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## The Most Utilized Rotation and Translation Movement While In Ball-Possession Among Futsal Players

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### Abstract

The objective of this study was to identify the most utilized rotation and traction related movements among international futsal players when they are in a ball possession situation. A total of 4 matches from The AFF Futsal Championship 2014 were analyzed. The analyzed matches consist of two semifinal matches, 3rd-4th placing match and the final match. There are four indicators for rotation movement (half-trunk rotation, half-body rotation, quick-half trunk rotation, and quick-body rotation) and four indicators for traction movement (front traction, back traction, side traction, and sudden stop) that are selected to be observed in this study. Each indicator was divided into two categories, which are attacking and defensive mode. All matches were recorded using a full high definition video camera and analyzed using SportCode Elite (v. 10) and Dartfish EasyTag (v. 1.0.8) software. Two trained and experienced analysts were assigned to analyze all 4 matches. Inter- and Intra- analyst reliability studies were also performed in order to examine the content validity of the data obtained. Overall results indicated that the front traction during the defensive mode is the most utilized movement, among others, while back traction during the attacking mode is the least utilized movement. Front traction during attacking mode was found to be the highest number of usage during attacking mode while sudden stop traction during defensive mode is the least utilized movement among other defensive movements. Regardless of attacking or defensive mode, results show that front traction is the most utilized movement, followed by half-trunk rotation and side traction. This study also show that the rotation (47%) and traction movements (53%) utilized during competitive games are quite balanced. A similar result was also obtained when comparing between attacking (46%) and defensive mode distribution (54%) from overall data. Further study on futsal games should focus on the most utilized movement during competitive matches to understand more about the nature of the games.

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*Keywords:* Futsal; Traction; Rotation; real-game data

### 1. Introduction

In 1989, FIFA staged the first ever FIFA Futsal World Cup which was held in Netherlands. Since then, 6 other nations from 4 different continents have already hosted this event [1]. Futsal is a 5-a side sports that is very similar with soccer. It should be played on flat, smooth and non-abrasive surface which can be either an artificial material-based or wooden pitch [2]. Despite the popularity of futsal, its first systematic review in English language was only published in 2014 [3].

In a futsal game, technique, the passing accuracy and speed are very crucial [1]. Therefore, it is not a coincidence that futsal is included in the list of one of the most injury-prone sports where one injury incident occurs in every 181 hours of futsal play [4]. Past study also shows that almost 33% of injury cases in futsal is a non-contact injuries where lower extremity and trunk injuries are among the injury cases recorded [4].

Past studies focuses more on the physiological demands [5-8], psychological demands [9-10] and tactical aspect [11-15] of the game. There is a need to understand more on how the movement performed by futsal players relate to all of these demands. The

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establishment of movement classification related to futsal is important in order to create the movement operational definitions for coding purpose in match analysis [16]. This will also provides specificity on futsal movement that can be utilized in other areas of study such as in physical conditioning and coaching [17]. Currently, study on the player movement during a competitive futsal match is lacking. In order to precisely predict and simulate the real demand of a futsal match, a competitive game with good standard of play should be the basis of any study. Among other factors, traction is considered as an important aspect that relates with the futsal players performance and safety [18]. This study focuses on the movement analysis of international futsal players during an international competition. The purpose of this study is to reveal the most utilized rotation and traction movement performed by international futsal players when they are in-possession of the ball.

## 2. Method

### 2.1 Selected futsal matches for analysis

A total of 4 futsal matches from the 2014 ASEAN Futsal Championship (AFF Futsal Championship) were recorded and analyzed. The matches consists of two semi-final games between Thailand and Indonesia (Semi-Final 1), and Australi and Vietnam (Semi-Final 2), a third place play-off between Indonesi and Vietnam and the final between Thailand and Australia. The purpose of focusing on the games starting only from the semi-final onwards is to obtain data from the best performing team in the competition. The final also represent two of the best futsal team in Asia based on Futsal World Ranking competing against each other [19]. (Thailand: world rank no.17 and Australia: world rank no.21)

### 2.2 Movement analysis indicator

In this study, players movement that relate to body rotation (rotation) and body translation based on traction (traction) are being analyzed. The inclusion criteria of the type of movement to be analyzed are based on the following:

- i. Only selected from movement made by players who are in ball-possession during matches, excluding the goalkeeper.
- ii. Any movement that generates body rotation by utilizing the support leg to rotate, while another leg is controlling the ball..
- iii. Any movement that generates body translation by utilizing the support leg to translate, while another leg is controlling the ball.

Initially, movement of futsal players were observed by a researcher that is specialized in sports biomechanics. This is performed in the earlier stage(group stage matches) of the competition. Based from this observation, 8 movement indicators were established. There are 4 indicators for rotation movement and 4 indicators for traction movement. The movement indicators for rotation movement are half-trunk rotation, half-body rotation, quick-half trunk rotation, and quick-body rotation. Front traction, back traction, side traction, and sudden stop represent movement indicators for traction movement. Each indicator are then separated to differentiate between movement that are performed during attacking and defensive mode.

### 2.3 Instrumentation

One Full HD video camera (setted at 1920x1080 pixels on 50 frame per second) were utilized to record all futsal matches in the competition. Video camera are positioned at the side view of the futsal pitch, as shown in Fig.1. All recorded matches were then analyzed with SportsCode Elite (v.10) and Dartfish EasyTag (v. 1.0.8) software (Fig.2 and Fig. 3) .

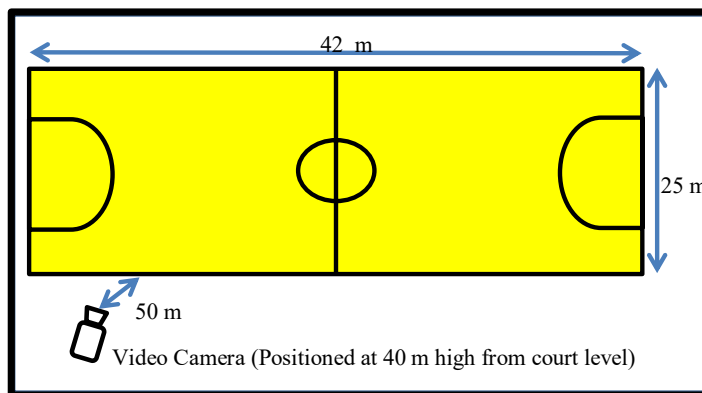


Fig. 1. Video camera position

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