Jurnal Patriot
E-ISSN: 2714-6596 P-ISSN: 2655-4984
Homepage: http://patriot.ppj.unp.ac.id/index.php/patriot
Vol. 7 (Issue 3), 2025, pp. 122-128

Development of the forehand drive instrument in table tennis

Suhermon[1*], Arisman[1], Ferri Hendryanto[1], Siska[1] ,Ian Harris Sujae[2] , Jeki Haryanto[3] , Debby Indah[1], M Nurul Hamdan[1] ,Tofikin[1]
[1] Physical Education, Health and Recreation Study Program, Faculty of Education, Universitas Rokania, INDONESIA
[2] Nanyang Technological University, SINGAPORE
[3] Department of Coaching, Faculty of Sports Science, Universitas Negeri Padang, INDOENSIA

Informasi Artikel:
Submitted: August 7th, 2025; Revised: August 27th, 2025; Published: September 30rd, 2025

ABSTRACT
Problems: The problem in this research is that there is no new drive measuring tool in table tennis. **Purpose**: To make a drive measuring tool for table tennis. **Methods**: This research method is research and development (R&D). The population and sample in this study were 30 table tennis athletes from PTM Rohul. The study was conducted on May 13, 2025, by administering questionnaires to 2 media experts and 2 material experts. The first drive test was conducted on May 13, 2025, and the second drive test was conducted on May 15, 2025, to test the reliability of this instrument. The criterion test, using a previously existing drive test (from Tomoliyus), was conducted on May 14, 2025, to determine the validity of the test. This study involved samples of 30 PTM Rohul athletes from the first and second tests. The data collection method used questionnaires and tests. **Results**: The research results obtained from material experts were 87% and 86% (appropriate), and media experts were 85% and 88% (appropriate). Validity was 0.84 and reliability was 0.87. **Conclusion**: Research on the development of a forehand drive instrument in table tennis has produced a valid and reliable measuring tool to objectively assess the athlete's forehand drive technique. Through stages of content validity, construct validity, and reliability testing, this instrument has been proven to be able to measure aspects of accuracy, speed, and consistency of forehand drive strokes with a high level of accuracy. This study only involved a limited sample from one region or club, so the generalizability of the results still needs to be tested on a wider population. Encourage the development of similar instruments in other table tennis techniques such as backhand drives, chops, and smashes. It is recommended to develop application-based digital instruments, so that forehand drive skill measurements can be carried out efficiently and in real-time.
Keywords: development; instrument; drive forehand; table tennis.

https://doi.org/10.24036/patriot.v%vi%i.1174

Corresponding Author:
Suhermon
Physical Education, Health and Recreation Study Program, Faculty of Education, Universitas Rokania, INDONESIA.
Email: suhermon97@gmail.com

Introduction

Exercise is a physical activity that can improve a person's physical and mental health, ultimately shaping a quality person. Table tennis is a very fast-paced ball game, so for training and competing in table tennis, it's important to understand the characteristics of the sport and the factors that determine success. Exercise is a movement activity that humans constantly engage in, such as walking, running, jumping, and throwing. (Almanar et al., 2018). In sports itself, it consist of various sport that are classified improve his physical and spiritual fitness (Suhermon et al., 2024). Sports activities are not limited to urban areas; they are now practiced by the wider community. People are increasingly aware and understand the importance of sports, whether for recreation, health, or to improve performance (Anggara, 2021). Through exercise, a person can achieve success and improve their physical and mental fitness. Sports itself comprises various disciplines, including team and individual sports. One of the most popular sports is table tennis, or ping pong.

