Impact of Non-Performance-Oriented Factors on the Final Result of International Test Cricket Matches

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Abstract

Background: In test cricket, most of the matches are one-sided and less competitive due to several reasons. One of the major factors is the proportion of the luck component involved in this format of the game. The aim of this study was to examine how home advantage and winning the coin toss, which are non-performance-oriented factors, impact the final result of international test cricket matches.

Methods: The sample for the study consisted of 680 international test matches played between the period of 1st January 2001 and 31st March 2020 amongst the top eight test teams, which were examined using descriptive statistics to investigate different team’s win percentages when the odds were in their favour and when the odds were against them. Statistical program SPSS and Microsoft Excel were used to carry out the chi-square test of independence and the post-hoc test respectively for each team separately to check the significance of the impact of the venue and toss on the match result.

Conclusion: The results indicated that home advantage has a significant impact on the outcome of a test match but toss does not give any considerable edge to the team winning it. From the results, it appears test cricket is driven with both luck as well as performance-oriented elements.

Keywords: coin toss, home advantage, luck factor, match result, test cricket

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1. Introduction:

Test cricket is the oldest and longest form of the game. The first-ever official test match was played way back in 1877 between England and Australia at the Melbourne Cricket Ground (MCG). A test match is played between two teams having eleven players each, consisting of four innings, each team getting a chance to bat and bowl twice during the game. A test match is played over a period of five days with each day’s play lasting for six hours or at least ninety overs played per day. There are four possible results in a test match for teams – win, loss, draw, and tie. Tie being the rarest of results possible as there have been only two international test matches in the history of cricket which were tied. The first was in the year 1960 and the second in 1986. Since then there haven’t been any tied matches in international test cricket. Currently, twelve teams are having the test status which are recognized as full members by the International Cricket Council (ICC).

Every match consists of a pre-match coin toss between the captain of both the teams. The winner of the coin toss gets to select whether to bat first or bowl. One must think how it matters as both teams have to bat and bowl in a match whether it is first or second. But in any format of the game, the team winning the toss gains a lot of advantages in choosing to bat or bowl considering the pitch conditions, weather conditions, team strengths and weaknesses, strategies, and the kind of opponents.

In the past few years, it is seen that most teams in test matches after winning the toss select to bat first as it has significantly increased their probability of winning. Despite several discussions done by the International Cricket Council (ICC) Committee to scrap off the tradition of toss, it still prevails in the current World Test Championship. Not only in international test cricket but the significance of toss on match results and league points has also been noticed in the English County
Cricket Championship\(^2\). To make the matches and tournament more competitive, The English and Wales Cricket Board (ECB) in recent years has almost moved away with the toss system by giving the visiting captain the choice to bowl first. This not only takes care of the advantages of winning the toss but also minimizing the home advantage, making the competition more even and exciting for the spectators to watch\(^3\).

Apart from the coin toss advantage, home advantage has been quite dominant in test cricket for years. Home advantage has prevailed in several team sports and has played a significant role in the outcome of many matches\(^4\). The precise causes of home advantage in competitive sports is not well understood\(^5, 6\). But according to the results obtained from previous studies, few causes of home advantage are: crowdeffects\(^7\), travel factors\(^8\), familiarity\(^9\), and rules\(^10\). These factors not only influence the psychological but also behavioural states in athletes and coaches. Based on several studies in the past, a positive relationship has been derived between the psychological and behavioural states of athletes prior to competitive events and home advantage\(^10, 11, 12, 13, 14\). As far as cricket is concerned the major advantage the home team has is a familiar pitch. As more often the pitch is prepared considering the strengths of the home team\(^15\).

Every team has its strengths and weaknesses and in cricket, the major strength of any team is a familiar pitch and playing conditions in comparison to crowd support and other advantages of being a home team. The significance of these advantages and strength has been more dominant in test cricket than any other format of the game. It is very visible when we see subcontinent teams like India, Sri Lanka, and Pakistan have spin-friendly pitches, especially in test cricket due to the presence of world-class spinners in their side. Australia is known for its fast and bouncy pitches whereas England for its swing conditions. Hence any team that tours struggle a lot due to unfamiliar conditions and the home team being a master at their den. This makes test cricket very one-sided and less competitive.

