

Analysis of technical performance of pencak silat athletes in the sparring category of men's class c, men's class e and women's class b at malang state university

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Abstract. This research aims to find out the technical performance of pencak silat athletes in the sparring category of class C men, class E men and class B women of State University of Malang through performance analysis. This research uses descriptive qualitative methods with Visual Research Method techniques by analyzing match videos from the three athletes as research samples, there are 22 video recordings of matches from city to national levels as research objects. The results found that the dominant technique of the three athletes was the sickle kick. In men's class C athletes the sickle kick is done with a percentage of 39.1% with a technique success rate of 70%. In male E class athletes with a percentage of 34% and a percentage level of success of 85%. In female B class athletes with a technical percentage of 33% with a percentage of success of 75.4%. the results of the analysis show that, the left sickle kick has a higher success rate. The results of the above analysis can be used as a reference in analyzing technical performance to determine the development of individual abilities so that they can provide evaluations that are relevant to the needs of athletes.

1. Introduction

Pencak silat is a martial art sport and culture of Indonesia that has developed for a long time [1]. Pencak silat as a competitive sport (Championship) began to be pioneered through several championship trials at the regional to national level since 1969 [2]. This martial sport began to be competed in PON VIII in 1973 in Jakarta as an official national championship [3]. Until now, pencak silat has developed into the realm of achievement sports and is competed from the regional level to the international level [4]. In pencak silat, there are 4 categories that are competed,

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namely, single, double, team and sparring [5]. In this study, it specifically discusses the sparring category in adult / student age pencak silat.

Sparring category pencak silat is a category that matches two fighters from different camps using the elements of attack and defense in the target area and knocking down opponents [6]. Pencak silat sparring category is one of the individual match numbers or individual sports. This category is a body contact achievement sport that requires good bimotor skills [7].

Achievement pencak silat matches or competitions are the same as martial arts competitions in general, athletes (pesilat) who have more or superior technical points or values are winners. The use of attack and defense techniques will be decisive in pencak silat as mentioned by [7] about the basic principles of pencak silat in the sparring category, namely performing attack techniques in the form of punches, kicks, defenses, counter attacks, falls (catches and kicks or hooks) in the target area to get as many values or points as possible.

According to [8] technical values or points can be obtained from the application of a valid attack and defense pattern, among others, a successful hand attack hits a direct and strong target with a value or point 1, a successful foot attack hits a direct and strong target with a valid point 2, a valid fall is all techniques that apply to drop the opponent by ensuring that the knees and above touch the floor. For sweeping and scissoring techniques within 2 (two) seconds, a fall with a catch or with a pull is given 5 (five) seconds.

The legal attacks are 1) successful hand attacks with a score or point of 1 such as, straight punches, haymaker punches, back knuckle punches, side knuckle punches, elbow punches, jab punches, slaps, guesses (palm strike), double straight punch, bottom knuckle punch, belly poke, swing up punch, cast punch, spinning knuckle punch, top to bottom punch; 2) successful leg strikes such as, front kick, side kick, spinning back kick, crescent kick, stomp, flying kick, horse kick, double side kick, double front kick, side jump kick, front kick, spinning jump kick; 3) legal falls, i.e. all applicable techniques to knock down an opponent ensuring that the knees and above touch the floor such as, sweeping and scissoring techniques within 2(two) seconds, falls by catch or by pull are given 5(five) seconds.

The use and mastery of attack and defense techniques in fighters cannot be separated from measured and regular training. As mentioned by [9] that training is a person's effort to improve the improvement of organisms and their functions to optimize sports achievement and performance. To achieve good performance, it is necessary to provide a training program that refers to the principle of the needs of athletes and their sports [10] The role of the coach is needed in implementing a training program properly and correctly guided by the principles of training [11]. As one of the individual sports, it is very necessary to apply individual principles and progressive principles to monitor the development of athletes. The coach's job is to consider the individual features of each athlete because the achievement of a person or team can be achieved optimally if the training program refers to the principle of individualization [10]. On the other hand, the progressive principle is also something that needs to be considered by emphasizing that athletes must increase training time progressively in the overall training program [12] This training principle will be the

basis for assessing the extent of the development of loading on athletes during training which will affect athlete performance.

