

THE EFFECT AT MUSCLE POWER ARM, HAND-EYE COORDINATION, FLEXIBILITY AND SELF CONFIDENCE UPON BADMINTON SMASH SKILL

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Abstract

This study aims to reveal whether there is effect muscle power arm, hand eye coordination, flexibility and confidence to smash badminton skills, either directly or indirectly. The research was conducted at the Serambi Mekkah University, with a sample consisting of 73 samples were selected from 677 students from the Serambi Mekkah University penjaskesrek program.. The analysis technique used in this research is using path analysis (path analysis), with the aim to identify the direct and indirect effect between variables. The results showed that: (1) Arm muscle power directly effect the confidence of 4.62%, (2) Hand-eye coordination has a direct effect on confidence of 59.29%. (3) Flexibility of the torso indirectly effect the confidence of 92.69%, (4) Arm muscle power indirectly effect badminton smash skills of 66.55%. (5) Eye-hand coordination directly effects badminton smash skills by 8.64%, (6) Flexibility of the torso directly effects badminton smash skills by 10.43%, (7) Confidence directly effects badminton smash skills of 14.90%.

Keywords: *Badminton smash skills, muscle power arm, hand- eye coordination, flexibility, confident*

Badminton in Indonesia has placed itself as a sport that is very popular among the public, badminton is Indonesia's flagship sport in multieven event because of the achievements achieved and able to compete with other countries in the world. Consequences of achievements that have been achieved is every player is required to always achieve optimal performance. Accordingly, both players and coaches are required to implement a pattern of scientific training programs in accordance with the current development of the sport. The process of coaching in badminton can not be done instantly, but must go through a long process. To achieve the optimal performance required various supporting variables such as physical factors and psychological factors, but it also required perseverance, sacrifice, determination and based on high motivation for optimal achievement.

Badminton is a sport that requires players / athletes to have elements of physical condition that some of them are like power, coordination and flexibility, and excellent physical endurance. In addition, this sport should also be supported by

mental factors, because it is no secret that the current psychic element becomes an important factor to support the skills of exercise.

Badminton is one of the courses that students studied in the course of Physical Education, Health and Recreation Serambi Mekkah University of Banda Aceh. In this course students learn the basic techniques of badminton games that match the rules of badminton play is good and true, which will be applied when teaching in school or when serving in the community.

In badminton lectures, the core activities of the lectures are various physical movement activities arranged in a motion pattern to perform various basic techniques of badminton skills. Through such diverse physical movement activities students are expected to experience the motion, which in turn will lead to changes in skilled behavior that can be observed and measured as a skill. Activity movement in learning badminton in the form of mastery of various basic skills such as badminton badge (strokes), which includes lob, long service, and smash.

In badminton, smash is a kind of punch that is usually used to turn off the opponent and to gain points. Smash is one of the punch techniques in badminton that requires flexibility in moving. To be able to smash well, a badminton player must be equipped with good motion and mental factors. Smash skills occur because of a series of systematic movements. The basic technique of performing smash skills begins by pulling the right leg backward, the position of the left shoulder facing the opponent, the weight is on the right foot, the left hand is lifted to keep the balance. The movement begins by moving the weight from the right foot to the left foot while turning the right shoulder to the right, along with it swinging the right arm holding the racket ends with a cross to the bottom of the body.

Usman explains that the definition of smash is to strike a ball of forehand or a very loud and sharp backhand or full smash, because it is accompanied by all the energy available, and more so with a jump that aims to press the opponent until the ball turns off. Basically the forehand smash movement is the same as the throwing movement, the stages of smash movements that start from the preparation, the implementation to the followthrough are arranged in sequence, the sequential muscle action (kinetic chain) often occurs in the movement with the principle of throwing, this principle involves the recruitment of body segments into in motion at the right time, Movement generally uses large muscle groups.

