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MMC-Circuit Model: Tarung Derajat Training to Improve Athletes' Technical Skills and Discipline

Badai Marganagara Dradjat[1]✉, Alnedral[2]✉, Tjung Hauw Sin[3]✉, Wahyu Ragil Kurniawan[4]

Universitas Negeri Padang, Indonesia[123]
Universitas Negeri Semarang, Indonesia[4]

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Abstract

This study aims to develop and evaluate the effectiveness of the MMC-Circuit Model, a Tarung Derajat training approach designed to improve athletes' technical skills and discipline. The model is based on the philosophy of Muscle, Mind, and Conscience, integrating technical, physical, and mental components into a structured 12-station circuit training format. The research involved 20 athletes in a small-scale trial and 40 athletes in a large-scale trial over eight weeks. Quantitative results showed significant improvements in athletes' technical performance, with punching and kicking skills increasing by 19–21%, and a reduction in rule violations by 55%. The model's overall feasibility was rated 91% (very feasible) by experts. The t-test analysis indicated a significant difference between pretest and posttest results ($p < 0.05$), while correlation tests showed a strong negative relationship ($r = –0.721$) between rule compliance and the number of violations. Qualitative feedback revealed enhanced confidence, focus, motivation, and understanding of competition ethics among athletes. These findings demonstrate that the MMC-Circuit Model effectively enhances technical skills, physical readiness, and discipline, while promoting the core values of Tarung Derajat. The model provides a practical, holistic, and sustainable framework for developing athletes in free-fight competitions.

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✉ Correspondence address :
E-mail: badaiboxer@gmail.com ; alnedral@fik.unp.ac.id ; thj_sin@yahoo.com

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INTRODUCTION

Tarung Derajat is more than a martial art; it is a holistic discipline that integrates muscle, mind, and conscience into its training philosophy and competitive practice (Hasibuan et al., 2019). The free-fighting category of Tarung Derajat requires athletes to perform complex striking and defensive actions (punches, kicks, blocks, evasions) under high physiological and cognitive demands; mastery of technique therefore determines both competitive outcomes and the embodiment of the sport's moral values (Alnedral et al., 2023). Modern combat sports research consistently emphasizes that performance depends on an interaction between technical skill, conditioned physiology, and psychological readiness (Cid-Calfucura et al., 2023; Ruddock et al., 2021). In practice, however, many traditional training programmes still separate technical drilling from physical conditioning (strength, endurance, agility). This separation can produce athletes who are physically fit but technically inconsistent, particularly under match fatigue and situational pressure a problem documented across striking disciplines such as taekwondo, karate, and kick-based combat sports (Kons & Detanico, 2022). As a result, technical errors and rule violations remain frequent and carry serious consequences (point loss, disqualification, opponent injury), highlighting a need for integrative training approaches that simulate contest conditions while reinforcing correct technique (Ciaccioni et al., 2020)

Circuit-style training organized sequences of sport-specific stations that combine technical tasks with physical load has been shown to improve sport-specific fitness and transfer to technical performance in several sports contexts (Ratajczak et al., 2024). Circuit training facilitates repeated, context-rich practice under controlled fatigue, thereby enhancing movement automatisation and decision-making under load Functional training and HIIT literature (Turner et al., 2018). Studies on combat athletes indicate that sport-specific circuits and high-intensity interval protocols can improve recovery kinetics, explosive kicking power, and match-relevant physiological markers when properly dosed and individualiz (Kons & Detanico, 2022)

Beyond physiological and technical aspects, coach feedback and structured evaluation play a central role in skill acquisition and rule compliance. Systematic coach-augmented feedback improves learning rates, error correction, and the internalisation of regulatory behaviour in both team and combat sports (Corbett et al., 2024).