The proportion of luck factor in test cricket is plenty as the outcome of the game is much dependent on factors like the coin toss, home advantage, pitch conditions, weather, etc which are non-performance-oriented. With the introduction of T20 format which is a fast and short version of the game, more competitive, exciting, and fun to watch\(^16\), test cricket, the traditional format has lost its charm. A year after the first T20 Cricket World Cup which was held in the year 2007, the Indian Premier League (IPL) was launched which enjoyed tremendous success. Following the same, many countries came up with their own leagues and in no time the shorter version of the game got more and more popular. Not only the spectators prefer this format due to its less time commitment but also players prefer as there is more money in this format. Many experienced cricketers also sacrificed their test careers so that they can play in as many leagues as possible and extend their T20 careers\(^17\). Viewership of test cricket was declining rapidly and to counter the issue ICC came up with new approaches like day-night test matches in 2015 and recently in July 2019 they launched the inaugural edition of ICC World Test Championship. Both these new concepts introduced by the ICC were very well-acknowledged by cricket fans across the globe but the issue of one-sided matches still prevails to be a major setback in test cricket.

There have been research papers published in the past that have considered different factors that affect the performance of a player or a team or the final result of a match, whether it is a test match, a one-day match, or a T20 match. The objective of this paper is to quantitatively analyse the impact of winning the coin toss and home advantage on the final result of the international test cricket matches. The study also aims to showcase the proportion of luck factor that is involved in this format of the game and to check the difference it makes to the win percentages of various teams. Statistically analysing the impact of home advantage and winning coin toss on the match result separately for all the top eight teams to come to a general conclusion, whether match results of international test matches are dependent on home-away and toss factor or not, is the uniqueness of the study. This research will benefit all those people who follow or play cricket at any level in understanding how the various elements that are involved in the game severely impact the final result of the match for different teams. This paper also tends to suggest ICC, to come up with a more competitive model for test cricket to deal with home and coin toss advantages.

2. Material & methods:

This section covers the sample used for the study, the procedure followed for conducting this research, and the statistical techniques used to derive the results for this analytical study.

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2.1. Sample

The sample data considered for the study consisted of 680 international test matches played between the period of 1st January 2001 and 31st March 2020 amongst top eight test teams (Australia, New Zealand, India, England, Sri Lanka, South Africa, Pakistan, and West Indies) as per the ICC Rankings as on 04th May 2020\(^{18}\). Only day matches were considered for this study as the sample size of day-night matches played was very small. The dependent variable in this study was match result where as independent variables were toss and venue (home and away).

2.2. Procedure

The statistical data used for this study was secondary quantitative data which was collected from the website www.espncricinfo.com in May 2020 where the data was publically available\(^ {19}\). The data collected included the number of matches played, won, lost, drawn, and tied by each of the top eight teams between the period (1st January 2001 and 31st March 2020). There were no tied matches in the sample. Therefore, the data that is matches played, won, lost, and drawn by each team then was segregated based on eight different parameters (played at home, played away, played when won the toss, played when loss the toss, played at home when won the toss, played at home when lost the toss, played away when won the toss, played away when lost the toss). After that win percentages of every team for each of the eight parameters were calculated (number of matches won/number of matches played *100). The entire experiment was conducted in May 2020 at Symbiosis School of Sports Sciences.

2.3. Statistical Analysis

Descriptive statistics was used to evaluate the win percentages of all the eight teams for eight different parameters to derive a relationship between venue and match result, and toss and match result. To check the significance of these relationships and to find out whether playing home or away and winning the toss has a significant impact on match results, the chi-square test of independence and the post-hoc test were carried out for each team separately using statistical program SPSS version 24 and Microsoft Excel respectively. The level of statistical significance was set at \( p = .05 \).

3. Results and Discussion:

This section comprises of relevant tables and charts demonstrating the results obtained from the statistical analysis carried out and discussion relating to the significance of the observations.