Table Tennis is a net sport that is quite popular (Annisa et al., 2022). Table tennis is a sport that has no age limits. People all over the world enjoy playing table tennis for fun (Arbaoui et al., 2025). Table

tennis or "ping pong" is a sport game that uses a racket as a tool, played by two people for singles and two pairs for doubles, both men's and women's doubles and mixed doubles, played on a table as a court that is bordered by a net (Andriani & Widodo, 2019). Table tennis can be played not only for recreational purposes but also for achievement (Paksi, 2016). Table tennis is played on a very small court, the players play short distance matches during rallies (Le Mansec et al., 2018). Table tennis is a highly popular competitive sport and is frequently competed in at various events, both at the regional, national, and international levels. Table tennis is a sport that improves concentration, reaction speed, and coordination, as well as arm and body muscles. When performing a movement or playing table tennis, the muscles of the arms and eyes must always be coordinated, as they must see the speed of the ball's arrival and return. Table tennis also provides many other benefits, including physical, mental, and social development. The complexity of the game requires mental and tactical preparation. A good table tennis player is one who understands and can perform the techniques of the game (Suryapranata et al., 2020). Table tennis is a fast-paced and skill-intensive sport that demands a combination of physical prowess and mental acuity from its players (Zhang et al., 2023)

The training process in learning technical skills in table tennis is of course through observation methods and is studied repeatedly using examples of table tennis games that have reached the highest level in matches (Yulianto, 2015). With a good training program, it will result in a successful process and effective training quality (Apriyanto & S, 2022). In table tennis, various aspects and techniques are required to win a match and achieve better results in the future. Mastering basic techniques is crucial, as they are a player's starting point for developing talent in their chosen sport (Julianena & Abdul, 2018). . In table tennis, there are four basic techniques that players must master to achieve maximum performance: stroke, grip, stance, and footwork. These techniques include the serve, smash, drive, flick, block, and chop. The stroke is one of the fundamental techniques in table tennis, alongside other fundamental techniques that players must master (Budiman, 2017). Table tennis is a game that has many variations of strokes. (Ewan, 2019). One of the dominant techniques used in playing table tennis is the drive technique.

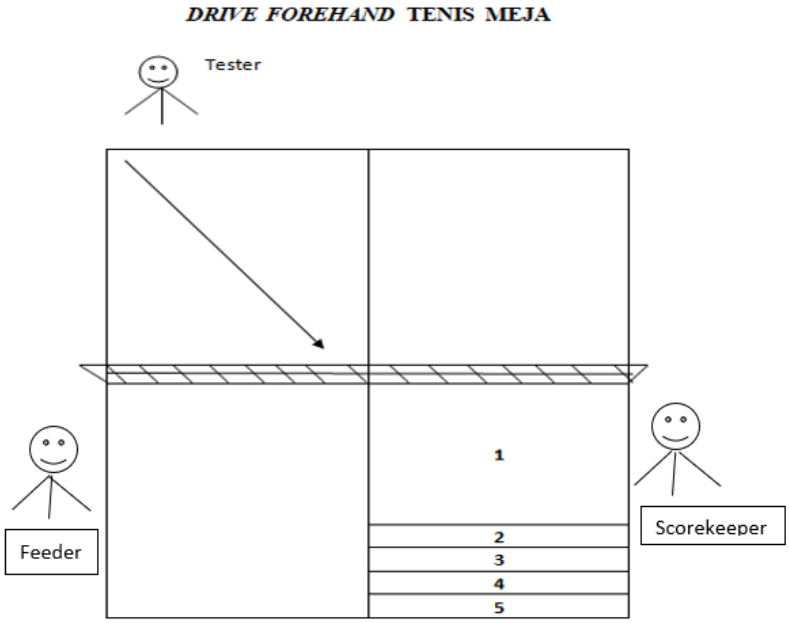
One of the most common attacking strokes in table tennis is the drive. Theoretically, a forehand drive is an attacking stroke performed by swinging the racket from the bottom up with the ball in contact with the position in front of the right side of the body (for right-handed players). According to sports biomechanics theory, the effectiveness of a forehand drive is greatly influenced by the coordination between lower body movement, wrist, racket position, and timing when hitting the ball. The alignment of these movement components determines the direction, speed, and accuracy of the resulting ball. The game domain of table tennis must be the narrowest game, the speed of the ball at which the player's partner also hits the ball in about 0.50 - 1.75 seconds, the spin, and direction of the ball must be predicted, and the optimal position of the ball and the posture of the ball for the hit must be taken (Kumar, 2018).