Monitoring the development of athletes can be done through the Analysis Of Technical Performance approach through observation and analysis of matches or competitions that are followed during a certain periodization. The competition itself is a forum that becomes a benchmark for athlete achievement [13]. Nasnoor Juzaily (2024) in Sharing Session Performance Analysis said that in performance analysis the most important thing is to find the 'X- Factor' which is the advantage or characteristic ability in athletes, by knowing the 'X-Factor' in athletes, the coach can design a training program that suits the needs of athletes. Thus, understanding the characteristic abilities of athletes is very useful in preparing match strategy tactics and efforts to develop athletes' abilities on an ongoing basis.

State University of Malang is quite active in fostering the sport of pencak silat and has a history of good achievements, especially for the sparring category in both light and heavyweight classes. The State University of Malang IPSI team has won several pencak silat championships, both between universities and general championships such as, 1st general champion of POMPROV JATIM 2023, 1st general champion at Trunojoyo Cup 1 2024, 2nd general champion at Raja Brawijaya Open V and several other achievements.

This research seeks to analyze the technical performance of pencak silat athletes in the sparring category of class C men, class E men and class B women of State University of Malang. These class athletes have good achievements. Class B women have won several championships both at the city and national levels, among others: 1) 3rd place POMPROV JATIM 2023; 2) 1st place Raja Brawijaya Open V and; 3) 1st place National Self Shield Championship Airlangga University 2023. The achievements of male C class athletes include: 1) KEJURPROV Pencak silat Univertisa Jember Se-JATIM; 2) 1st place Madura Raya 57 Pencak silat National Competition; 3) 1st place IPSI Malang Championship II. The achievements of male class E athletes include: 1) 3rd place POMPROV JATIM 2022; 3rd place Batu City Cup 2024; 3rd place Raja Brawijaya Open V. Considering that the three athletes are students of the State University of Malang who excel, the research "Analysis of Technical Performance of Pencak Silat Athletes in Sparring Category Class C Men, Class E Men and Class B Women of State University of Malang" needs to be done.

2. Methods

Penelitian ini A descriptive qualitative approach was used in this study. Qualitative research is a form of research data analysis to test the generalizability of research results based on one sample (Coleman & Fuoss, 1955). The descriptive approach is an attempt to describe data based on events or phenomena that occur today based on facts [14]. Qualitative research forms data in the form of sentences or narratives obtained through qualitative data collection techniques [15]. The current study uses Visual Research Method. This method is data collection with observation techniques

or observations through visual media such as; video recordings, images or other media [16]. The object of this research data is the match video of each research subject in three different competitions. In this study, researchers tried to collect facts about the development of the technical performance of pencak silat athletes in class C men, class E men and class B women at State University of Malang from three different championships as research subjects.

Determination and collection of research sample data refers to 2 criteria on each subject, namely: 1) Video documentation of matches of pencak silat athletes in the sparring category of class C men, class E men and class B women of the State University of Malang during the competition from the competition from July to December 2024; 2) All match videos are carried out in 2 (two) - 3 (three) rounds. Meanwhile, the exclusion criteria for the research sample were not including videos with resignation wins or weight disqualification wins into the study. The championship data that became the object of research can be seen in the following table.

Table 1. List of championships from which the research object was taken

No.	Athlete Class	Championship	Schedule	Video Count
1	C male	Kejurkot kota malang	October 3-4, 2024	2
		Ipsi malang championship	October 27-28, 2024	2
		Koni cup kota batu iv	October 17-20, 2024	2
		Kejurnas merpati putih	November 20-23, 2024	3
		Trunojoyo cup ii	July 18-21, 2024	3
2	E male	Koni cup kota batu iv	October 17-20, 2024	1
		Kejurda tapak suci buchory jember cup ii 2024	November 14-17, 2024	2
		Kejurkot kota malang	October 3-4, 2024	1
3	B female	Kejurnas perisai diri	July 14-17 2024	3
		Koni cup kota batu iv	October 17-20, 2024	1
		Seleksi ipsi kota malang	September 1, 2024	2
		Total videos		

3. Results and Discussion

The following are the results of the technical analysis performed on each video of the research subjects' performance.