**Table 1. Win percentages of top eight test teams for the period (1st Jan, 2001 to 31st Mar, 2020)**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>AUS</th>
<th>NZ</th>
<th>IND</th>
<th>ENG</th>
<th>SL</th>
<th>SA</th>
<th>PAK</th>
<th>WI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>67.35</td>
<td>37.68</td>
<td>58.62</td>
<td>54.92</td>
<td>45.45</td>
<td>56.67</td>
<td>41.67</td>
<td>22.08</td>
</tr>
<tr>
<td>Away</td>
<td>45.36</td>
<td>12.07</td>
<td>28.43</td>
<td>28.43</td>
<td>13.64</td>
<td>32.47</td>
<td>24.32</td>
<td>2.94</td>
</tr>
<tr>
<td>Toss won</td>
<td>62.75</td>
<td>27.27</td>
<td>50.00</td>
<td>43.48</td>
<td>36.84</td>
<td>53.49</td>
<td>38.81</td>
<td>13.75</td>
</tr>
<tr>
<td>Toss lost</td>
<td>49.02</td>
<td>26.87</td>
<td>35.64</td>
<td>40.00</td>
<td>24.32</td>
<td>36.47</td>
<td>28.36</td>
<td>13.04</td>
</tr>
<tr>
<td>Home &amp; toss won</td>
<td>73.33</td>
<td>39.39</td>
<td>60.98</td>
<td>60.32</td>
<td>51.35</td>
<td>63.83</td>
<td>50.00</td>
<td>25.00</td>
</tr>
<tr>
<td>Home &amp; toss lost</td>
<td>62.26</td>
<td>36.11</td>
<td>56.52</td>
<td>49.15</td>
<td>40.00</td>
<td>48.84</td>
<td>35.71</td>
<td>18.18</td>
</tr>
<tr>
<td>Away &amp; toss won</td>
<td>53.70</td>
<td>10.00</td>
<td>40.43</td>
<td>23.53</td>
<td>20.59</td>
<td>43.24</td>
<td>27.78</td>
<td>0.00</td>
</tr>
<tr>
<td>Away &amp; toss lost</td>
<td>34.88</td>
<td>14.29</td>
<td>18.18</td>
<td>33.33</td>
<td>6.25</td>
<td>22.50</td>
<td>21.05</td>
<td>6.06</td>
</tr>
</tbody>
</table>


As can be seen in table 1, there is a major difference in win percentages, when teams play at home and when they play away [Australia (21.99), New Zealand (25.61), India (30.19), England (26.49), Sri Lanka (31.81), South Africa (24.20), Pakistan (17.35), West Indies (19.14)]. The results demonstrate that each team has a better winning percentage at home in comparison to their away records. Sri Lanka and India have shown most dependence on the venue factor as there is a drastic drop in their win percentages when they play away in comparison to their home winning percentages. As far as the toss is concerned, the difference in win percentages when a team wins the toss and when they lose it is [Australia (13.73), New Zealand (0.40), India (14.36), England (3.48), Sri Lanka (12.52), South Africa (17.02), Pakistan (10.45), West Indies (0.71)]. Each team has shown a greater win percentage when they win the toss than when they lose it, but the difference is not much as compared to the difference in win percentages of a team playing at home and playing away. New Zealand, West Indies, and England being the teams that have shown the least dependence on the toss factor in winning matches as there is not much difference in their winning percentage whether they win the toss or not. Whereas on the other hand, South Africa and India have shown most dependence on the toss factor out of all the 8 teams considering the fall in their win percentages.

Figure 1. Comparative Analysis Based on Matches Played Home and Away

The symbol * denotes that the difference in win percentages for matches played at home and matches played away is statistically significant. All the values in figure 1 are in percentages. AUS: Australia, NZ: New Zealand, IND: India, ENG: England, SL: Sri Lanka, SA: South Africa, PAK: Pakistan, WI: West Indies.