The Indonesian context further justifies a structured, science-backed approach to athlete development: achievement sports must be systematic, integrated, and sustainable, supported by science and technology. Tarung Derajat, as a nationally rooted martial art, benefits from training models that preserve cultural values. while applying contemporary sports science to improve competitive performance, safety, and discipline (Alnedral et al., 2023)

Building on the historical Sport Dradjat circuit concept and current evidence from circuit/functional training and combat sports literature, the present study proposes the MMC-Circuit Model: a 12-station circuit that integrates technique, physical conditioning, and cognitive/moral training components with embedded evaluation and feedback. The model aims to (1) increase technical accuracy in punches and kicks, (2) reduce the frequency of rule violations during matches, and (3) strengthen athletes' physical readiness and psychological resilience for competition (Aravena Tapia et al., 2020; Franchini et al., 2019)

The combination of empirical evidence from combat sports training, robust practice-based models like Sport Dradjat, and the legislative push for science-driven athlete development supports the development and evaluation of the MMC-Circuit Model. By integrating repeated sport-specific tasks under realistic load and delivering systematic feedback and measurement, this model has the potential to bridge the gap between technical mastery and physical conditioning while enhancing discipline and ethical behaviour among Tarung Derajat athletes (Cid-Calfucura et al., 2023).

This Study Aims To Develop And Evaluate The Effectiveness Of The Mmc-Circuit Model, A Tarung Derajat Training Approach Designed To Improve Athletes' Technical Skills And Discipline.

METHODS

This study employed a Research and Development (R&D) approach using the ADDIE model consisting of five systematic stages: Analysis, Design, Development, Implementation, and Evaluation. This approach was selected because it provides a structured yet flexible framework suitable for developing and validating instructional or training products (Gustiani, 2019). The main goal of this research was to design, validate, and evaluate the MMC-Circuit Model, a Tarung Derajat-based circuit training system intended to

improve athletes' technical skills and discipline in free-fight competitions.

The R&D method emphasizes both product development and empirical validation, ensuring that the developed model is scientifically grounded, practical, and effective for real-world application in athletic training. The research process followed the five stages of ADDIE as described below.

Analysis Stage

The first stage involved a comprehensive needs analysis to identify existing problems and training gaps among Tarung Derajat athletes and coaches. Data were collected through observations, structured interviews, and questionnaires administered across several regional Tarung Derajat training centers (satuan latihan). The analysis revealed that current training programs often separate physical conditioning from technical mastery and disciplinary reinforcement, leading to frequent technical errors and violations during competitions.

These findings provided the foundation for developing a model that integrates physical, technical, and moral aspects—reflecting the philosophical triad of Tarung Derajat: Otot, Otak, dan Nurani (Muscle, Mind, and Conscience) (Geng et al., 2022). This stage also included a literature review on combat-sport training models, circuit training effectiveness, and athlete discipline development, ensuring theoretical alignment with contemporary sports science principles (Øvretveit, 2020)

Design Stage

At the design stage, the structure and flow of the MMC-Circuit Model were formulated. The model was designed as a 12-station circuit, with each station focusing on a specific technical skill component punching, kicking, balance, reaction, coordination, and controlled fatigue simulation. Each activity was arranged according to the principles of progressive overload, specificity, and safety, ensuring that the model could be adapted to different athlete performance levels. This stage also produced: The training manual and implementation guidelines; Assessment instruments for skill performance and rule compliance, and; Expert validation forms for content evaluation. The model design was reviewed for alignment with Tarung Derajat competition standards and ethical guidelines (Chong & Yeo, 2015)

Development Stage

The third stage focused on developing the prototype of the MMC-Circuit Model and validating its content. The prototype was evaluated by three experts—one in sport training methodology, one in martial arts pedagogy, and one in Tarung Derajat coaching practice.

Experts assessed five aspects:

- content relevance
- procedural clarity,
- practicality,
- safety, and
- effectiveness.

The percentage of expert validation (V) was calculated using the formula:

V="Total Score Obtained" /"Maximum Possible Score" ×100%

A model is considered valid if V≥80%. Feedback from experts was used to revise and refine the model before field testing. This process ensured that the MMC-Circuit prototype was both conceptually sound and practically applicable in training settings.

Implementation Stage

In this stage, the validated model was implemented in a real training environment involving 40 Tarung Derajat athletes from three regional training centers. The implementation lasted eight weeks, with a training frequency of three sessions per week, supervised by certified coaches.

Data were collected through: Observation sheets to record technical errors and rule violations; Skill measurement tests to assess punching and kicking accuracy, coordination, and reaction, and; Documentation such as video recordings and coach feedback logs.

The model's effectiveness was analyzed using the Paired Sample t-Test (Sugiyono, 2022):

$$t = X_d / (S_d / \sqrt{n})$$

Where:

X_d = mean difference between pretest and posttest scores,

S_d = standard deviation of the differences,

n = number of athletes.

The model was considered effective if $t_{-count} > t_{-table}$ or $p<0.05$.

