition designs rule to measure those aspects. To deal with a particular competition, athletes are trained to mobilize their efforts and energy to achieve the objectives of sports skill and high performance. Sports competition requires an athlete to prepare and perform their best talent and effort to take part in a particular competition. It calls for various aspects to meet in order to hold a competition. One of the requirement is official availability like a referee (PBVSI,2013), (Soekintaka, 1973).

Referees are authoritative persons to lead and make a decision in a particular game sport. Given their huge power and authority, referees should have not only sufficient knowledge about the rules of the game but also possess sound physical abilities. Their physical abilities include many things and one of them is eye-hand coordination. Eye-hand coordination is a pivotal factor that referees need to take into consideration. It equips them with the visual ability that they received through their eyes as information. In addition, that information will then be processed to make a decision using their hand in a particular match. Their decision can be seen by players of a particular match and they move their hand to complete a particular decision. Their hand movement signal a particular decision in a match. Eye-hand coordination is the ability of the vision system to coordinate the information received through the eyes to control, guide, and mind direct the hands in the accomplishment of a given task. To get an accurate movement of the ability to see and the ability of the hand is certainly very dependent on the retinal and extraretinal signals. Coordinating eye and arm movements are central to our natural behaviour. Eye-hand coordination depends on a combination of retinal and extra-retinal signals necessary for accurate movement. In the aspect of hand-eye coordination, eye function has a very central role, considering the movements that the body will carry out depend on the speed of the eye to catch stimulating thing (information).). It

has been known for some time that rapid aimed limb movements depend critically on information obtained from the eyes. In short, referees need to pay attention to this factor. Referees require excellent visual skills to catch details of action on the field during matches, (Arun Kumar Nayak, 2015), (Heather, 2011), (Rudzitis, Kalejs & Licis, 2014) ,(Chiraz Bensa, 2006), (David L Gallahue,1989)

Psychologically, referees are required to have a good self-confidence level in carrying out their mission. Having a high self-confidence level, they benefit much in their performance to lead and make a decision in a match. The effectiveness of the self-perception affects the patterns of thinking and behaviour and emotional excitement, the higher the level of self-efficacy, the higher the achievement and the abandonment of failure experiences as well as self-regulation of reflexes (Charbi Belkacem & Khader Salih, 2018). It goes without saying that self-confidence influences human behaviour and emotion which are closely related to achievement. Self-confidence contributes highly to human skill in a particular activity. In the context of referees, their self-confidence level determines their achievement in leading a match. They are able to decide on the field to the best they can perform without being under pressure, hurry and provoked by the surrounding. In other words, their decision is not influenced by players, viewers, coaches and official. Their best performance is crucial to ensure their fairness and neutrality in a particular match. To achieve this, referees should have sound psychological maturity when leading a match because they will face various form of characters and different attitudes that players exhibit. Thus, their mental health and self-confidence must be better and stronger than the players since they lead and judge the match and maintain fair and neutral position (Charbi Belkacem & Khader Salih, 2018), (Dilli, Harry, Achmad, 2017). Regarding the mental attitude of referee Cancel Arslanego et al. In an International Journal states that factors affecting person's perception process (age, experience, attitudes, values, physical and social factors, culture, etc.) influence decision-making behaviour and thinking styles. In this context, it is very important for the volleyball referees to make instant decisions in terms of the feature of the game. The decisions made in a very short time are closely related to the mental processes of referees. The referees who manage the mental process correctly will inevitably be successful in decision-making and thinking styles (Cancel Arslanogu.2018).

There are several factors that come into play when referees make their decision. Those factors go hand in hand with their cognitive styles to influence referees in making a decision. The factors include age, experience, attitudes, values, physical, social, and culture and etc. Referees need to take them into consideration when making a decision. Their decision must be quick since they deal with a short time to judge a particular event. To be able to make the correct decision, they should

manage well their mental process and thinking style. If they succeed to manage them, they will perform well. On the contrary, if they fail to manage them, they are likely to fail to make a correct decision which affects the game.

Studies investigating factors that influence a referee's perception process in decision making have not been much published. This study tries to fill the gap. To be specific it sought to explore between referees' physical factor in terms of their eye-hand coordination and their self-confidence level in making a decision in an indoor volleyball competition in West Java, Indonesia.