Such conditions when the author conducted observations and interviewed the PTM Rohul coach that the problem that occurred when athletes competed was that the drive stroke was less efficient and effective and the coach did not have a drive measuring tool used to see the extent of each athlete's drive ability. Therefore, a solution is needed on how to create a drive instrument in table tennis. In addition, the formulation of the problem in this study is (1) whether this test instrument is valid, (2) whether this test instrument is reliable.

Method

This research uses the Research and Development (R&D) method. The R&D method is a research method used to produce a specific product and test its effectiveness (Purnama, 2016). The population in this study were 30 PTM Rohul athletes consisting of 30 men and the sample in this retest test was 30 men, which was carried out for the first drive test and the second drive test. The trial sample determination technique in this study was using the saturated sample method.

Figure 1. Table tennis drive instrument design



Test Name : Table tennis forehand drive test
Purpose : Measuring table tennis forehand drive capability
Equipment : Table tennis table, net, bat, 15 balls, chalk, stationery, one scorekeeper and one person feeder
Score size :

1. For a score of 5, the box size from the edge of the back of the table is 15 cm.
2. For a score of 4, the box size from the edge of the score line is 5, namely 15 cm.
3. For a score of 3, the box size from the edge of the score line is 4, namely 15 cm.
4. For score 2, the box size from the edge of the score line 3 is 15 cm
5. For score 1, the box size is from the edge of the score line 2, namely to the front of the net side.

Implementation :

1. The testee stands on the right side of the back table.
2. When the whistle sounds, the feeder gives the testee 15 balls in stages.
3. The testee performs a forehand drive stroke to the side of the table (diagonal) that has been marked with a score.
4. When you have finished 15 forehand drive strokes, count the score you get.
5. The test is carried out only once (15 strokes)
6. When the ball does not go in/out/get caught in the net, it does not get a point/score.

Evaluation : Calculate the score obtained by the testee when he has completed 15 forehand drive strokes.

The data collection techniques in this study used questionnaires and measurement tests. The questionnaires were given to material experts and media experts to validate whether the drive test instrument in table tennis was content-appropriate or not. Meanwhile, tests were conducted to collect data to determine whether the drive test instrument in table tennis was valid and reliable. To obtain test reliability, the results of the first drive test were correlated with the results of the second drive test, and to determine the validity of this instrument, the results of the first smash test were correlated with the results of the criterion test. The criterion test referred to here is a test using a pre-existing test. The data analysis

technique in this study used the product-moment correlation formula (Effendi et al., 2018).

Results

1. Expert Validation

In the first validation with the material expert, the percentage obtained was 87% of the maximum score. It can be stated that according to this material expert, the drive instrument in table tennis was categorized as "Feasible" in content validation. In the second validation with the material expert, the percentage obtained was 86% of the maximum score. It can be stated that according to this material expert, the drive instrument in table tennis was categorized as "Feasible" in content validation.".

In the first validation by media experts, the percentage obtained was 85% of the maximum score. It can be stated that according to the media experts, the drive instrument in table tennis received the "Feasible" category based on content validation. In the first validation by media experts, the percentage obtained was 88% of the maximum score. It can be stated that according to the media experts, the drive instrument in table tennis received the "Feasible" category based on content validation.

2. Validity and Reliability of the Smash Instrument

Test validation in this study was conducted by correlating the first drive test with the criterion test. Based on the data obtained, the validity of this drive instrument was 0.84. Therefore, this table tennis drive instrument was declared valid based on the Kirkendall validity coefficient interval, which stated that 0.84 was included in the "High" category. Test reliability in this study was conducted by correlating the results of the first drive test and the results of the second drive test. Based on the data results above, the reliability of this test was 0.87. Therefore, this table tennis drive test instrument was reliable based on the Kirkendall coefficient interval of 0.87, which was included in the "High" category.