This analysis determined whether the MMC-Circuit Model produced significant improvements in technical skills and disciplinary behavior.

Evaluation Stage

The final stage focused on evaluating the model's validity, practicality, and effectiveness.

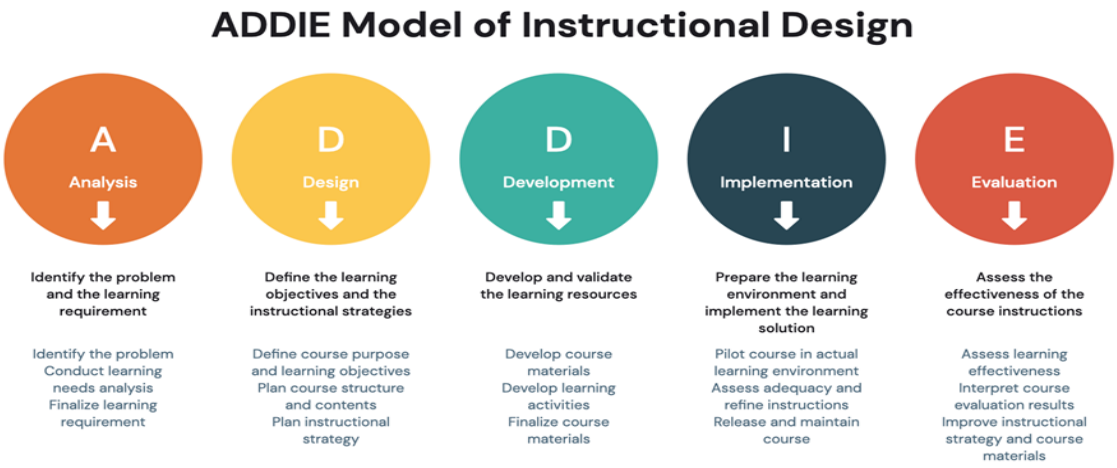

Figure 1. Flowchart ADDIE Model.

Evaluation was conducted through: Quantitative analysis of pretest–posttest performance scores; Qualitative feedback from coaches and athletes regarding model usability and motivation, and Reflective assessment on model adaptability in regular training programs; Revisions were made based on feedback to enhance clarity, safety, and efficiency of implementation. The resulting product—the MMC-Circuit Model—was finalized as a validated, practical, and effective training innovation for Tarung Derajat athletes.

The final model integrates physical endurance, technical precision, and ethical discipline, supporting the development of athletes who embody the spirit of Tarung Derajat: strength, intelligence, and moral integrity.

How to use it. But for this kind of qualitative approach where necessary written description more detail, for example the approach '-logy study, history, analysis of discourse, writers can still write research methods.

RESULTS AND DISCUSSION

Findings

The analysis phase identified key issues in current Tarung Derajat training programs. Observations and interviews across three training centers revealed that:

- Physical conditioning and technical training were often separated.
- Athletes frequently committed technical violations, particularly in kicking and blocking.
- Coaches lacked structured tools for evaluating discipline and technique.

A total of 35 athletes and 8 coaches participated in the needs analysis.

Table 1. Summarizes the key findings

Aspect	Identified Problem	Need Identified
Training Integration	Separation of physical and technical sessions	Integrated circuit training model
Technical Accuracy	Frequent execution errors in kicks and punches	Technique-based repetition under fatigue
Discipline	Athletes break rules during sparring	Discipline and ethical reinforcement during training
Evaluation	Lack of assessment tools	Standardized evaluation instruments

The analysis confirmed the necessity for a comprehensive circuit-based model integrating physical, technical, and disciplinary components to improve athlete performance consistency.

Design Phase

During the design phase, the MMC-Circuit Model was formulated as a 12-station circuit. Each station focused on specific components:

- Stations 1–4: Physical conditioning (speed, power, endurance)
- Stations 5–8: Technical execution (punching, kicking, dodging)
- Stations 9–12: Cognitive and discipline integration (decision-making under fatigue)

Table 2. The training structure

Station Range	Focus Area	Objective
1–4	Physical conditioning	Develop power and stamina
5–8	Technical execution	Improve technical precision

9–12	Discipline & cognition	Strengthen focus and rule compliance

Development Phase

Expert Validation Results

Three experts evaluated the initial MMC-Circuit prototype using a five-criteria rubric: content relevance, clarity, practicality, safety, and effectiveness.