As can be seen in figure 1, for each team the bar denoting the win percentage at home is greater than the bar denoting the win percentage away. But to check whether the difference is statistically significant, the chi-square test of independence was carried out setting the level of significance at p = .05. It was obtained that result of the match was dependent on the home – away factor for every team, as the p-values for Australia (p = 0.001), New Zealand (p = 0.000), India (p = 0.000), England (p = 0.000), Sri Lanka (0.000), South Africa (p = 0.003), Pakistan (p = 0.004) and West Indies (p = 0.000) are less than the set level of statistical significance (p =.05). To control type 1 error, a post-hoc test was carried out in each case by comparing the calculated probability values associated with each adjusted standardised residual to the adjusted alpha value 0.00833 (original alpha value/ number of analysis conducted) or (0.05/6). The calculated probability values associated with each adjusted residual were lesser than the adjusted alpha value (0.00833) for all the eight teams denoting the results obtained to be statistically significant.
As can be seen in figure 2 the bar denoting the win percentage of teams when they have won the toss is greater than the bar denoting the win percentage when a team has lost the toss, but the difference in case of few teams is negligible whereas for rest is also less in comparison to the home – away factor. To check statistically the significance of toss on the match result, the chi-square test was carried out setting the level of significance at $p = .05$. The results obtained were – [Australia ($p = 0.142$), New Zealand ($p = 0.660$), India ($p = 0.047$), England ($p = 0.830$), Sri Lanka ($p =0.068$), South Africa ($p = 0.071$), Pakistan ($p = 0.422$) and West Indies ($p = 0.992$). Other than team India, every team’s $p$-value is greater than the set level of statistical significance ($p = .05$), which indicates that the result of the match is not dependent on the toss factor for 7 out of 8 teams. In the case of team India’s result, a post-hoc test was carried out to control the type 1 error and it was found that the relationship between toss and match result is statistically insignificant as the calculated probability values associated with each adjusted standardised residuals were greater than the adjusted alpha value (0.00833).

The study aimed in finding the influence of home advantage and result of coin toss on the outcome of the match. The aim of doing this study was also to know whether test cricket is dominated by luck factor or not. As per the main findings of the study, it was established that the result of a test match is dependent on the venue and is in favour of the team playing at home. Whereas toss does not have a statistically significant impact on the match result as per the chi-square test of independence, which is backed by the findings of a past research paper which had concluded that there was no evidence to prove that winning the toss gives an advantage to team20. The results were derived by statistically analysing each team considered in the study separately and not a general analysis of overall test cricket statistics. The results indicate that test cricket has a luck component involved in it but also the performance of the team matters in the outcome of a match.

Comparing the results of this study to past papers under the same category, the findings of this study does not support the results of a earlier study in test cricket which had concluded that the toss is very crucial and has a significant impact on the final result of the game21. A study which was carried on T20 cricket which aimed to check the impact of winning a coin toss and home advantage on T20 international matches, the results showed that toss had some significant impact on the match result but the home team did not get any competitive edge in case of T20 matches15. On the other hand, in one-day international cricket, a statistical analysis showed that winning the coin toss does not give a competitive advantage to a team, whereas home advantage does22. So whether it is test cricket, T20 cricket, or one-day international cricket, in every format there is some influence of non-performance-oriented factors that contribute to the victory of one team and defeat of the other. Every sport has some luck element involved in it but if a contest is decided by luck, the study concluded that home advantage has a significant influence on the match result.
the game is spoiled\textsuperscript{(23)}. As competition is the core of any sports contest\textsuperscript{(24)}. Therefore, reducing the luck factor must be a key priority for a sports federation or council.

The findings of this study backed by the results of past research papers must be considered by International Cricket Council (ICC) to make a new model of test cricket that focusses on increasing the competition between the teams. Making such a model that does not upset the tradition of the game but at the same time drives spectator interest which is necessary to keep test cricket alive. It is suggested that ICC adopts a model especially for test cricket, in which the coin toss is scrapped and the captain of the visiting team is given the right to decide whether to bat or bowl first. This model will not completely change the current scenario as toss does not have a statistically significant impact on match result whereas home advantage does, but it will still be able to tackle both home advantage and winning coin toss advantage to some extent, by giving both teams a fair chance to compete against each other.

For future areas of research, the study can be extended by investigating the influence of weather and pitch conditions on the match result moving along the same lines of analysis. For this, the researcher will need to examine each and every match in the period of study thoroughly for every team to analyse their performances in different playing (pitch and weather) conditions. The results will help to figure out each team’s strengths and weaknesses and which can be used by teams in understanding and improving their performances accordingly.

4. Conclusion:

Instead of rapidly increasing research on the home advantage factor in team sports, there is much more to study to interpret the relevance of its impact on match results, especially in cricket. Taking two important variables, home advantage and winning coin toss, our study aimed to understand the impact of these variables on the final result of international test cricket matches. The results show that in test cricket home advantage determines match result but toss does not. The dependence of match result on home advantage ruins the competition, which can be countered to a great extent by offering the toss advantage to the visiting team. Competitive test matches will guide more spectators, more fans, and more revenue leading to the rise of the oldest and traditional format of cricket again.

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