3. Forehand Drive Test Norms in Table Tennis

Tablel 1. Table Tennis Forehand Drive Test Norms

Score	Category
≥ 42	Excellent
37-41	Good
33-36	Fair
29-32	Poor
≤ 28	Very Poor

Discussion

Initially, the development of the drive instrument in table tennis was designed and produced as a measuring tool for the drive ability of table tennis athletes. The development process went through a research and development procedure. Through several planning, production, and evaluation procedures, this instrument was compiled by various parties who supported the development of the drive instrument in table tennis. This initial instrument received many suggestions from coaches, material experts, and media experts. After this instrument was validated by experts, a test-retest was conducted to determine the reliability of this test and for its validity, namely by correlating the results of the first test with the results of the criterion test.

The validation process by material experts and media experts produced data that can be used as the content validity of the drive instrument in table tennis. Meanwhile, its empirical validity is the validity obtained from the first test of the drive with the criterion test. The quality of the "Development of the Drive Instrument in Table Tennis" in terms of content validity is included in the "Very Feasible" category. Coaches and athletes are happy and enthusiastic about the existence of this drive instrument in table tennis and this instrument can be disseminated as a measuring tool in seeing drive ability in table tennis. The advantages of this product include requiring equipment that is easily obtained. There are weaknesses in this

product, including the area used in this instrument does not use technology (sensors) on the score line. From these weaknesses, it is hoped that attention and further development efforts will be paid to obtain better product results.

This instrument was developed by considering the characteristics of the forehand drive technique, which is an attacking stroke executed with a forward swing using the top of the racket. The forehand drive technique is fundamental to offensive table tennis play because it is key to mastering the rhythm of the game. Therefore, measuring this skill must assess speed, accuracy, and ball control, all three of which are key components in the final outcome of a stroke. Sport is all systematic activities to encourage, foster, and develop physical, spiritual, and mental potential (Ninglan et al., 2020). Sport is a physical activity that can make a person physically and mentally healthy, ultimately forming a quality human being (Suhermon et al., 2023). Table tennis is considered to be one of the most demanding sports games in terms of its structural complexity compared to other sports disciplines (Munivrana et al., 2015). Speed, reaction time, and technical skills were the basic features in table tennis to meet the nature of the Game, e.g. fast pace, quick response, and flexibility in any circumstances (Tuan & Dinh, 2022). As seen from watching elite table tennis players play, they are capable of very fast rallies (Inaba, 2017). One technique in table tennis is the crushing forehand stroke (Prabowo et al., 2021). The mechanical principles of motor performance are an important component that must be used in planning the training process to make it more effective and successful (Alwan, 2016).

The results of this study have significant implications for table tennis coaching. With this tool, coaches can quantitatively evaluate athletes' basic technical abilities, allowing for more targeted training program planning. Systematic evaluation also allows coaches to identify which aspects of the forehand drive technique need improvement, such as foot position, swing speed, or ball direction consistency. Although the results demonstrate the instrument's feasibility, this study still has several limitations. The sample size was limited to regional-level athletes, so the results cannot be broadly generalized. Furthermore, the testing was conducted under standard training conditions, not in actual match situations involving psychological pressure and game dynamics. For future research, it is recommended that this instrument be developed using sensor-based measurement technology or video analysis applications to ensure more objective and precise observation results.

Conclusion

The results of the study "Development of Forehand Drive Instruments in Table Tennis" are categorized as valid and reliable as a measuring tool for drive tests in table tennis. This can be seen from the results of the study which has a test validity of 0.84 and a test reliability of 0.87, that the drive instrument in table tennis is valid and reliable based on the coefficient from Kirkendall. While in content validity, the first material expert is 86% and the second material expert is 87%, this shows that in terms of content according to the material expert, this test instrument is "Appropriate". In the first media expert, 85% and the second media expert, 88%, this shows that in terms of content according to the media expert, this test instrument is "Appropriate".

References

Almanar, A. B., Ramadi, D., Pd, S., Kes, M., Agust, K., Pd, S., & Pd, M. (2018). the Correlation Between Wrist Flexibility With Forehand Accuration Chop Service in Table Tennis. *Physical Education and Recreation Department Faculty of Teachers Training and Education University of Riau*, *3*, 1–10.