Material & methods

This research applied a descriptive research method seeking to describe objects in their natural circumstance without undergoing treatment. Descriptive research is usually called non-experimental because researchers are not in a position to manipulate research variables. It allows researchers to conduct several actions like; to make connections between variables, test hypotheses, develop generalizations and develop theories featuring universal validity.

The population involved in this study were 22 referees who were assigned in the qualifying round of regional sports week (PORDA) XIII and its qualifying round (Kejurda) among indoor volleyball clubs in West Java in 2018 and 2017 respectively. Total sampling technique was used because it allowed this study to use all referees taking part in this study since they had a particular set of characteristics needed in this study. The samples in this study were all referees assigned in both event, PORDA XIII and Kejurda in West Java in 2017.

This study applied two variables. The dependent variable in this study referred to referees' self-confidence level using a questionnaire. Independent variable referred to eye-hand coordination using motor fitness test instrument where a volleyball is thrown to the target or volleyball referee who acted as research respondent.

This study collected data through several stages namely : (1) composing research variables indicator; (b) compiling instrument grid; (c) conducting instrument trial, and (d) testing validity and reliability of the instrument. In accordance with the types of variables involved, this study obtained the data using several instruments namely: (1) Instruments of self-confidence with questionnaires, questionnaire tests arranged according to the Likert scale (2) Test of motor skills/motor fitness test. To analyze the data, this study applied statistical technique by testing a hypothesis to examine two variables in question

Results and Discussion

Descriptive Data

Respondent Overview

This study was aimed at investigating the relationship between referees' eye-hand coordination and their self-confidence level in carrying out duty to lead a particular match. The object of the research, as the unit of analysis of this study, is the referees' self-confidence level in leading volleyball sports competition. This research took place in West Java and used all referees involved in the two events namely PORDA XIII and Kejurda. The participating referees served as respondents in this study and they can be categorized based on gender, education, age, and experience as a referee. To get a bigger picture, the following section will describe these categories modifying referees participating in the research.

a) Gender of Respondents

Based on gender, all respondents in this study were the male referee. This is to say that there was no female referee involved in this study.

b) Respondent Education

Unlike gender which is dichotomous, referee's educational level vary. This category is deemed necessary to be analyzed since it describes referees' level of knowledge and understanding in carrying out their duties and responsibilities. Based on formal educational level, respondents can be grouped into several categories as listed in table 4.1 below:

Table 4.1

Respondent Characteristics Based on Education Degree

Respondents' Education Degree	**Number**	**Percentage**
S3(Doctor)	0	0%
S2 (Master)	0	0%
S1(Bachelor)	17	77,3%
Diploma	1	4,5%
Senior high School	4	18,2%
Total	**22**	**100%**

Referring to table 4.1 above, it can be seen that the referees' educational level who are respondents in this study were generally S1 degree. In other words, the majority of the referee had studied their bachelor degree in University prior to serving their career as a referee. In the more detailed

description, out of 22 respondents, 17 of them were S1 graduates, 4 respondents were high school graduates, and the remaining 1 person was a Diploma graduate. None of the respondents in this study had accomplished a master or doctoral degree. It can be concluded that the majority of respondents were S1 graduates and their number reaching 17 people (77.3%). Based on the data mentioned in table 4.1, respondents' education level can be displayed through the following figure 4.1:

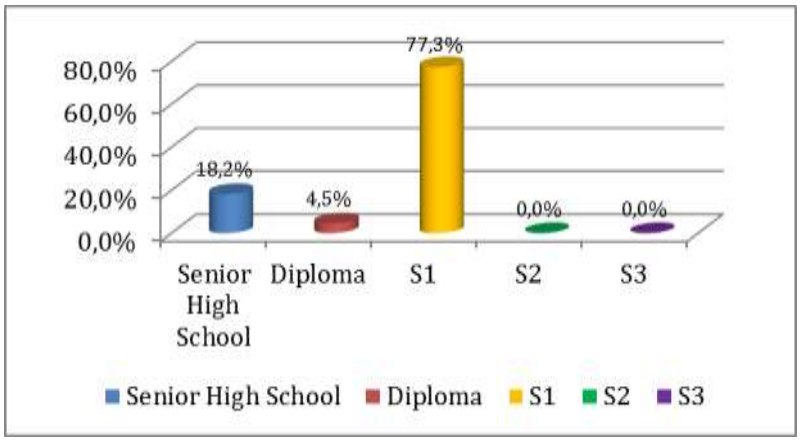

Figure 4.1

Respondent Characteristics Based on Education Level

c) Age of Respondents

Unlike the education level, the age factor has nothing to do with referees' academic background. Their age factor is considered necessary to describe differences in respondents' maturity levels and their cognitive. It is common that persons as they grow older they become more mature. Based on respondents' age level, they fall into several groups as they are shown in table 4.2 below:

Table 4.2

Respondents' Characteristic Based on Their Ages

Respondent's Age	**Total**	**Percentage**
< 31 years old	18	81,8%
31 – 40 years old	4	18,2%
41 – 50 years old	0	0%
> 50 years old	0	0%
Total	**22**	**100%**

Referring to table 4.2 above, it can be seen that most of the respondents belong to the group under 31 years old. Out of the 22 respondents involved in this study, 18 of them were less than 31 years old, while the remaining 4 respondents were around 31-40 years old. This means that the majority of referees who were respondents in this study fell in the category of fewer than 31 years old. They were working-age population or belong to the stage of productive age. There were 18 productive age respondents (81.8%) out of a total of 22 respondents. From the above table 4.2, respondent data based on their age can be illustrated in figure 4.2 as follows:

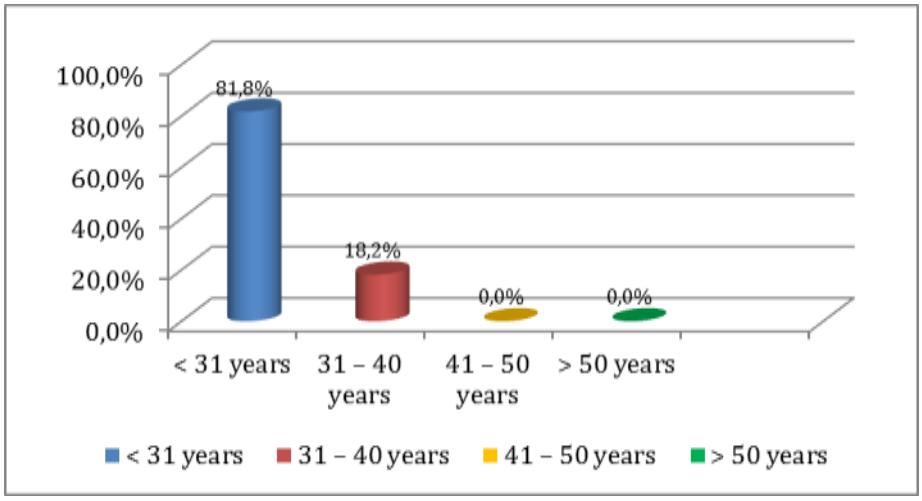

Figure 4.2

Respondent Characteristics based on Age

d) Respondents' Experience as referee

This factor relates to how long they spend their life as a referee. Respondents' experience to work as a referee is seen as necessary to be analyzed to describe their level of experience and their understanding in carrying out their duties and responsibilities as referees. Based on their experience as a referee, they can be grouped in the following table 4.3 as follows:

Tabel 4.3

Respondents' Characteristic Based on Their Experience

Respondent Age	**Total**	**Percentage**
< 3 years	1	4,5%
3 – 5 years	11	50,0%
6 – 10 years	8	36,4%
> 10 years	2	9,1%
Total	**22**	**100%**

Referring to table 4.3 above, it can be seen that respondents' experience to work as referees generally ranges from 3 to 5 years. As much as 50% of the total respondents. Of the 22 respondents who were the object of this study, 1 of them only worked as a referee for less than 3 years, 11 other people have worked as referees for about 3 to 5 years, 8 others have worked as referees around 6 to 10 years, while the remaining 2 people have undergone the indoor volleyball referee profession for more than 10 years. Their data can be presented in figure 4.3 below:

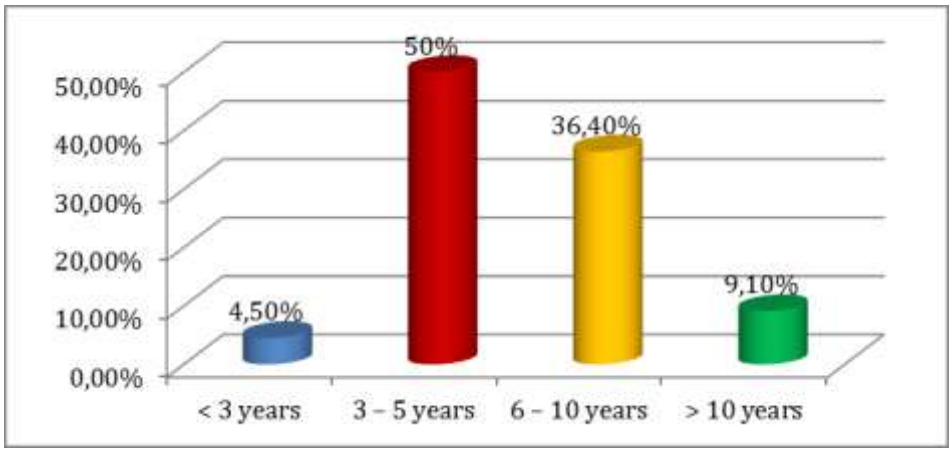

Figure 4.3

Respondents' Characteristic Based on Their Experience to Work as Referee

Research Variable Overview

Self-Confidence Level

Speaking about self-confidence, it is a crucial factor for the referee and plays an important role to ensure referee success in leading the match. In other words, self-confidence is often served as a determining a factor for the success of a referee when leading a match. It can be suggested that self-confidence may influence performance in the refereeing context, as it does in many others (Felix Guillen & Deborah L. Feltz, 2011).

This study used an instrument to investigate respondents' self-confidence level and found the following data:

Table 4.4

Descriptive Statistic Result from the Questionnaire on Referee Self-Confidence Level

Explanation	Value
Number of respondents	22
Mean	102,6
Maximum	117,0
Minimum	83,0
Mode	117,0
Median	103,0
Standard Deviation	8,9

Given the above table 4.4, it can be seen that the average score for Referees' self-confidence level is 102.6 with a standard deviation of 8.9. The mode and median values are higher than the average value of 117 and 103 respectively. The highest score is 117, and the lowest score is 83.

To measure how high and low a variable, there are indicators representing each variable measured in this study. The respondents' percentage of achievement for their scores can be calculated. The criteria for determining the high and low of each research variable are based on the criteria of the absolute norm standard using scale 5 as follows:

Ideal Maximum Score= 100%

Mean of Ideal (Mi) = ½ SM = ½ x 100 = 50

St. Dev. Ideal (SDi) = 1/3 MI = 1/3 x 50 = 16,67

Given the above formula, this study gains the guidelines for absolute norm conversion for research variables in the form of questionnaires which are outlined as follows:

Table 4.5

Criteria Guideline for % scale Absolute Norm

Formula	Interval (%)	Category
(Mi + 1,5 SDi) - (Mi + 3,0 SDi)	75,0 – 100	Excellent
(Mi + 0,5 SDi) - (Mi + 1,5 SDi)	58,3 – 74,9	Good
(Mi - 0,5 SDi) - (Mi + 0,5 SDi)	41,6 – 58,2	Average
(Mi - 1,5 SDi) - (Mi – 0,5 SDi)	24,9 – 41,6	Fair
(Mi - 3,0 SDi) - (Mi - 1,5 SDi)	0,0 – 24,9	Poor

There were 22 respondents and 26 items of the instrument to measure the referee's self-confidence level in this study. Each item has a maximum weight of 5 and the ideal total score of the research instrument referee self-confidence variable is 2860. After processing questionnaire data, the results show that the number of referee confidence variables is 2257. Thus, the percentage achievement score of the referee confidence variable is 78.92%. This means that West Java indoor volleyball referees' confidence was in the very good category according to the absolute norm standard.
Based on the referee's self-confidence level, respondents in this study can be displayed in the following table.