Power or speed is the ability to resist resistance / burden with rapid and explosive movements. This restriction refers to the ability to move quickly, so that when the resistance is unable to move quickly then the force of speed will turn into an explosive force. Power is the primary key for the final quality of a smash. so, at the time of a smash hit, there is a muscle performance that is: elasticity at the time of releasing a punch.

Coordination is the body's ability to integrate different movements into a single, harmonious and effective movement. Koordinasi adalah kemampuan. In badminton games, the time required to process visual information can be an important factor to distinguish the performance of badminton players from each other.

Smash motion is a body activity that harnesses the power of the arm muscle swing and is assisted with other body movements, resulting in a strong and hard punch. The swing arm movement combined with good flexibility will result in a good smash hit too. So badminton players to reach the highest level requires strength, stamina and flexibility.

Confidence can play a major role in determining success in life. It is further disclosed that, confidently determines someone dare to take risks. If a person has enough self-confidence in his ability, he will be sure that something wrong is done, he is able to correct it. Exercise is instrumental in developing a positive self-image and self-confidence. Confidence can trigger motivation and increase one's self-esteem, achievement motivation and self-esteem are important characteristics for achievement of sports achievement.

Based on the description above, it is assumed that arm muscle power factor, hand-eye coordination, Flexibility of the torso and confidence are the factors that effect badminton smash skills.

On the other hand, based on preliminary observations, the authors identified that students' badminton smash skills in the Penjokesrek Program Serambi Mekkah University of Banda Aceh were relatively poor, presumably caused by variables such as arm muscle power, hand-eye coordination, Flexibility of the torso and confidence, based on this, it is necessary to hold a scientific approach to see the effect of the above variables by doing a research. so it is relevant the author makes research with the theme of arm muscle power, eye-hand coordination, the formation of Flexibility of the torso and self-confidence and its effect on smash badminton skills students in the in the Penjokesrek Program Serambi Mekkah University of Banda Aceh.

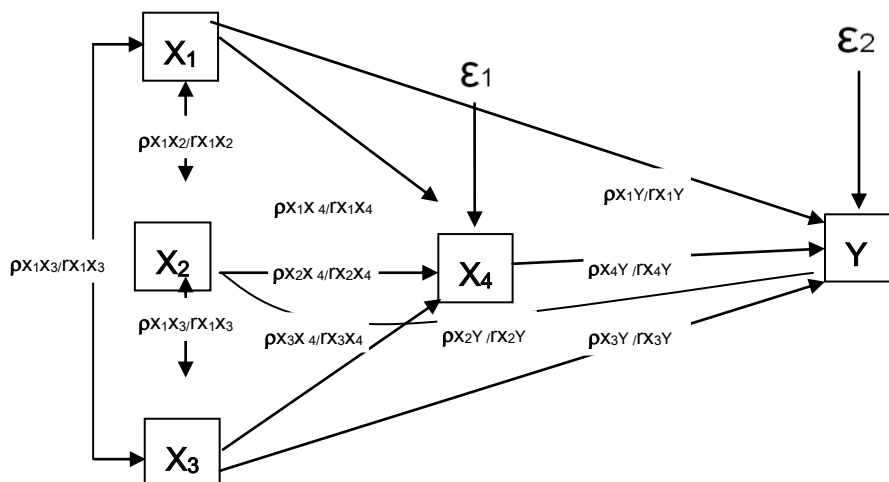
In general, this study aims to identify the effect of arm muscle power, hand eye coordination, flexibility of the torso and confidence in badminton smash skills, either directly or indirectly.

RESEARCH METHODOLOGY

Based on the study of problems to be studied and objectives to be achieved, the method used in this study is a survey method with causality studies or studies of relationships cause effect between variables studied.