Alwan, M. H. (2016). Biomechanical Statistical Model for the Accuracy of the Forehand Smash Stroke in Higher Levels of Table Tennis. *Journal of Applied Sports Science*, *6*(1), 20–26. https://doi.org/10.21608/jass.2016.84538

Andriani, S. A., & Widodo, D. A. (2019). Analisis Kebutuhan Kondisi Fisik Pemain Tenis Meja. *Jurnal Kesehatan Olahraga*, *3*(7), 535–542. https://ejournal.unesa.ac.id/index.php/jurnal-kesehatan-olahraga/article/view/26709%0Ahttps://ejournal.unesa.ac.id/index.php/jurnal-kesehatan-olahraga/article/view/26709/31661

Anggara, A. (2021). Pengaruh latihan Forehand Smash Multiball Terhadap Prestasi Tenis Meja. *Jurnal Fakultas Keguruan & Ilmu Pendidikan*, *2*(2), 62–73.

Annisa, R., Nofriansyah, D., & Kusnasari, S. (2022). Sistem Pendukung Keputusan Dalam Assesment Peningkatan Kemampuan Pemain Tenis Meja Menggunakan Metode ARAS. *Jurnal Sistem Informasi Triguna Dharma (JURSI TGD)*, *1*(4), 304. https://doi.org/10.53513/jursi.v1i4.5285

Apriyanto, R., & S, A. (2022). Analisis Keterampilan Teknik Bermain Tenis Meja dalam Mewujudkan Konsep Kurikulum Merdeka Belajar. *Physical Activity Journal*, *4*(1), 87.

https://doi.org/10.20884/1.paju.2022.4.1.6738

Arbaoui, B., Htut, A. Y., Hein, S. K. T. L., Aye, K. H., & Pyae, A. P. (2025). The Impact of Artificial Intelligence Technology on Table Tennis. *Proceedings of RSU International Research Conference (RSUCON-2025)*, *11*(1), 318–329. https://pubmed.ncbi.nlm.nih.gov/28459981/%0Ahttps://doi.org/10.1016/j.resenv.2025.100208%0Ahttp://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng-8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps:

Budiman, S. A. P. &. (2017). Hubungan Koordinasi Mata Tangan, Kekuatan Lengan dan Motivasi Berprestasi dengan Ketepatan Forehand dalam Tenis Meja. *Jurnal Penelitian Dan Pengkajian Ilmu Pendidikan: E-Saintika*, *1*(1), 11–17.

Effendi, E., Mursilah, M., & Mujiono, M. (2018). Korelasi Tingkat Perhatian Orang Tua dan Kemandirian Belajar dengan Prestasi Belajar Siswa. *Titian Ilmu: Jurnal Ilmiah Multi Sciences*, *10*(1), 17–23. https://doi.org/10.30599/jti.v10i1.131

Ewan, I. (2019). Pengaruh Kelincahan , Kecepatan Gerak Dan Kelentukan Terhadap Ketepatan Pukulan Forehand Drive Pada Permainan Tenis Meja Siswa SMA Negeri 3 Maros. *Jurnal Pendidikan Olahraga*, *9*(2), 19–29. http://www.ejournal.tsb.ac.id/index.php/jpo/article/view/324

Inaba, Y. (2017). Effec ct of Ch anging Table T Tennis Ball B Mat terial fro om Cell luloid to Pl lastic on n the Po st-Colli sion Ba ll Trajec ctory. *Journal Of Humans Kinetics*, *55*, 29–38.

Julianena, H., & Abdul, H. (2018). Analisis Ketepatan Servis Backspin Tenis Meja pada Atlet Junior Putra di PTM Sahabat Surabaya. *Jurnal Prestasi Olahraga*, *1*(1), 1–11.

Kumar, S. (2018). Research on table tennis player's cardio-respiratory endurance. *International Journal of Table Tennis Sciences*, *5*(6), 97–99.