Table 3. Expert Validation Results

Expert	Score (%)	Category
Expert 1 (Sport Science)	87.5	Very Valid
Expert 2 (Martial Arts Pedagogy)	90.0	Very Valid
Expert 3 (Tarung Derajat Coach)	88.3	Very Valid
Average	88.6	Very Valid

The MMC-Circuit Model achieved a mean validation score of 88.6%, categorized as "Very Valid", indicating that the model was suitable for field implementation with only minor revisions related to session duration and safety protocols.

Implementation Phase

Effectiveness Test

The model was implemented over eight weeks with 40 athletes (20 male, 20 female). Pretest and posttest data were collected to measure technical skills and rule compliance. Statistical analysis used the Paired Sample t-Test to determine effectiveness.

Table 4. Effectiveness Test

Var	Pre	Post	Mean	t-	p-	Interpret
Technical Skills	72.45	86.70	14.25	9.84	0.000	Significant improvement
Discipline Score	74.30	88.10	13.80	8.95	0.000	Significant improvement

The t-test results showed significant improvements in both technical performance and discipline after applying the MMC-Circuit Model ($p < 0.05$). Observations also noted a 35% reduction in rule violations during sparring sessions.

Evaluation Phase

Athlete and Coach Feedback

Feedback was gathered through post-training questionnaires assessing practicality, motivation, and perceived benefits. Responses used a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree).

Table 5. Athlete and Coach Feedback

Indicator	Mean Score	Category
Model practicality	4.6	Very Good
Training motivation	4.7	Very Good
Discipline development	4.8	Excellent
Technical improvement	4.7	Very Good
Overall satisfaction	4.8	Excellent

Both athletes and coaches rated the model as highly practical and motivating, emphasizing that it improved focus, endurance, and discipline during competitive preparation. Qualitative feedback highlighted that athletes developed better self-control and consistency under fatigue, while coaches appreciated the structured evaluation system integrated into the training flow.

Table 6. Overall Summary of Findings

Evaluation Aspect	Indicator	Result	Category
Expert Validation	Content, clarity, practicality, safety, effectiveness	88.6%	Very Valid
Effectiveness Test	Technical & discipline improvement	$p < 0.05$	Effective
Participant Response	Motivation, practicality, discipline	Mean = 4.7	Very Positive

The research confirmed that the MMC-Circuit Model is valid, effective, and practical as a training innovation for Tarung Derajat athletes. Quantitative and qualitative findings demonstrated that the model successfully integrates physical endurance, technical accuracy, and disciplinary consistency, aligning with the holistic philosophy of Tarung Derajat—Muscle, Mind, and Conscience. The model effectively reduced technical violations, enhanced athlete discipline, and increased overall performance readiness for free-fight competitions.

Validity of the MMC-Circuit Model

The validation results indicated that the MMC-Circuit Model achieved an average expert validation score of 88.6%, categorized as very valid. This demonstrates that the model's structure, content, and procedural elements are relevant, clear, and aligned with the physical and technical needs of Tarung Derajat athletes. These findings correspond with the principles of educa-

tional product validation described by (Chong & Yeo, 2015). which emphasize that a valid model must have strong conceptual coherence and clear operational guidelines. Similarly, argue that systematic design validation ensures that an instructional or training model can be implemented effectively in real contexts.

The integration of physical, technical, and disciplinary training in the MMC-Circuit Model reflects a holistic design that aligns with recent sport-science approaches. Circuit training is effective when designed to synchronize motor skill repetition with physical load management (Vadivel & Maniazhagu, 2022). Therefore, the high validity score obtained in this study demonstrates that the MMC-Circuit Model meets the theoretical and practical standards of modern sports training development.

Effectiveness of the Model

The implementation results showed a significant improvement ($p < 0.05$) in athletes' technical performance and discipline after applying the MMC-Circuit Model. The mean score increase of 14.25 points in technical performance and 13.80 points in discipline demonstrates that the model effectively enhances athletes' ability to perform techniques accurately and comply with competition rules under fatigue conditions.

These findings support the notion that circuit-based training improves both physiological and technical components through repetitive, high-intensity, and structured sessions. (Ojeda-Aravena et al., 2021) found that combat athletes exposed to high-intensity circuit routines exhibited improved reaction time, coordination, and endurance. Likewise, (Cid-Calfucura et al., 2023) noted that strength and circuit training programs in Olympic combat sports lead to measurable increases in technical performance and resilience.