To get the value of techniques, a fighter must apply pencak silat principles such as step patten (step pattern), on guard position (posture) and attack/defense (attack/defense) [8].The use of effective and efficient techniques greatly benefits a

fighter. In the context of modern sports, a sport science approach is needed, one of which is performance analysis involving complex and comprehensive processes. In this study, there are several findings regarding technical performance from the coach's point of view in sparring category pencak silat athletes who are divided into 3 different classes. The description of the results of the technique performance analysis is as follows.

3.1. Percentage of dominant techniques in the men's C class sparring (AMA)

Table 2. Men's C class technique analysis results (AMA)

Jenis Teknik	n				Total N	
	B	%	G	%	N	%
Tebak	8	100%	0	0%	8	2,8%
Pukulan lurus	14	82%	3	18%	17	5,9%
Pukulan ayun ke atas	0	0%	0	0%	0	0,0%
Pukulan bandul samping	1	50%	1	50%	2	0,7%
sikutan atas	0	0%	0	0%	0	0,0%
sikutan depan	0	0%	0	0%	0	0,0%
Tendangan depan	34	67%	17	33%	51	17,6%
Tendangan Sabit	79	70%	34	30%	113	39,1%
Tendangan T	18	47%	20	53%	38	13,1%
Tendangan T belakang	5	56%	4	44%	9	3,1%
Tendangan depan cobra	1	100%	0	0%	1	0,3%
Jatuhan dgn tarikan	4	80%	1	20%	5	1,7%
Jatuhan dgn dorongan	1	50%	1	50%	2	0,7%
Jatuhan Tanpa menjatuhkan badan	9	69%	4	31%	13	4,5%
Sapuan rebah depan	0	0%	0	0%	0	0,0%
Sapuan rebah belakang(serkel)	1	25%	3	75%	4	1,4%
Kaitan luar	0	0%	5	100%	5	1,7%
Kaitan dalam	0	0%	13	100%	13	4,5%
Guntingan luar	0	0%	1	100%	1	0,3%
Guntingan dalam	3	60%	2	40%	5	1,7%
Guntingan luar dengan tarikan	1	100%	0	0%	1	0,3%
Guntingan dalam dengan tarikan	1	100%	0	0%	1	0,3%
Kuncian	0	0%	0	0%	0	0,0%

Total	180	100%	109	100%	289	100,0%
%	62%		38%			

Based on the results of video observation and analysis, the percentage results of the dominant attack techniques used by athletes while participating in 4 (four) different matches, found 3 dominant techniques used are sickle kick attack techniques with a percentage of 39.1%. Front kick as much as 17.6%. T kick with a percentage of 13%. As for the comparison of the percentage of success and failure of the dominant technique, namely, the sickle kick has a percentage comparison of 69%: 39%. Likewise with the front kick with a percentage ratio of 67%: 33%. While the T kick has a comparison value of 47% : 53% which means the failure rate is higher than the success rate of the technique.

Based on the results of the analysis, the dominant techniques used is:

- 1) Crescent kicks with a percentage ratio of success and failure of 70%: 30%. This technique is more dominant in successful attacks 56.1%.
- 2) Front kick with a success rate of 100% and dominant in the left front kick with a success percentage of 22.7%.
- 3) T kick with a percentage ratio of success and failure of 47% : 53%. This kick was predominantly successful on the right attack. Despite being one of the dominant techniques, this kick is considered ineffective to be used by fighters. The percentage of technique failures is caused by, attacks not hitting the target and being blocked / deflected.