The variables in this study are endogenous variables, ie badminton smash skills(Y), second variable is intervening variable, ie self confidence (X_4), and third variable is exogenous variable consisting of arm muscle power (X_1), eye-hand coordination (X_2) and flexibility of the torso (X_3)

Analytical technique used is path analisys approach. This model is used to analyze the pattern of relationships between variables with the aim to determine the direct or indirect effect between variables. The path analysis model (path analisys) in this study can be seen in the following constellations:



Causality Relationship of Path Coefficients

- X₁ : Arm muscle power
- X₂ : Hand-eye Coordination
- X₃ : Flexibility of the torso
- X₄ : Confidence
- Y : Badminton smash skills
- $\rho_{X_1X_4}$: Path coefficient variable X₁ to variable X₄
- $\rho_{X_2X_4}$: Path coefficient variable X₂ to variable X₄
- $\rho_{X_3X_4}$: Path coefficient variable X₃ to variable X₄
- ρ_{X_1Y} : Path coefficient variable X₁ to variable Y
- ρ_{X_2Y} : Path coefficient variable X₂ to variable Y
- ρ_{X_3Y} : Path coefficient variable X₃ to variable Y
- ρ_{X_4Y} : Path coefficient variable X₄ to variable Y
- $r_{X_1X_2}$: correlation coefficient variable X₁ to variable X₂
- $r_{X_3X_2}$: correlation coefficient variable X₃ to variable X₂

The population of this study are students of penjaskesrek study program Serambi Mekkah University of Banda Aceh academic year 2014/2015 which amounted to 677 people. Technical selection of samples in this study is to select a sample with a purposive basis that is purposive sampling technique that determines the sample with certain considerations, for example by considering the ability possessed by the sample. In this connection the samples that researchers will take for instrument testing and research data collection are students who are proficient and able to perform smash techniques from 677 students who are identified based on the results of smash badminton tests on students Penjaskesrek study program Serambi Mekkah University of Banda Aceh conducted at the time preliminary observation. so that 30 samples were identified for the test (the test sample should not be included in the research data collection) and 73 samples for the collection of research data.

In this study, the instruments used in collecting data used based on the variables involved are described as follows:

1. Badminton Smash Skill Test Instrument

Instrument test of smash skills in badminton game is the total score of a person's ability when doing smashes by performing the appropriate body movements in accordance with the technique of doing good smash badminton and true with 4 dimensions based on preparation, swinging racket to back, swinging racket forward and implementation with 12 indicators, the indicator will then be given the following assessment, as follows; 4 = Very Good, 3 = Good, 2 = Enough, 1 = Less.

2. Arm Muscle Power Test Instrument

The test instrument of arm muscle power capability is the score obtained from the maximum muscle-deployment test at maximum speed when releasing the load / resistance in the form of a bullet towards the front with rapid and explosive movement. The unit of measurement used to identify this test is meter (m).

3. Eye-Hand Coordination Test Instrument

The eye-hand coordination test instrument is a total score of ability to control the movement of a muscle from one pattern of movement to the next pattern of movement appropriately through the integration of the eyes and hands during the throwing of a tennis ball with one hand and recapture with a different hand over 15 seconds.

4. Flexibility Of The Torso Test Instrumen

Flexibility of the torso test instrumen is the score of the ability of space owned joints with the movement of joints to the maximum in accordance with the possibility of movement (range of movement) at the time of motion of floating from the floor to the maximum awkward ability. Some people who have wide joint space will have a kelentukan which is good, the test is very relevant to the movement of body when making a smash.

5. Confidence Test Instrumen

Confident instrument is a score obtained through a Likert questionnaire with 54 points statement based on indicators of confidence, namely (1) Awareness of strengths / advantages possessed, (2) Awareness of weaknesses / shortcomings possessed, (3) Ability (4) Ability to accept failure objectively, (5) Awareness of successes and failures experienced, (6) Ability to determine the feelings that are consistent with the condition of self, (7) Understanding of the factors that support achievement of goals, and (8) Ability to determine what should be done to achieve the target. The definition and indicators will be a reference in making the items.

