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INTRODUCTION

Global and Theoretical Context

Futsal is a dynamic invasion sport in which performance emerges from interactions between attacking organization, defensive coordination, and transitions following changes in possession. Its five-a-side format, restricted playing area, and frequent possession changes require coordinated positioning, rapid decision-making, and collective movement under temporal and spatial constraints (Rico-González et al., 2020; Travassos et al., 2016). The international growth of women's futsal highlights the need for research reflecting the specific demands of elite women's competition, yet the available evidence remains comparatively limited and fragmented across competitive levels and analytical approaches (Barreira et al., 2024, 2025; Santos et al., 2024). The FIFA Women's Futsal World Cup 2025 therefore offers an important opportunity to establish an initial descriptive reference for understanding tactical behaviors in elite women's futsal.

A phase-of-play framework provides a conceptual basis for examining in-possession, out-of-possession, and transition

Phase-of-Play Performance Profiles in Elite Women's Futsal: Evidence from the FIFA Women's Futsal World Cup 2025

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ABSTRACT

Background & objective: The purpose of this study was to analyze performance characteristics associated with in-possession, out-of-possession, and transition phases during the FIFA Women's Futsal World Cup 2025. As the inaugural edition of this global tournament, the study aimed to establish baseline phase-of-play performance profiles at the highest level of women's futsal competition.

Materials & Methods: A descriptive quantitative research design using a notational performance analysis approach was employed. The sample consisted of 64 team performances derived from all 32 matches of the FIFA Women's Futsal World Cup 2025. Performance data were obtained from official match summary reports released by the tournament organizers. Performance indicators were categorized according to phases of play, including in-possession, out-of-possession, and transition actions. Descriptive statistics, including total counts, mean values with standard deviations, and relative frequencies, were calculated using SPSS statistical software.

Results: Out-of-possession actions accounted for the largest proportion of total team actions (50.8%), followed by in-possession actions (41.0%), while transition actions represented a smaller share (8.2%). In-possession performance was dominated by set plays, which accounted for 55.3% of actions within the phase, indicating a strong reliance on structured offensive situations. Out-of-possession behaviors were primarily characterized by mid-block and low-block defensive organization, reflecting an emphasis on compact defensive structures. Transition phases were mainly composed of recovery and defensive transition actions, highlighting the importance of reorganization following possession changes.

Conclusions: Performance at the FIFA Women's Futsal World Cup 2025 was characterized by a high volume of out-of-possession activity, structured in-possession behaviors dominated by set plays, and transition phases focused primarily on recovery and defensive reorganization. These findings provide the first phase-of-play performance benchmarks at the world championship level in women's futsal and offer valuable reference values for coaches, performance analysts, and researchers preparing for future international competitions.

Keywords

women's futsal; performance analysis; FIFA Women's Futsal World Cup.

behaviors as distinct but interdependent components of team performance. Attacking actions are shaped by defensive pressure, defensive organization influences opponents' opportunities, and transitions may create temporary imbalances that affect subsequent play. Research on collective tactical behavior and adaptive attacking patterns emphasizes the importance of player interactions and changing environmental constraints (Dominguez et al., 2019; Armatas, V., et al., 2025; Alves et al., 2021), while phase-based approaches in football seek to integrate possession-related information into broader performance analysis. Accordingly, phase-of-play analysis can establish descriptive benchmarks for future research; however, action frequency alone cannot demonstrate tactical effectiveness or strategic superiority (Deb et al., 2024; Plakias et al., 2024; Tani et al., 2014). These profiles should instead provide a foundation for investigating contextual variation and relationships between tactical behaviors and match outcomes.

Critical Review of Existing Evidence

Research on futsal performance has examined attacking profiles, technical-tactical indicators, defensive behaviors, and collective adaptations to opponents. Studies of elite futsal teams have highlighted the importance of coordinated attacking patterns, counterattacks, and adaptation to defensive formations, indicating that attacking behavior should be interpreted in relation to the tactical environment rather than as a collection of isolated actions (Domínguez et al., 2019; Santos et al., 2019; Travassos et al., 2016). Research using positional data has also contributed to understanding collective tactical behavior, although the extent to which these findings can be translated into operational benchmarks for women's international futsal remains uncertain (Rico-González et al., 2020).