Table 4.6

Category of Referee's Self-Confidence Level

Interval (%)	**Category**	**Number of Respondents**	**Percentage**
75,0 – 100	excellent	16	72,7%
58,3 – 74,9	Good	6	27,3%
41,6 – 58,2	Average	0	0%
24,9 – 41,6	Fair	0	0%
0,0 – 24,9	Poor	0	0%
Total		**22**	**100%**

Based on table 4.6 above, it appears that the referees' level of self- confidence of indoor volleyball in West Java in this study fell into the excellent category. Of the 22 respondents, 16 of them or 72.7% belonged to the category of referees who had a very good self-confidence level. The remaining 6 respondents are considered to have a good self-confidence level. No single respondent is considered to have less or no good level of self- confidence. Respondents' self-confidence level can be shown in the following figure:

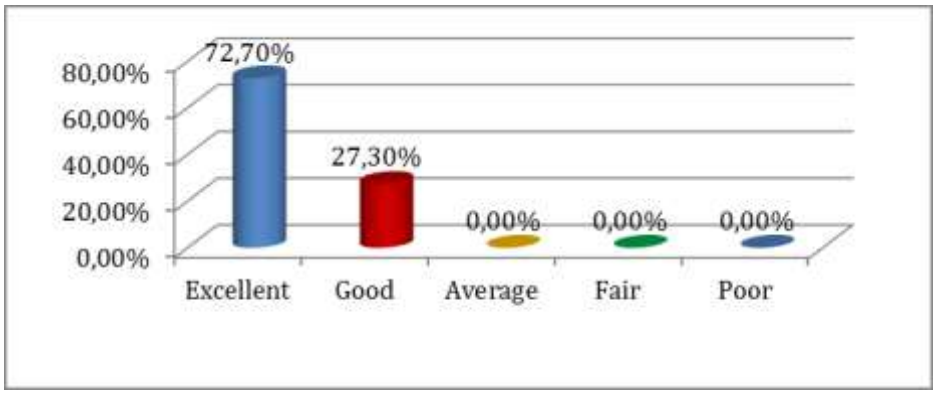

Figure 4.4

Respondents' Category of Self-Confidence

As mentioned earlier in the previous section, referee's self-confidence level in this study is measured or categorized based on nine indicators namely: 1) Believing in one's own abilities; 2) Acting independently in making decisions; 3) Having a positive self-concept; 4) Showing Brave to express opinions; 5) Showing Optimism; 6) Being Objective; 7) Being Responsible; 8) Being Rational; and 9) Being focused. Generally speaking, the respondents' self-confidence level variable based on each indicator can be seen in the following table:

Table 4.7

Percentage of Achievement Score on Referee's Self-Confidence Level on Each Indicator

Indicator	**Total Score**	**Ideal Score**	**% achievement**	**Category**
Believing in one self-ability	265	330	80,3%	Excellent
Acting Independently to make a decision	238	330	72,1%	Good
Having positive self-concept	257	330	77,9%	Excellent
Having Courage to express opinion	259	330	78,5%	Excellent
Baing Optimistic	283	330	85,8%	Excellent
Being Objective	264	330	80,0%	Excellent
Being responsible	197	220	89,5%	Excellent
Being Rational	251	330	76,1%	Excellent
Being Focused	243	330	73,6%	Good

Based on table 4.7 above, it can be seen that the referees' self- confidence level in this study for each indicator fell into the excellent category. Based on the table above, it also appears that the highest indicator of score achievement is the indicator of responsibility, which is 89.5%. The indicator with the smallest score of achievement is an indicator of independence to make a decision which is equal to 72.1%. Nevertheless, all of these indicators are still categorized as excellent and good.