Data analysis techniques used are as follows:

1. Descriptive statistics, namely statistics that aims to provide data description of each research variable.
2. Test analysis requirements that include (1) data normality test, and (2) linearity test.
3. Correlation statistics, to see the relationships that occur between exogenous variables and endogenous variables that are related to each other.
4. Path analysis, to see the effect of a variable on other variables.

RESEARCH RESULTS AND DISCUSSION

1. Data Description

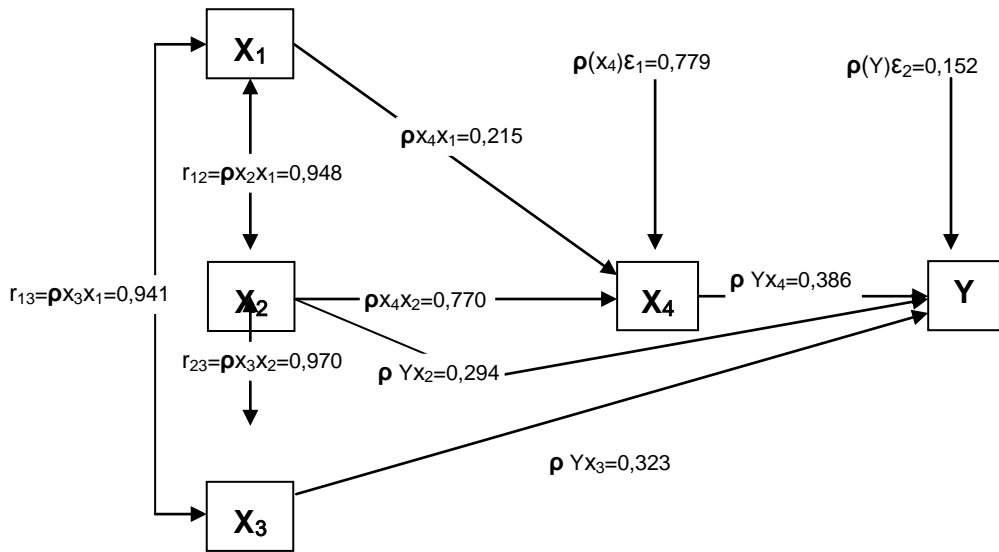
The data descriptions presented in this chapter include data on badminton smash (X_4) variables that are endogenous variables and arm muscle power variables (X_1), hand-eye coordination (X_2), flexibility of the torso (X_3) and confidence (X_4) as an exogenous variable. These exogenous variables determine the value of endogenous variables. Among endogenous and exogenous variables there is a confident variable (X_4) that is categorized as an intermediate variable. This is because the variable X_4 in addition to effect the value of variable Y, is also effectd by variables X_1 , X_2 and X_3 .

Furthermore, the exposure of some descriptive statistics starts from Y and then proceeds with variables X_1 , X_2 , X_3 and X_4 .

Table1 Descriptions of Research Results

Statistic	Variable									
	Badminton smash skills		Arm muscle power		Hand-eye Coordination		Flexibility of the torso		Confidence	
	Default score	Z score	Default score	Z score	Default score	Z score	Default score	Z score	Default score	Z score
Maximum Value	41	1,602	8,66	1,456	19	1,591	71,30	1,954	254	1,314
Minimum Value	31	-2,530	4,87	-1,628	9	-2,267	44,45	-1,757	158	-2,467
Average	37,12	1,118	6,87	1,164	14,88	1,001	57,16	1,177	220,64	1,006
Range	10	4,131	3,79	3,084	10	3,857	26,85	3,711	96	3,781
Standard deviation	1,602	1,602	1,510	1,456	2,592	1,591	7,235	1,954	25,392	1,314
n	73		73		73		73		73	

Based on the results of the path coefficients in sub-structures 1 and sub-structure 2, an overall causal relationship between X_1 , X_2 , X_3 , and X_4 may be described as follows:



Causal Relation of variables X₁, X₂, X₃, and X₄ against Y

The results of the path coefficients in sub-structures 1 and sub-structure 2 turn into structural equations, as follows:

a. Sub-structure 1:

$$X_4 = \rho_{X_4X_1}X_1 + \rho_{X_4X_2}X_2 + \varepsilon_1 \text{ and } R^2_{X_4X_2X_1}$$

$$X_4 = 0,215X_1 + 0,770X_2 + 0,799\varepsilon_1 \text{ and } R^2_{X_4X_2X_1} = 0,952$$

b. Sub-structure 2:

$$Y = \rho_{YX_2}X_2 + \rho_{YX_3}X_3 + \rho_{YX_4}X_4 + \varepsilon_2 \text{ and } R^2_{YX_4X_3X_2}$$

$$Y = 0,294X_2 + 0,323X_3 + 0,386X_4 + 0,152\varepsilon_2 \text{ and } R^2_{YX_4X_3X_2} = 0,977$$

2. Hypothesis Testing

After testing the model, then tested the hypothesis to determine the direct and indirect effects between variables. The proposed hypothesis will be concluded through the calculation of path coefficient and significance for each path under study. The result of the decision on all hypotheses proposed, described as follows.

a. Arm muscle power (X₁) Effect Directly To Self Confidence (X₄)

Hypothesis testing is performed to prove that arm muscle power (X₁) has direct effect on Confidence (X₄). The hypotheses tested are as follows:

$$H_0 : \rho_{X_4X_1} = 0$$

$$H_0 : \rho_{X_4X_1} > 0$$

Based on the above data analysis, the coefficient value of X₁ to X₄ ($\rho_{X_4X_1}$) is 0.215 where the t count is 2.594, then at $\alpha = 0,05$ obtained by t table 2,290. Thus it is identified that the t count (2.594) is greater than the t table (2,290), so the path coefficient is significant. So based on these calculations found that arm muscle power (X₁) directly effect the confidence (X₄).

b. Hand-eye Co-ordination (X_2) Directly Effects Self-Confidence (X_4)

Hypothesis testing is performed to prove that hand-eye coordination (X_2) has a direct effect on Confidence (X_4). The hypotheses tested are as follows:

$$H_0 : \rho_{X_4X_2} = 0$$

$$H_0 : \rho_{X_4X_2} > 0$$

Based on the above data analysis, the coefficient value of X_2 to X_4 ($\rho_{X_4X_2}$) is 0,770 where t count is 9,305, then at $\alpha = 0,05$ obtained by t table 2,290. So it is identified that the value of t count (9,305) is greater than the t table value (2,290), so the path coefficient is significant. So based on these calculations found that hand-eye coordination (X_2) has a direct effect on Confidence (X_4).

c. Flexibility of the torso (X_3) Directly Effects Self-Confidence (X_4)

Hypothesis testing is performed to prove that flexibilitythe torso (X_3) has a direct effect on self-confidence (X_4). The hypotheses tested are as follows:

$$H_0 : \rho_{X_4X_3} = 0$$

$$H_0 : \rho_{X_4X_3} > 0$$

Based on the above data analysis, the coefficient value of X_3 to X_4 ($\rho_{X_4X_3}$) is equal to -0.317 where the value of t count is -2.993, then at $\alpha = 0.05$ obtained t table of 2,290. So it is identified that the value of t count (-2.993) is smaller than the t table value (2,290), so the path coefficient is not significant. So based on the calculations found that the flexibility of the torso (X_3) has no direct effect on Confidence (X_4).

d. Arm muscle power (X_1) Effect Directly to Badminton Smash Skill (Y)