Evidence concerning defensive organization similarly emphasizes the importance of collective positioning, compactness, and coordinated pressure. Studies in football have examined defensive behavior and pressing through tracking data, behavioral sequences, and tactical analyses, demonstrating the value of considering spatial organization and interactions between players (Fernandes et al., 2021; Forcher et al., 2022; Pizarro et al., 2020). Research on transitions has further emphasized the adaptive nature of attacking and defensive behaviors following changes in possession (Casal et al., 2016, 2020; Maneiro et al., 2019). These studies provide useful conceptual and methodological foundations, but their findings require cautious interpretation when applied to futsal because of differences in playing area, team size, and the temporal structure of competition.

Despite these advances, the existing evidence presents three important limitations. First, the literature covers different populations and competitive contexts, including elite futsal leagues, football competitions, and studies of tactical behavior using positional data. Differences in sport, competition level, operational definitions, and analytical methods limit direct comparisons between reported performance indicators. Second, much of the relevant evidence focuses on particular tactical dimensions, such as attacking profiles, defensive organization, or transitions, rather than describing the relative distribution of all three phases within the same competition. Although integrated analytical frameworks have been proposed, their application to a complete women's futsal world championship remains insufficiently established in the literature considered here (Deb et al., 2024; Barreira et al., 2024).

Third, evidence from women's futsal has not developed at the same pace as the sport's international visibility. Recent reviews identify continuing limitations in the breadth and organization of research on women's futsal and its physiological and competitive characteristics (Barreira et al., 2024, 2025). Consequently, the transferability of findings from domestic leagues, other sports, or predominantly male samples to a world championship involving elite women's teams remains uncertain. In addition, frequency-based analyses may describe the occurrence of tactical behaviors without explaining their effectiveness, temporal sequencing, or sensitivity to match context. These limitations do not diminish the value of descriptive analysis; rather, they establish the need for clearly defined variables, transparent data procedures, and cautious interpretation when developing initial performance

benchmarks.

Research Gap, Novelty, and International Contribution

Although previous studies have advanced understanding of attacking profiles, defensive organization, collective tactical behavior, and transitions in futsal and football, it remains unclear how performance actions are distributed across in-possession, out-of-possession, and transition phases during the inaugural FIFA Women's Futsal World Cup. In particular, evidence remains limited regarding the relative contribution of these phases and the composition of their constituent actions across all team performances in a world-level women's futsal competition.

The present study addresses this gap by examining all 32 matches of the FIFA Women's Futsal World Cup 2025, representing 64 team performances. Using official tournament match-summary data, it classifies performance indicators into three phases of play and describes their frequencies, distributions, and variation across team performances. Its principal novelty lies in the competition-specific population and the integrated descriptive examination of the three phases within a single international tournament, rather than in the introduction of a new theoretical model or causal analytical method.

The international contribution is therefore foundational. By documenting phase-specific performance profiles at the highest level of women's futsal competition, the study provides an initial reference against which future research may compare subsequent tournaments, examine contextual differences, and investigate relationships between tactical behaviors and competitive outcomes. The findings may also help coaches and performance analysts identify behaviors that warrant further investigation in training and match preparation. Nevertheless, because the study is descriptive and limited to one tournament, the resulting profiles should not be interpreted as universal standards, evidence of optimal tactics, or proof that particular behaviors cause successful performance.

Objectives and Hypotheses

The primary objective of this study was to describe the distribution of in-possession, out-of-possession, and transition performance indicators across the 64 team performances recorded during the FIFA Women's Futsal World Cup 2025. The secondary objectives were to quantify the relative frequencies of the three phases of play, describe the frequency and variability of individual performance indicators within each phase, and establish preliminary descriptive benchmarks to support future contextual and comparative research in elite women's futsal. In accordance with the descriptive observational design, the study was guided by three directional expectations: (H₁) out-of-possession actions would account for a larger proportion of total recorded actions than in-possession and transition actions; (H₂) set plays would represent the largest proportion of recorded actions within the in-possession phase; and (H₃) mid-block and low-block actions would account for larger proportions of recorded actions within the out-of-possession phase than the other defensive indicators. These expectations concerned the distribution of observed actions rather than tactical effectiveness and were assessed descriptively, without implying statistical significance, causal relationships, or superiority of any particular strategy.

MATERIALS METHODS

Setting and Participants

This study examined team performance across all 32 matches of the FIFA Women's Futsal World Cup 2025, an international

tournament involving elite women's futsal teams. Each match contributed two observational units, corresponding to the competing teams, resulting in 64 team-performance observations.