The techniques that are not dominantly used by athletes but have a 100% success rate are the right guessing hand attack, outside scissors, and inside scissors.

with a pull and an inside scissors with a pull. Meanwhile, this fighter has techniques with a high failure rate that can be seen in the techniques of outer hooks, inner hooks, outer scissors and backward sweeps. In addition, there are several techniques that have never been used such as swinging punches upwards, front and top elbows, front lying sweeps and locks.

The attack pattern of the pugilist is dominant in the position of the front right pair (ready stance of the right foot in front) with the dominant attack pattern starting with the right T kick technique, right sickle kick and left sickle kick. While the defense pattern of the front right pair, the dominant technique performed is the left sickle kick with a tepis prefix and avoidance and blocking attacks with hands and feet. For the attack pattern at the time of the front left pair position, the dominant attack is the right back kick, right crescent kick and left front kick. Meanwhile, during defense, the dominant technique used is the left crescent kick which begins with a slap and step/avoidance.

Overall, it can be concluded that male C-class pugilists are athletes who have a dominant type of offense using right attacks and dominantly using the front right pair position both for attack and defense. This indicates that physical conditions such as

strength, coordination, agility, explosive power and speed are superior to the right body. Therefore, it is recommended that training be balanced between the right and left sides of the body—across both the upper and lower extremities—to support the development of a fighter's technical performance.

3.2. Percentage of dominant techniques in the men's E class sparring category (KKBS)

Table 3
Men's C class technique analysis results (AMA)

Jenis Teknik	n				Total N	
	B	%	G	%	N	%
Tebak	16	100%	0	0%	16	14%
Pukulan lurus	7	100%	0	0%	7	6%
Pukulan ayun ke atas	0	0%	0	0%	0	0%
Pukulan bandul samping	1	100%	0	0%	1	1%
sikutan atas	0	0%	0	0%	0	0%
sikutan depan	0	0%	0	0%	0	0%
Tendangan depan	24	100%	0	0%	24	20%
Tendangan Sabit	34	85%	6	15%	40	34%
Tendangan T	3	38%	5	63%	8	7%
Tendangan T belakang	0	0%	0	0%	0	0%
Tendangan depan cobra	0	0%	0	0%	0	0%
Jatuhan dgn tarikan	7	88%	1	13%	8	7%
Jatuhan dgn dorongan	2	100%	0	0%	2	2%
Tanpa menjatuhkan badan	1	100%	0	0%	1	1%
Sapuan rebah depan	0	0%	0	0%	0	0%
Sapuan rebah belakang(serkel)	0	0%	1	100%	1	1%
Kaitan luar	0	0%	0	0%	0	0%
Kaitan dalam	1	100%	0	0%	1	1%
Guntingan luar	0	0%	0	0%	0	0%
Guntingan dalam	1	33%	2	67%	3	3%
Guntingan luar dengan tarikan	1	100%	0	0%	1	1%
Guntingan dalam dengan tarikan	5	100%	0	0%	5	4%
Kuncian	0	0%	0	0%	0	0%
Total	103	100%	15	100%	118	100%
%	87%		13%			

Based on the results of video observation and analysis, 3 (three) percentages of the most used techniques were found, namely, crescent kicks as much as 34%. Front kick 20%. Guess attack 14%. Of these techniques, there are dominant falling techniques, namely falling with a pull 7% and deep scissors with a percentage of 4%. Percentage comparison between success and failure of the dominant technique used is in the crescent kick with a ratio of 85%: 15%. Front kick with a percentage of 100%: 0%. Guessing attack with a ratio of 100% : 0%.

The results of the analysis show that pugilists have dominant techniques, namely:

- 1) Crescent kick which has a higher success rate than the failure rate with a ratio of 80.0% : 15%. This technique is dominantly successful on left attacks.
- 2) Right front kick with a higher success rate than the left front kick with an overall technique success percentage of 100% which means this technique is effectively used by athletes.
- 3) The probing (or 'guessing') attack is one of the dominant hand techniques used, achieving an overall success rate of 100%. This technique is particularly effective when targeting the left side.