Respondents' percentage of achievement score based on each indicator can be seen in the following figure:

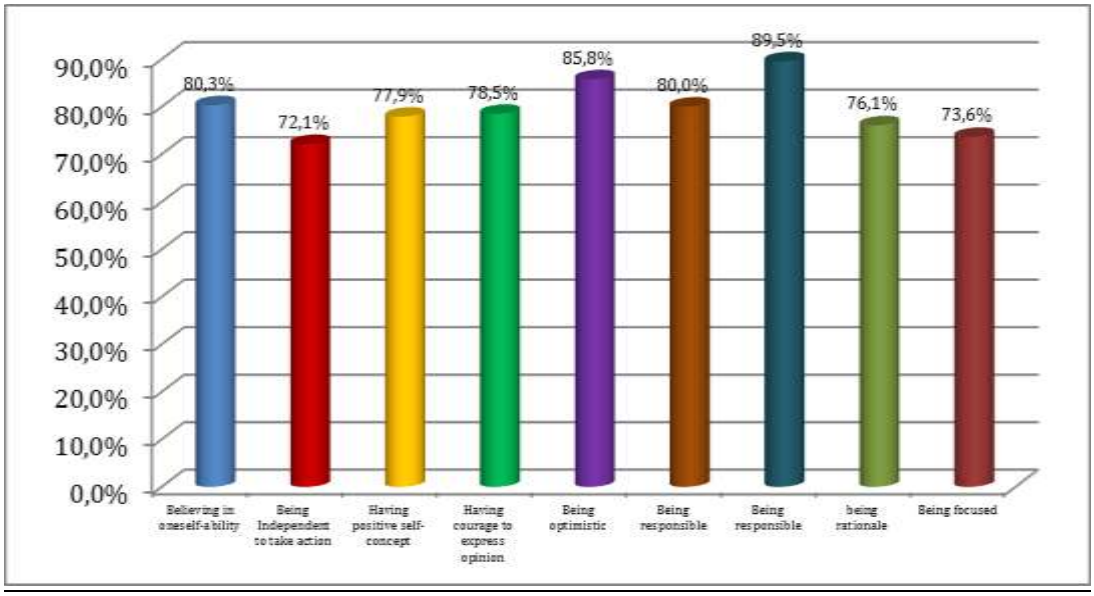

Figure 4.5

Comparison of Achievement Score Percentage on referee self-confidence level on each indicator

Eye-hand coordination

Eye-hand coordination can be interpreted as a combination of eyes and hands to do a movement. It means persons use their visual system ability to coordinate between information received through the eye and controlling ability using their hand (both hands) in completing the task given. In this study, referees perform eye-hand coordination when they signal decision through the movement of their hand in a particular match.

To assess referees' eye-hand coordination ability, this study used motor fitness test instrument. Practically, respondents were tested by a ball thrown on the target given. This was conducted to measure their eye-hand coordination.

Based on the test conducted, the results of respondents' motor skills in the form of throwing ball

tests on targets against referees are as shown in the following table.

Table 4.8

The result of respondent performance in motor test

No Respondent	distance 3,1 M	distance 4,1 M	distance 5,1 M	Score total
1	7	5,5	5	17,5
2	5,5	4	5,5	15
3	3	4	3	10
4	8	5,5	3,5	17
5	8	6	5,5	19,5
6	5,5	3,5	3,5	12,5
7	2	3,5	3,5	9
8	4,5	2,5	3	10
9	2	5,5	1,5	9
10	2,5	3,5	1,5	7,5
11	4,5	4	3,5	12
12	4,5	5	4,5	14
13	8	3,5	2	13,5
14	7	7	6	20
15	6	4	2	12
16	6	4,5	3	13,5
17	3,5	2,5	6	12
18	7	6	7	20
19	8	5,5	2	15,5
20	4,5	3	3,5	11
21	7	7	3	17
22	6	5,5	3,5	15
Mean	**5,45**	**4,59**	**3,70**	**13,75**
Maximum score	**8,00**	**7,00**	**7,00**	**20,00**
Minimum Score	**2,00**	**2,50**	**1,50**	**7,50**

Based on the test, the results shown in Table 4.8 concerning referee's ability to perform test can be described as follows: throwing ball to targets at a distance of 3.1 meters, 4.1 meters, and 5.1 meters, in general, have an average score amounting to 13.75 with the highest score of 20 and the lowest score of 7.5.