The study used publicly available secondary match data and did not recruit individual athletes. It employed a retrospective observational design, with no intervention, randomization, allocation concealment, or blinding. All matches within the defined tournament were included, constituting a census of tournament matches rather than a sample selected from a larger population. Eligibility was based on participation in an official tournament match and the availability of relevant team-level performance records. The available documentation does not specify how incomplete or unavailable records were handled, whether a protocol or analysis plan was prospectively registered, or whether protocol deviations occurred; these details should be clarified from the original research records before submission.

Study Design and Reporting Guideline

This study employed a descriptive quantitative observational design using notational performance data from official match-summary reports covering all 32 matches of the FIFA Women's Futsal World Cup 2025, yielding 64 team-performance observations across in-possession, out-of-possession, and transition phases. The study relied exclusively on publicly available secondary data and involved no direct recruitment, intervention, or contact with players, coaches, or officials; therefore, individual recruitment, participant consent, baseline assessments, and withdrawal procedures were not applicable. Reporting was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement, with particular attention to study design, setting, eligibility criteria, variable definitions, data sources, statistical methods, limitations, and generalizability. The appropriate STROBE checklist should be used to evaluate reporting completeness according to the final design classification. STROBE is a reporting guideline rather than a methodological quality assessment tool, and its use does not by itself establish that all reporting recommendations have been satisfied.

Sample Size and Rigor Justification

No a priori statistical power calculation was performed because the study aimed to describe all 32 matches of the FIFA Women's Futsal World Cup 2025, yielding 64 team-performance observations, rather than test a prespecified intervention effect or between-group difference. The number of observations was determined by the scope of the tournament and the availability of eligible match records, rather than by an assumed effect size, significance threshold, or statistical power target. Including all tournament matches minimized selective sampling within the defined competition but did not eliminate potential measurement errors, dependence between observations, or limitations in generalizability to other tournaments and populations. In particular, the 64 team performances cannot be assumed to be statistically independent because teams participated in multiple matches and opposing teams shared the same match context. Accordingly, methodological rigor depends on the completeness and accuracy of the source records, consistent classification of performance indicators, appropriate handling of repeated team observations, and transparent data-processing procedures. Future studies examining associations or comparative outcomes should justify sample size according to the planned statistical analysis, expected effect sizes, and dependence arising from repeated observations of teams.

Research Procedures and Data Collection

Performance data were obtained from official match-summary reports of the FIFA Women's Futsal World Cup 2025, covering all 32 matches and yielding 64 team-performance observations. The

recorded indicators were classified into three phases of play: in-possession (attacking actions, individual attack, counterattack, and set play), out-of-possession (high block, high press, mid-block, mid-press, low block, and low press), and transition (counterpress, defensive transition, and recovery). Goals scored were also recorded to provide contextual information on match outcomes. The extracted data were organized by team and match, classified according to the designated performance indicators, and summarized descriptively using IBM SPSS Statistics version 25. As the study relied on secondary observational data, it involved no experimental intervention, treatment assignment, or post-intervention follow-up; therefore, intervention dose, adherence, fidelity, and intervention-related adverse events were not applicable. The available documentation does not specify the exact extraction dates, detailed data-cleaning procedures, independent verification methods, or procedures for resolving discrepancies in source records; these details should be included only if confirmed by the original research documentation.

Measures and Instruments

The primary analytical variables were the frequencies of performance actions within the three phases of play. The phase classification was based on the categories reported in the official tournament documentation and operationalized in the original study.

Table 1. Performance indicators and measurement procedures

Phase / Variable	Performance indicator	Measurement purpose
In-possession	Attacking actions	Describe recorded attacking behaviors
	Individual attack	Describe individual attacking actions
	Counterattack	Describe counterattacking behaviors
	Set play	Describe attacking actions originating from set plays
Out-of-possession	High block	Describe defensive organization in a high-block position
	High press	Describe high-pressing behaviors
	Mid-block	Describe defensive organization in a mid-block position
	Mid-press	Describe mid-pressing behaviors
	Low block	Describe defensive organization in a low-block position
	Low press	Describe low-pressing behaviors
Transition	Counterpress	Describe counterpressing actions following loss of possession
	Defensive transition	Describe recorded defensive transition actions
	Recovery	Describe actions associated with regaining possession
Additional outcome	Goals scored	Provide descriptive context for team performance

For each performance indicator, total frequency, mean, standard deviation, minimum, and maximum were calculated across the 64 team performances. Relative frequencies were used to describe the distribution of actions across the three phases and within each phase, with denominators reported separately. The available manuscript does not document a complete instrument manual, detailed coding rules, independent validation, inter-rater reliability, or assessor training. Therefore, the original source and version of the performance definitions should be identified, and any researcher-performed coding or recategorization should be documented. No unverified reliability or validity coefficients should be reported.