In addition, other effective but rarely used techniques are the drop with a push to drop the body and the drop with a pull to drop the body, straight punches and deep scissors with a pull. Meanwhile, the techniques that are considered weak and ineffective are the T kick, backward sweep, and deep scissors. While the techniques that were never used by athletes were top and front elbows, back T kicks, front cobra kicks, front fall sweeps, outside hooks, and locks.

Based on the results of the analysis, there are findings that male class E pencak silat athletes have a dominant type of offense in the front right pair position with attacks that are often used such as right sickle kicks, right T kicks, left sickle kicks and attacks that begin with holding / gripping (grip on body protector) opponent. Meanwhile, in the left front pair position, the dominant attacks are right front kick and right guess. The results show that these fighters are more effective in using left attack techniques. Therefore, fighters are advised to improve the performance of the left attack technique because there are still many fighters who are familiar with the right attack and not a few possibilities to anticipate the right attack only.

3.3. Percentage of dominant techniques in the women's class B sparring category (GDA)

Table 4. Men's C class technique analysis results (AMA)

Jenis Teknik	n				Total N	
	B	%	G	%	N	%
Tebak	8	100%	0	0%	8	4%
Pukulan lurus	14	88%	2	13%	16	9%
Pukulan ayun ke atas	6	100%	0	0%	6	3%
Pukulan bandul samping	13	93%	1	7%	14	7%

sikutan atas	0	0%	0	0%	0	0%
sikutan depan	0	0%	0	0%	0	0%
Tendangan depan	11	42%	15	58%	26	14%
Tendangan Sabit	46	75%	15	25%	61	33%
Tendangan T	15	68%	7	32%	22	12%
Tendangan T belakang	0	0%	0	0%	0	0%
Tendangan depan cobra	0	0%	0	0%	0	0%
Jatuhan dgn tarikan	16	89%	2	11%	18	10%
Jatuhan dgn dorongan	2	100%	0	0%	2	1%
Tanpa menjatuhkan badan	0	0%	0	0%	0	0%
Sapuan rebah depan	0	0%	0	0%	0	0%
Sapuan rebah belakang(serkel)	0	0%	0	0%	0	0%
Kaitan luar	0	0%	0	0%	0	0%
Kaitan dalam	0	0%	1	100%	1	1%
Guntingan luar	0	0%	0	0%	0	0%
Guntingan dalam	1	25%	3	75%	4	2%
Guntingan luar dengan tarikan	3	100%	0	0%	3	2%
Guntingan dalam dengan tarikan	4	67%	2	33%	6	3%
Kuncian	0	0%	0	0%	0	0%
Total	139	100%	48	100%	187	100%
%	74%		26%			

Based on the results of video observation and analysis, it was found that the 3 most frequently used techniques were sickle kicks at 33%. Followed by the front kick as much as 14%. T-kick as much as 12%. In addition, the dominant fall technique was found to be the fall with a pull with a percentage of 10% and the deep cut with a pull. The dominant fall technique is the fall with a pull.

Based on the results of video observation and analysis, it was found that the percentage of success and failure of the dominant technique was found in the sickle kick attack 75.4%: 24,6%. T kick with a ratio of 68.2% : 31,8%.

The results of the analysis show that female class B fighters have dominant techniques, among others:

- 1) The crescent kick, with a percentage ratio of success and failure of 75.4%: 24.6% so it is considered quite effective in use by fighters. The dominant fighter uses the left crescent kick.
- 2) T kick with a success percentage of 68.2%. This technique is dominantly successful in right attacks. However, this attack is still considered less effective because it still has a considerable failure value of 31.8%.
- 3) Drops with body pulls with a percentage of success and failure of 88.9%: 11,1%. This technique is fairly effective because it is a drop technique as regulated in [8] that

a technical value of 3 (three) points is obtained from a successful drop technique. The dominant fighter uses this technique with the right hand pull.