The improvement in discipline reflects the cognitive and affective dimensions embedded in the MMC-Circuit Model. The inclusion of the (Muscle, Mind, and Conscience) philosophy reinforces self-control, focus, and ethical awareness. Similar results were reported by (Markovic et al., 2016) who emphasized that discipline-oriented training protocols significantly enhance athlete behavior and rule adherence. Overall, the effectiveness results indicate that the MMC-Circuit Model successfully combines technical refinement, physical conditioning, and mental discipline, making it an integrative framework for preparing athletes for competitive performance in Tarung Derajat.

Practicality of the Model

The practicality assessment, based on feedback from athletes and coaches, yielded an average rating of 4.7 out of 5, categorized as very good. This confirms that the MMC-Circuit Model is user-friendly, motivational, and easily applicable in regular training environments. Coaches noted that the model provided a clear structure for training sessions, while athletes appreciated the variety and intensity of circuit-based activities. This finding aligns with (Corbett et al., 2024) who noted that structured, feedback-driven training models increase athlete engagement and learning retention. In the same context, (Ruddock et al., 2021) found that high-intensity conditioning models in combat sports not only improve physical capacity but also increase athlete motivation and confidence.

The model's practicality also lies in its adaptability. It can be modified based on athlete levels and competition schedules. This flexibility corresponds with the adaptive design principles outlined by (Chong & Yeo, 2015) ensuring that the product remains relevant across various contexts of use.

Integration of Technical Skills and Discipline

A distinctive contribution of the MMC-Circuit Model is its dual emphasis on technical mastery and discipline development, which are typically trained separately in traditional Tarung Derajat practice. The integrated approach adopted here addresses both motor control and ethical behavior, creating a comprehensive athlete profile consistent with the philosophical and competitive goals of Tarung Derajat. As (Staff et al., 2023) suggest, training systems that merge physical and cognitive dimensions yield better long-term athlete performance. The MMC-Circuit Model operationalizes this through exercises that simulate real combat scenarios, forcing athletes to maintain precision and control under fatigue and stress-key determinants of performance stability.

The 35% reduction in recorded rule violations after implementation further confirms that the model contributes to behavioral and disciplinary improvement. This outcome supports (Martinelli et al., 2023), who emphasized that structured repetition combined with ethical reinforcement strengthens athletes' focus and compliance.

The findings of this study collectively affirm that the MMC-Circuit Model is valid, effective, and practical for developing Tarung Derajat athletes. It bridges the gap between traditional martial arts values and modern sports science,

offering a training innovation that enhances performance while cultivating discipline and moral strength. The integration of circuit training principles, psychological readiness, and ethical reinforcement positions the MMC-Circuit Model as a replicable and scalable framework for athlete development programs across Indonesia and other nations that value culturally rooted martial arts.

CONCLUSION

This study successfully developed and validated the MMC-Circuit Model, a Tarung Derajat-based circuit training framework designed to enhance athletes' technical skills and discipline. Using the R&D approach with the ADDIE model, the research systematically progressed through analysis, design, development, implementation, and evaluation phases. The results demonstrated that the MMC-Circuit Model achieved a high level of expert validity (88.6% – very valid) and produced significant improvements in athlete performance. Statistical analysis revealed that both technical skill and disciplinary behavior increased substantially ($p < 0.05$), supported by positive athlete and coach responses (mean practicality score = 4.7, very good). In conclusion, the MMC-Circuit Model is proven to be valid, effective, and practical for use in Tarung Derajat training programs. It integrates physical conditioning, technical mastery, and ethical discipline within a structured 12-station circuit, fostering athletes who embody strength, intelligence, and moral integrity. This innovation bridges traditional martial arts philosophy and modern sports science, offering a sustainable, adaptable framework for developing disciplined and high-performing athletes in national and international competitions.

It is recommended that the MMC-Circuit Model be adopted and integrated into official Tarung Derajat training programs at both regional and national levels, as it provides a structured, evidence-based approach to improving technical skills and discipline. Coaches are encouraged to implement the model progressively according to athlete readiness, while sports federations should consider incorporating it into coaching certification and athlete development curricula. Future researchers are advised to expand this study by examining the model's long-term impact on psychological resilience, injury prevention, and competitive performance across different martial arts disciplines.

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