Statistical and Analytical Procedures

Statistical analyses were performed using IBM SPSS Statistics version 25. Descriptive statistics, including total frequencies, means, standard deviations, and minimum and maximum values, were calculated for each performance indicator across 64 team

performances. Relative frequencies were used to describe the distribution of actions across the three phases of play, with phase-level percentages calculated against the total number of recorded actions and within-phase percentages calculated against the total frequency of indicators within each phase. The analysis was descriptive and did not include documented inferential tests, regression models, effect sizes, or 95% confidence intervals; therefore, the findings describe observed frequency distributions rather than causal relationships or comparative tactical effectiveness. Before publication, the dataset and reported results should be checked for missing records, duplicate entries, inconsistent classifications, transcription errors, and discrepancies in frequency totals. Additional procedures, including outlier assessment, imputation, assumption testing, sensitivity analyses, or inferential testing, should be reported only if they were actually conducted and documented.

Ethical Approval and Informed Consent

This study used publicly available secondary data from official match-summary reports of the FIFA Women's Futsal World Cup 2025 and involved no direct participant interaction, experimental intervention, or collection of personally identifiable individual-level data. Individual informed consent and consent for publication were therefore not applicable. Formal ethical approval was reportedly not required under the applicable institutional guidelines; however, this statement should be retained only after confirmation of the relevant institutional policy or an exemption determination, where required. The authors should identify the responsible institutional ethics authority if a formal determination exists and should not claim ethical approval or provide an approval number unless officially granted. All data were used in accordance with the source provider's terms and applicable institutional requirements.

RESULTS

Overall Descriptive Statistics

The analysis included 64 team performances derived from all 32 matches of the FIFA Women's Futsal World Cup 2025. The original dataset reported 9,416 phase-of-play actions, comprising 3,860 in-possession actions, 4,783 out-of-possession actions, and 773 transition actions. A total of 210 goals were recorded, corresponding to a reported mean of 3.28 ± 3.26 goals per team performance. Table 2 presents the descriptive statistics for goal

scoring and the individual performance indicators. Within the in-possession phase, set plays had the highest reported total (2,135), followed by counterattacks (813), attacking actions (723), and individual attacks (189). Within the out-of-possession phase, mid-block and low-block actions were the most frequently recorded indicators, with totals of 1,987 and 1,830, respectively. Recovery was the most frequent transition indicator, with 370 recorded actions.

Table 2. Descriptive statistics of goal scoring and phase-of-play performance indicators

Phase	Performance indicator	Total	Mean $\pm$ SD	Min	Max
Goal scoring	Goals	210	3.28 ± 3.26	0	17
In-possession	Attacking actions	723	11.30 ± 8.59	0	40
In-possession	Individual attack	189	2.95 ± 2.83	0	18
In-possession	Counterattack	813	12.70 ± 6.65	1	32
In-possession	Set play	2,135	33.36 ± 13.39	6	67
Out-of-possession	High block	318	4.97 ± 5.42	0	22
Out-of-possession	High press	298	4.66 ± 6.17	0	29
Out-of-possession	Mid-block	1,987	31.05 ± 13.28	2	64
Out-of-possession	Mid-press	301	4.70 ± 5.39	0	27
Out-of-possession	Low block	1,830	28.59 ± 18.75	1	89
Out-of-possession	Low press	49	0.77 ± 1.33	0	7
Transition	Counterpress	197	3.08 ± 2.99	0	12
Transition	Defensive transition	206	3.22 ± 2.39	0	8
Transition	Recovery	370	5.78 ± 4.08	0	19

Note. SD = standard deviation; Min = minimum; Max = maximum. The values reproduce the descriptive statistics reported in the original manuscript and require verification against the source dataset before publication.

Distribution of Actions Across Phases of Play

The distribution of recorded actions differed across the three phases of play. Out-of-possession actions accounted for 50.8% of all recorded actions, followed by in-possession actions (41.0%) and transition actions (8.2%). The corresponding frequencies and percentages are presented in Table 3.

Table 3. Overall distribution of phase-of-play actions

Phase of play	Total actions	Percentage (%)
In-possession	3,860	41.0
Out-of-possession	4,783	50.8
Transition	773	8.2
Total	9,416	100.0

Note. Percentages were calculated using the total number of recorded actions (9,416) as the denominator.