Hypothesis testing is performed to prove that arm muscle power (X_1) directly effect the skills of smash badminton (Y). The hypotheses tested are as follows:

$$H_0 : \rho_{YX_1} = 0$$

$$H_0 : \rho_{YX_1} > 0$$

Based on the data analysis above obtained the coefficient of X_1 to Y (ρ_{YX_1}) is 0.109 where the value of t count is 1.696, then at $\alpha = 0.05$ obtained t table of 2,290. So it is identified that the value of t count (2.594) is smaller than the t table value (2,290), so the path coefficient is not significant. So based on the calculations found that arm muscle power (X_1) has no direct effect on badminton smash skills (Y).

e. Hand-eye Co-ordination (X_2) Effects Directly to Badminton Smash Skills (Y)

Hypothesis testing is performed to prove that Eye-hand coordination (X_2) has direct effect on badminton smash (Y) skill. The hypotheses tested are as follows:

$$H_0 : \rho_{YX_2} = 0$$

$$H_0 : \rho_{YX_2} > 0$$

Based on the above data analysis, the coefficient value of X_2 path to Y (ρ_{YX_2}) is 0.294 where the t count value is 1.696, then at $\alpha = 0.05$ obtained t table of

2,290. So it is identified that the value of t count (0.294) is greater than the t table value (2,290), so the path coefficient is significant. So based on these calculations it was found that Eye-hand coordination (X_2) had a direct effect on badminton smash skills (Y).

f. Flexibility of the torso (X_3) Directly Effects Badminton Smash Skill (Y)

Hypothesis testing is done to prove that the flexibility of the torso (X_3) directly effects the skills of smash badminton (Y). The hypotheses tested are as follows:

$$H_0 : \rho_{YX_3} = 0$$

$$H_0 : \rho_{YX_3} > 0$$

Based on the analysis above data obtained coefficient value of X_3 path to Y (ρ_{YX_3}) is equal to 0.323 where the t count value of 4.210, then at $\alpha = 0.05$ obtained t table of 2.290. So it is identified that the value of t count (4.210) is greater than the t table value (2,290), so the path coefficient is significant. So based on the calculations found that the flexibility of the torso (X_3) directly effect the skills of smash badminton (Y).

g. Self Confidence (X_4) Effect Directly to Badminton Smash Skill (Y)

Hypothesis testing is done to prove that the confidence (X_4) directly effect the skills of smash badminton (Y). The hypotheses tested are as follows:

$$H_0 : \rho_{YX_4} = 0$$

$$H_0 : \rho_{YX_4} > 0$$

Based on the analysis above data obtained coefficient of X_3 to Y (ρ_{YX_4}) is 0.386 where t count 4,772, then at $\alpha = 0,05$ obtained t table equal to 2,290. So it is identified that the t count (4.772) is greater than the t table (2,290), so the path coefficient is significant. So based on these calculations found that confident (X_4) have direct effect onbadminton smash skills (Y).

After the results of the analysis and statistical tests of the proposed hypothesis are obtained, the results of its summary, especially those that directly effect, as shown in the table below

Table2 Recapitulation of Hypothesis Testing Results

No	Hypothesis	Statistic Test	Decision H_0	Conclusion
a.	The arm muscle power directly effects the self-confidence	$H_0 : \rho_{X_4X_1} = 0$ $H_0 : \rho_{X_4X_1} > 0$	H_0 rejected	directly
b.	Eye-hand coordination directly effects self-confidence	$H_0 : \rho_{X_4X_2} = 0$ $H_0 : \rho_{X_4X_2} > 0$	H_0 rejected	directly
d.	Muscle flexibility directly effects self-confidence	$H_0 : \rho_{X_4X_2} = 0$ $H_0 : \rho_{X_4X_2} > 0$	H_0 be accepted	Not directly
e.	Arm muscle power directly effect badminton smash skills	$H_0 : \rho_{YX_1} = 0$ $H_0 : \rho_{YX_1} > 0$	H_0 be accepted	Not directly

f.	Eye-hand coordination directly effects badminton smash skills	$H_0 : \rho_{YX_2} = 0$ $H_0 : \rho_{YX_2} > 0$	H_0 rejected	Not directly
g.	Muscle flexibility directly effects badminton smash skills	$H_0 : \rho_{YX_3} = 0$ $H_0 : \rho_{YX_3} > 0$	H_0 rejected	directly
h.	Confidence directly effects the skills of smash badminton	$H_0 : \rho_{YX_4} = 0$ $H_0 : \rho_{YX_4} > 0$	H_0 rejected	directly