Le Mansec, Y., Dorel, S., Hug, F., & Jubeau, M. (2018). Lower limb muscle activity during table tennis strokes. *Sports Biomechanics*, *17*(4), 442–452. https://doi.org/10.1080/14763141.2017.1354064

Munivrana, G., Petrinović, L. Z., & Kondrič, M. (2015). Structural Analysis of Technical-Tactical Elements in Table Tennis and their Role in Different Playing Zones. *Journal of Human Kinetics*, *47*(1), 197–214. https://doi.org/10.1515/hukin-2015-0076

Ninglan, T., Soegiyanto, & Sulaiman. (2020). Effect of Arm Muscles and Long Arm Power Exercises on the Results of Accuracy in Forehand Smash Blows in Table Tennis Games at Silaberanti Club , Palembang. *Journal of Physical Education and Sports*, *9*(1), 88–94. https://journal.unnes.ac.id/sju/index.php/jpes/article/view/32158/13814

Paksi, Ti. B. (2016). *HUBUNGAN ANTARA KEMAMPUAN PUKULAN FOREHAND DAN KECEPATAN REAKSI TERHADAP KEMAMPUAN BERMAIN TENIS MEJA DI SMK MUHAMMADIYAH 1 PRAMBANAN* (Vol. 15, Issue 1). https://core.ac.uk/download/pdf/196255896.pdf

Prabowo, F. S., Rustiadi, T., & Priyono, B. (2021). Smash, Forehand, Table Tennis The Effect of Arm Muscle Power Training and Hand Eye Coordination on the Accuracy of Table Tennis Smash Forehand on Athletes …. *Journal of Physical …*, *10*(4), 455–461. https://journal.unnes.ac.id/sju/index.php/jpes/article/view/55630%0Ahttps://journal.unnes.ac.id/sju/index.php/jpes/article/download/55630/21450

Purnama, S. (2016). Metode Penelitian Dan Pengembangan (Pengenalan Untuk Mengembangkan Produk Pembelajaran Bahasa Arab). *LITERASI (Jurnal Ilmu Pendidikan)*, *4*(1), 19. https://doi.org/10.21927/literasi.2013.4(1).19-32

Sasmita, B. S. K. (2018). MENINGKATKAN KETERAMPILAN SMASH TENIS MEJA DENGAN PENDEKATAN TAKTIS. *Jurnal Speed*, *2*(November), 44–52. https://123dok.com/article/pendekatan-taktis-kajian-teori-dan-penelitian-yang-relevan.zk0nmrpy

Suhermon, Arisman, Hendryanto, F., Siska, Tofikin, & Indah, D. (2023). Development of the Chop Instrument in Table Tennis. *Physical Activity Journal*, *5*(October), 37–46. https://doi.org/https://doi.org/10.20884/1.paju.2023.5.1.9697

Suhermon, Arisman, Tofikin, Hendryanto, F., Indah, D., & Haryanto, J. (2024). Development of Smash Accuracy Instrument in Table Tennis. *Jurnal Patriot*, *6*(4), 134–139. https://doi.org/DOI: https://doi.org/10.24036/patriot.v6i4.1006

Suryapranata, J., Arisandi, D., & Lauro, M. D. (2020). Pembuatan Marketplace Dengan Fitur Sistem Penunjang Keputusan Untuk Menentukan Kayu Tenis Meja Yang Sesuai Dengan Gaya Permainan Menggunakan Metode Smart Berbasis Web. *Jurnal Ilmu Komputer Dan Sistem Informasi*, *8*(1), 97. https://doi.org/10.24912/jiksi.v8i1.11476

Tuan, T. M., & Dinh, N. M. (2022). The Work-Outs To Optimize the Efficiency Footwork – a Case Study for Talented Female Table Tennis Athletes At the Age of 14-15 in Vinh Long Province, Vietnam.

European Journal of Physical Education and Sport Science, *8*(1), 1–10. https://doi.org/10.46827/ejpe.v8i1.4163

Yulianto, F. R. P. (2015). Study Analisis Ketermpilan Teknik Bermain Cabang Olahraga Permainan Tenis Meja. *Jurnal Kesehatan Olahraga*, *3*, 201–2016.

Zhang, S., Chen, G., Wu, Q., & Li, X. (2023). The Interplay Between Table Tennis Skill Development and Sports Performance: A Comprehensive Review. *Pacific International Journal*, *6*(3), 150–156. https://doi.org/10.55014/pij.v6i3.433