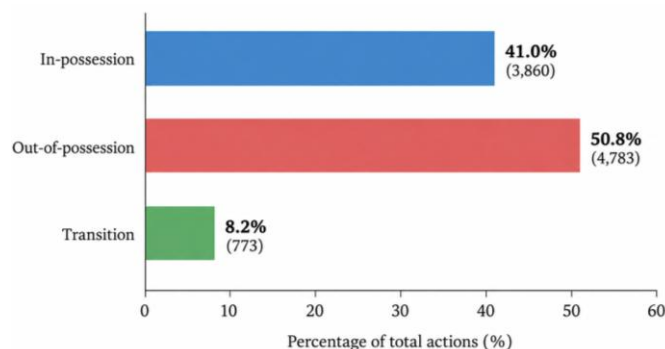


Figure 1. Percentage distribution of phase-of-play actions at the FIFA Women's Futsal World Cup 2025.



Figure 1 should present the three phase categories as a horizontal bar chart, with percentages labelled directly at the end of each bar. The visual highlights the larger share of out-of-possession actions relative to in-possession and transition actions. These percentages describe recorded action frequencies rather than the proportion of match time spent in each phase.

Distribution of Individual Performance Indicators

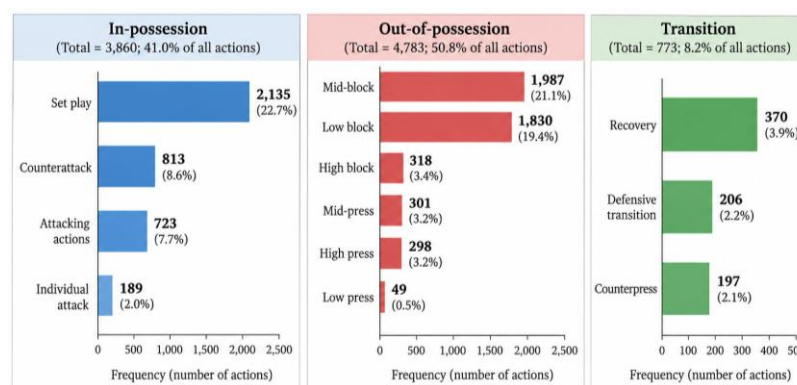
To examine the contribution of individual indicators to total tournament activity, each indicator's frequency was expressed as a percentage of all 9,416 recorded actions. Table 4 presents the corresponding counts and percentages.

Table 4. Individual performance indicators as a percentage of total recorded actions

Phase of play	Performance indicator	Total	Percentage (%)
In-possession	Attacking actions	723	7.7
In-possession	Individual attack	189	2.0
In-possession	Counterattack	813	8.6
In-possession	Set play	2,135	22.7
Out-of-possession	High block	318	3.4
Out-of-possession	High press	298	3.2
Out-of-possession	Mid-block	1,987	21.1
Out-of-possession	Mid-press	301	3.2
Out-of-possession	Low block	1,830	19.4
Out-of-possession	Low press	49	0.5
Transition	Counterpress	197	2.1
Transition	Defensive transition	206	2.2
Transition	Recovery	370	3.9
Total	All indicators	9,416	100.0

Note. Percentages were recalculated using the reported frequencies and the total of 9,416 actions as the denominator. Values are rounded to one decimal place.

Set plays accounted for the largest share of all recorded actions (22.7%), followed by mid-block (21.1%) and low-block actions (19.4%). Counterattacks contributed 8.6% of total actions, while attacking actions contributed 7.7%. Recovery accounted for 3.9%, whereas low press represented the smallest proportion (0.5%).



Note. Values in parentheses indicate the percentage of total recorded actions ($n = 9,416$). The total for each phase is shown in the panel title. Percentages are rounded to one decimal place.

Figure 2. Frequency of individual performance indicators across the three phases of play.

Figure 2 should use horizontal bars grouped into three panels: in-possession, out-of-possession, and transition. The bars should represent absolute frequencies, with values labelled at their ends. Separate panels will improve readability because the indicator frequencies differ substantially across phases. The figure should not use a common percentage scale that mixes overall percentages with within-phase percentages.

Composition of Performance Indicators Within Each Phase

The relative composition of each phase was calculated by dividing each indicator's frequency by the total frequency of the corresponding phase. The results are presented in Table 5.