In a more detailed description, the test on throwing the ball to the target with a distance of 3.1 meters, respondents in this study had an average score of 5.45 with the highest score of 8 and the lowest score of 2. Furthermore, the average score of the test results for the category of throwing the ball to a target of 4.1 meters distance is 4.59, with the highest score of 7 and the lowest score of 2.5. The average score of the test for throwing a ball to the target of 5.1 meters distance is 3.70, with the highest score of 7 and the lowest score of 1.5.

In comparison, the results of the throwing ball to the target on each different distance is shown in the following figure:

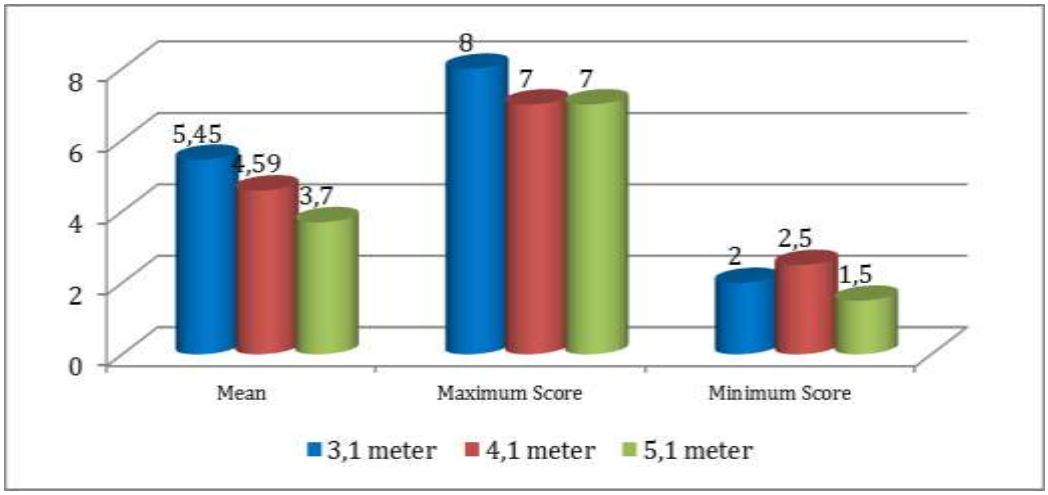

Figure 4.6

Comparison of the test results on the score of the motor test by throwing the ball to the target with a distance of

3,1 meter, 4,1 meter dan 5,1 meter

Hypothesis Testing

Having analyzed the result of the correlation analysis, this study found that there is a positive relationship between respondents' eye-hand coordination ability with their self-confidence level. This can be traced from the correlation coefficient between the two variables which is equal to 0.737 with a significance value of 0.05 which is 0.000.

The eye-hand coordination coefficient on the self-confidence level is significant because t count> t table with each value 3.756> 2.101 respectively. The significance value is 0.001 <0.05 where Ho is rejected or Ha is accepted. This means that the partial coordination ability of referee's eye-hand

coordination in indoor volleyball has a significant effect on their confidence in leading indoor volleyball matches.

Based on the result of statistical analysis, the results in this study show that there was a positive and significant effect of referees' eye-hand coordination ability on the level of their self-confidence level in carrying out their duties in leading a match. This means that if there is an increase in eye-hand coordination skills of referees, then it tends to increase their self-confidence level in leading the match. The study also found that the level of relationship between the referees' eye-hand coordination and their level self-confidence which fell into the very strong category. The direct effect of hand-eye coordination on referee's confidence level is of 33.9%.

Conclusions

This study was aimed to investigate referees' eye-hand coordination and their self-confidence level. Based on the result and discussion in the previous section, this study draws conclusions as follows: there are two variables in this study namely exogenous variables and endogenous variables. The former is referees' eye-hand coordination (X), and the latter is the referee' self-confidence level (Y). Referring to the statistical results, the study found empirical evidence regarding referees' eye-hand coordination correlating with a positive effect on their self-confidence level. Given this result, this study concludes that referees' self-confidence level is directly affected by their eye-hand coordination. The higher the referees' eye-hand coordination ability the higher their self-confidence level.

Conflicts of interest - This article is for the requirements to take a graduation exam on a doctoral study program.

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