In addition to the dominant techniques above, there are other techniques that are considered as effective techniques because they have a high success rate such as guessing attacks, straight punches, falls with a pull, falls with a push and side pendulum punches. In conclusion, the data indicates that attacking maneuvers from the left flank were significantly more effective. This fighter has a characteristic pattern of the front right pair, this is indicated in the 4 (competitions) that were followed only once doing the front left pair attitude to initiate contact or buzz with the opponent. The dominant attack techniques carried out during the right tide are the right sickle kick attack, left sickle kick, right T kick and left front kick. Whereas in the defensive pattern, the dominant pugilist uses the technique of dodge attack (counter attack) left sickle kick, right T kick and right deep scissors.

From the results of the analysis of the three fighters, it shows that the dominant techniques performed still have a considerable number of failures. Overall, the causes of the athlete's technical failures in the match are blocked attack techniques, not hitting the target (technical accuracy) and improper momentum. When viewed from the success rate which is not much different from the failure rate, of course, fighters will be ineffective in using attack and defense techniques in order to get technical values or points in competition. Ineffective use of attack and defense techniques will drain the athlete's energy and stamina without getting clear technical points.

Third, fighters must improve 4 (four) aspects that will support the development of their achievements. To achieve maximum achievement, physical, technical, tactical and mental components are needed [17]. Technical, tactical and mental improvements must be supported by good physical conditions [18]. Thus, these 4 (four) things have an important and interconnected role in achieving achievements and interconnected in achieving optimal performance.

The frequency of using techniques will refer to the athlete's physical abilities so that the better the fisilk pesilat, the longer the body's stamina can last. Related to the level of accuracy and effectiveness of the technique, strategic tactics are needed. Strategic tactics are also very important. The purpose of using strategy in a match is how to get a victory without spending a lot of energy so that fitness is maintained [19]. In addition, mental factors also affect the use of pencak silat techniques, in this case the self-confidence and courage of fighters are needed as found in the research by [20] which shows that psychological interventions can improve the mental readiness conditions of fighters before competing.

Therefore, the results of this study are expected to provide benefits for coaches that by analyzing the technical performance of their athletes, coaches can monitor the development of athlete performance as mentioned by [19] that performance analysis intends to provide objective information on athlete performance during training and competition. Thus the coach can apply relevant exercises to justify techniques (biomechanics) and increase the efficiency of various techniques, such as punches, kicks and fall techniques. The role of the coach is needed because when practicing and competing the coach has a broader perspective on his athlete than the athlete himself.

The advantages of this research provide benefits for coaches on how to approach technical performance analysis of martial arts athletes using video analysis, so that

they can find out the characteristic abilities and weaknesses of athletes. So that they can provide training programs that are relevant to the needs of their athletes. The analysis is carried out based on the coach's point of view because the data can be seen in detail referring to the video recording.

In addition, researchers are still aware of the shortcomings of this research, namely using analysis video observation data without synchronizing the truth of points with the history of match results by match officials because these observations are based on the coach's point of view.

This observation is based on the coach's point of view. For future research, it is recommended to analyze technical performance by synchronizing athlete data with official match history and reports from match officials.

4. Conclusion

Based on the results of the analysis, it can be concluded that each subject has its own characteristics but has similarities in the use of dominant techniques when making body contact. Male class C athletes (AMA) predominantly use sickle kicks with a percentage of 39.1% with a success rate of 70%. The dominant attack pattern in the right front position (right foot in front) with the dominant attack pattern begins with the right T kick technique, right sickle kick and left sickle kick.

Male class E athletes (KKBS) dominantly use the sickle kick technique with a percentage of 34%. This fighter has an offense, dominant in the front right pair position with attacks that are often used such as right crescent kicks, right T kicks, left crescent kicks and attacks that begin with holding / gripping the opponent's body protector.

Class C female (GDA) fighters have a dominant attack pattern of right pairs using the attack techniques of right sickle kick, left sickle kick, right T kick and left front kick. This athlete dominantly uses the sickle kick technique with a technique percentage of 33%.

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