Table 5. Within-phase distribution of performance indicators

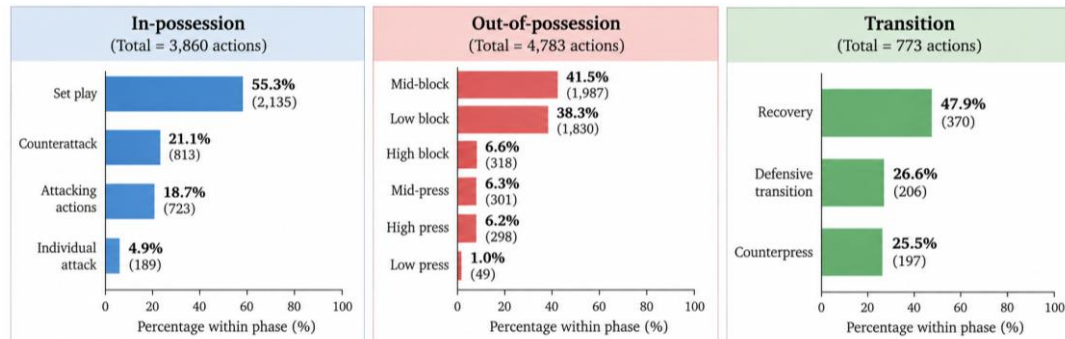
Phase of play	Performance indicator	Total	Within-phase (%)
In-possession	Attacking actions	723	18.7
In-possession	Individual attack	189	4.9
In-possession	Counterattack	813	21.1
In-possession	Set play	2,135	55.3
In-possession total		3,860	100.0
Out-of-possession	High block	318	6.6
Out-of-possession	High press	298	6.2
Out-of-possession	Mid-block	1,987	41.5
Out-of-possession	Mid-press	301	6.3
Out-of-possession	Low block	1,830	38.3
Out-of-possession	Low press	49	1.0
Out-of-possession total		4,783	100.0
Transition	Counterpress	197	25.5
Transition	Defensive transition	206	26.6

Transition	Recovery	370	47.9
Transition total		773	100.0

Note. Within-phase percentages use the total frequency of the corresponding phase as the denominator. Totals may differ marginally from 100% before rounding.

Within the in-possession phase, set plays accounted for 55.3% of actions, followed by counterattacks (21.1%), attacking actions (18.7%), and individual attacks (4.9%). Within the out-of-possession phase, mid-block accounted for 41.5% of actions and

low-block for 38.3%. The remaining defensive indicators each accounted for approximately 6.6% or less of the phase total. Within the transition phase, recovery represented 47.9% of actions, followed by defensive transition (26.6%) and counterpress (25.5%).



Note. Values indicate the percentage of actions within each phase of play. The number of actions for each indicator is shown in parentheses. Totals for each phase are shown in the panel titles. Percentages are rounded to one decimal place.

Figure 3. Relative composition of performance indicators within each phase of play.

Figure 3 should contain three horizontal bar-chart panels, one for each phase. Percentages should be calculated within the relevant phase, not across the entire tournament. Direct data labels should be used, and the same category order should be maintained wherever possible to facilitate comparison.

Summary of Principal Findings

The descriptive analysis identified three principal patterns in the recorded match data. First, out-of-possession actions represented the largest proportion of all recorded phase-of-play actions.

Second, set plays were the most frequently recorded in-possession indicator. Third, mid-block and low-block actions accounted for the largest shares of out-of-possession activity, while recovery was the most frequently recorded transition indicator. These results establish preliminary descriptive benchmarks for phase-of-play behaviors during the FIFA Women's Futsal World Cup 2025. They do not establish the effectiveness of specific tactical approaches or demonstrate that any indicator was associated with winning. Such conclusions would require additional analyses incorporating match context, tactical sequences, and competitive outcomes.

DISCUSSION

Principal Findings

This study examined phase-of-play performance profiles across all 32 matches of the FIFA Women's Futsal World Cup 2025, comprising 64 team performances. A total of 9,416 actions were recorded, with out-of-possession actions accounting for 50.8%, in-possession actions for 41.0%, and transition actions for 8.2%. These findings establish an initial descriptive benchmark of tactical activity in elite international women's futsal and demonstrate that out-of-possession indicators represented the largest proportion of recorded actions (Oliva-Lozano et al., 2024; Rico-González et al., 2020).