DISCUSSION OF RESEARCH RESULTS

Based on the test results from a hypothesis that has been done in the hypothesis testing section, it can be stated that:

First, for hypothesis there is significant effect of arm muscle power (X_1), hand-eye coordination (X_2), flexibility of torso (X_3) to self-confidence (X_4) after hypothesis testing individually obtained variable of flexibility of torso (X_3) its effect on confidence (X_4). Based on the results of hypothesis testing with path analysis obtained that there is positive effect of arm muscle power (X_1) and hand-eye coordination (X_2) to confidence (X_4). The structural equation of path analysis results from arm muscle power (X_1) and hand-eye coordination (X_2) to confidence (X_4) is $X_4 = 0.215 X_1 + 0.770X_2 + 0.799\varepsilon_1$. While the contribution (X_2 , X_3 and X_4) simultaneously to Y equal to 0.952 or 95.2% which means that 95.2% confidence variation (X_4) is effected by variation of arm muscle power (X_1) and hand-eye coordination (X_2).

Second, for hypothesis there are significant effect of arm muscle power (X_1), hand-eye coordination (X_2), flexibility of body (X_3) and self-confidence (X_4) against badminton smash (Y) skill, after hypothesis testing individually obtained variable arm muscle power (X_1) does not significantly effect its badminton smash (Y) skills. Based on the results of hypothesis testing with path analysis obtained that there are positive effects of hand-eye coordination (X_2), flexibility of body (X_3) and self-confidence (X_4) against badminton smash (Y) skills. The structural equation of path analysis result from hand-eye coordination (X_2), flexibility of the torso (X_3) and self-confidence (X_4) to badminton smash (Y) is $Y = 0,294X_2 + 0,323X_3 + 0,386X_4 + 0,152\varepsilon_2$. While the contribution of X_1 and X_2 simultaneously to X_4 is 0,977 or 97,7% which means that 97,7% variation of badminton smash (Y) skill is effected by variation of hand-eye coordination (X_2), flexibility of the torso (X_3) and confident (X_4).

These findings indicate that to improve the skills of smash badminton (Y), it is necessary to consider and increase the variables of arm muscle power (X_1), hand-eye coordination (X_2), flexibility of the torso (X_3) and confident (X_4).

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the analysis on the variables of badminton smash skills (Y), arm muscle power (X_1), hand-eye coordination (X_2), flexibility of the torso (X_3) and confidence (X_4), can be concluded that:

1. Arm muscle power directly effect the confidence of 4.62%.

2. Hand-eye coordination has a direct effect on confidence of 59.29%.
3. Flexibility of the torso indirectly effect the confidence of 92.69%.
4. Arm muscle power indirectly effect badminton smash skills of 66.55%.
5. Eye-hand coordination directly effects badminton smash skills by 8.64%.
6. Flexibility of the torso directly effects badminton smash skills by 10.43%.
7. Confidence directly effects badminton smash skills of 14.90%.

Based on the above conclusions, the following are suggested,

1. Better improvement of badminton smash skills done with increased arm muscle power, eye-hand coordination, flexibility of the torso and confidence. Of these variables the most dominant direct effect on badminton smash skills are confident variables, therefore the builders of badminton branch should pay attention to these factors.
2. Although arm muscle power does not directly effect badminton smash skills, but should be considered because of its effect indirectly through confidence.
3. Should enhance individual creativity by finding new solutions or looking at the problem of badminton lesson lesson
4. A comprehensive assessment of badminton smash skills should be due to the limitations in this study. There are still other factors that effect the badminton smash skills that need to be studied further.

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