Within the in-possession phase, set plays accounted for 55.3% of recorded actions, followed by counterattacks (21.1%), attacking actions (18.7%), and individual attacks (4.9%). Out-of-possession activity was dominated by mid-block (41.5%) and low-block actions (38.3%), whereas transition activity represented the smallest phase-level proportion. Within transitions, recovery actions were most frequent (47.9%), followed by defensive transitions (26.6%) and counterpressing (25.5%). These distributions describe the relative frequency of the recorded tactical indicators but do not establish their effectiveness, strategic superiority, or influence on match outcomes. Overall, the findings address the study objective by providing a descriptive profile of phase-of-play activity during the inaugural FIFA Women's Futsal World Cup. The study was not designed to test causal relationships or establish statistically significant differences between tactical strategies. Accordingly, its

principal contribution is the provision of tournament-specific benchmarks to support future research and inform coaching evaluation. Further studies should examine how these patterns relate to contextual factors, goal-scoring opportunities, and match outcomes before drawing conclusions about tactical effectiveness.

Comparison with International Evidence

The predominance of out-of-possession actions and the frequency of mid-block and low-block indicators are broadly consistent with research highlighting defensive organization, spatial control, and collective coordination in football and futsal (Casal et al., 2016, 2020; Low et al., 2018). Previous studies also emphasize interactions among players, opponents, and environmental constraints in shaping collective tactical behavior (Sgrò et al., 2016; Silva et al., 2014). Similarly, the high proportion of set plays within the in-possession phase aligns with research on structured attacking patterns and coordinated offensive behaviors in futsal (Dominguez et al., 2019; Santos et al., 2019). Team performance also depends on interactions among players rather than isolated technical actions (Duarte et al., 2012; Travassos et al., 2016). However, action frequency alone cannot establish defensive superiority or attacking effectiveness. Differences in coding procedures, populations, competition settings, and match contexts should therefore be considered, and tactical indicators should be examined alongside goal-scoring opportunities and outcomes (González-Ródenas et al., 2020; He et al., 2023).

The transition profile further describes tactical responses to

changes in possession. Previous research highlights the influence of player positioning, defensive organization, and situational opportunities on possession-related behaviors (Ilham et al., 2025; Maneiro et al., 2019). Although recovery actions were the most frequent transition indicator in this study, their frequency does not reveal the mechanisms, timing, or effectiveness of possession recovery. Findings on transitional behaviors and high-pressure physical demands in football provide useful context but require cautious interpretation when applied to women's futsal (Bortnik et al., 2023). By examining all 32 matches of the inaugural FIFA Women's Futsal World Cup, this study adds a descriptive reference to the comparatively limited evidence on elite women's futsal (Santos et al., 2024; Sanmiguel-Rodríguez et al., 2021). However, because no direct comparative analysis was conducted, the findings do not establish differences between women's and men's futsal or across competitions. Future international research should adopt harmonized indicators, consistent coding procedures, and contextual analyses to determine whether these tactical profiles are generalizable beyond the tournament examined.

Theoretical, Methodological, and Practical Implications

The findings support a phase-based approach to performance analysis that considers in-possession, out-of-possession, and transition behaviors as interconnected components of match performance. The distribution of actions across these phases highlights the value of examining collective tactical patterns rather than isolated indicators. This perspective is consistent with research emphasizing team coordination and the dynamic interaction between individual actions and collective organization (Duarte et al., 2012; Welch et al., 2021). Although the study does not directly test a theoretical model of tactical interaction, its descriptive findings provide a foundation for further theoretical development and empirical investigation.

Methodologically, analyzing all 32 matches of the FIFA Women's Futsal World Cup 2025 reduces selective match-sampling within the tournament and provides a consistent dataset for future comparisons. However, aggregate frequency analysis cannot capture the spatial, temporal, and sequential characteristics of tactical behaviors. Combining official match reports with detailed observational and tracking methods could provide deeper insights into how actions develop and relate to performance outcomes (Manzi et al., 2023; Rico-González et al., 2020). Such methodological improvements would strengthen the interpretation and reproducibility of future performance analyses.

Practically, the findings may help coaches review defensive organization, collective movement, set-play routines, and transition management. The emphasis on coordinated attacking behavior supports the consideration of structured offensive practice (Gibson et al., 2021; Marques et al., 2023) while transition-focused exercises may integrate physical, technical, and cognitive demands (Bortnik et al., 2023; Shalom et al., 2025). Nevertheless, training priorities should reflect team-specific needs and evidence of

effectiveness rather than action frequencies alone. At the broader level, standardized data collection and transparent indicator definitions could facilitate international comparisons and strengthen the evidence base for women's futsal (Prieto-González et al., 2025).

Strengths and Limitations

The study has several strengths, including the analysis of all 32 matches of the FIFA Women's Futsal World Cup 2025, representing 64 team performances, and the use of official match-summary reports as a consistent data source. Categorizing actions into in-possession, out-of-possession, and transition phases also provides a structured overview of tactical behaviors and establishes an initial benchmark for elite women's futsal. However, the reliance on aggregate data limits analysis of the spatial, temporal, and sequential characteristics of actions and their contribution to match outcomes (Manzi et al., 2023). Furthermore, coding reliability cannot be established without documented procedures and appropriate reliability statistics.

Several limitations also affect interpretation and generalizability. The study did not account for contextual factors such as scoreline, opponent strength, tournament stage, or tactical formation, which may influence observed behaviors (Hileno et al., 2020). Its descriptive design cannot establish causal relationships or determine tactical effectiveness, while the single-tournament sample limits generalization to other competitions. The absence of inferential analyses, effect sizes, confidence intervals, and longitudinal observations further restricts conclusions about differences and changes over time. Future research should verify indicator classifications and data consistency, report missing-data procedures, and incorporate video-based analysis, contextual variables, and multi-tournament comparisons to improve reliability, transparency, and applicability.

Future Research

Future research should validate these findings through standardized, multi-tournament studies of elite women's futsal across international, continental, and domestic competitions, with comparisons to men's futsal where appropriate. Combining official match reports with video-based and tracking data would enable more reliable assessment of tactical actions, their contextual determinants, and their effectiveness (Teng et al., 2024). Longitudinal and multilevel analyses should account for team characteristics, opponent strength, match status, and competition stage, while reporting effect sizes and confidence intervals. Further studies should also evaluate targeted training interventions, including set plays, defensive organization, and transitions, with attention to training dose, implementation fidelity, follow-up, and cost-effectiveness. International collaboration, harmonized coding frameworks, and reproducible analytical procedures would strengthen cross-competition comparisons and advance evidence-based understanding of performance in elite women's futsal.

CONCLUSION

This study established descriptive performance profiles of in-possession, out-of-possession, and transition actions across all matches of the FIFA Women's Futsal World Cup 2025. The findings showed that out-of-possession actions represented the largest proportion of recorded activity, while set plays were the most frequent indicator within the in-possession phase. Transition activity accounted for a smaller proportion of total actions and was characterized primarily by recovery actions. These findings provide

an initial empirical benchmark for understanding the distribution of tactical behaviors in elite international women's futsal and contribute to the limited evidence base on women's performance at world-championship level.

The findings may inform coaching practice, performance analysis, and the development of future research by providing a reference for examining tactical organization across phases of play. However, because the analysis relied on descriptive data from a

single tournament and did not directly assess the effectiveness of individual actions or account for contextual factors, the results should not be interpreted as evidence of causal relationships or generalized to all women's futsal competitions. Future research

using standardized video-based analysis, contextual variables, and data from multiple competitions is needed to validate these benchmarks and establish how phase-of-play behaviors relate to match outcomes.

DECLARATION

Ethical Approval

This study analyzed publicly available secondary data obtained from official match reports of the FIFA Women's Futsal World Cup 2025. No participants were recruited, no direct interaction with athletes occurred, and no identifiable individual-level personal data were collected. According to the authors' understanding of the applicable institutional guidelines, formal ethical approval was not required.

Consent for Publication

Consent for publication was not applicable because the manuscript does not report identifiable individual-level personal information, images, or case details.

Author Contributions (CRediT)

Nufi Saidatus Tsaniyah: Conceptualization, methodology, data curation, formal analysis, and writing—original draft.

Achmad Widodo: Methodology, supervision, and writing—review and editing.

Irmantara Subagio: Methodology, supervision, and writing—review and editing.

Heri Wahyudi: Formal analysis, supervision, and writing—review and editing.

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Conflict of Interest

The authors declare that they have no known competing financial interests

or personal relationships that could have appeared to influence the work reported in this manuscript.

Data Availability

The data analyzed in this study were obtained from official match-summary reports of the FIFA Women's Futsal World Cup 2025. The availability of these source reports is subject to the relevant provider's access conditions. The derived dataset used for the analysis may be made available by the corresponding author upon reasonable request, subject to applicable permissions and data-sharing restrictions.

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Generative artificial intelligence tools were used to assist with language editing, manuscript organization, and refinement of selected passages. The authors remain responsible for the accuracy, originality, integrity, and final content of the manuscript, including the verification of data, statistical interpretations, citations, and references. No AI-generated information was treated as a substitute for verification against the original data and source materials.

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