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To cite this article: Scott Irvine & Rodney Kennedy (2017) Analysis of performance indicators that most significantly affect International Twenty20 cricket, International Journal of Performance Analysis in Sport, 17:3, 350-359, DOI: [10.1080/24748668.2017.1343989](https://doi.org/10.1080/24748668.2017.1343989)

To link to this article: <http://dx.doi.org/10.1080/24748668.2017.1343989>



Published online: 10 Jul 2017.



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Analysis of performance indicators that most significantly affect International Twenty20 cricket

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ABSTRACT

Twenty20 (T20) cricket has rapidly become the most lucrative and desirable format of the game, with performance analysis pivotal in shaping successful tactics and strategies. The purpose of this study was to determine the performance indicators that most significantly affect the outcome of a game of international T20 cricket, in different parts of the world. Cricket-specific analysis software was used to analyse 40 international matches from 2012 to 2016, across 7 different countries. Magnitude-based inferences determined that the total number of dot balls bowled ($ES = 1.49$), the total number of wickets taken ($ES = 1.46$) and the innings run rate ($ES = 1.21$) were the most significant indicators of success across the four environments. This indicates the need to select wicket-taking bowlers, for captains to gamble with attacking fields throughout the innings and for aggressive batters with a high strike rate and boundary % to be selected where possible. Furthermore, the main indicators of success remained constant across environments, with run-scoring and batting determinants greatest when in sub-continent conditions.

ARTICLE HISTORY

Received 29 April 2017

Accepted 15 June 2017

KEYWORDS

Performance indicator;
batting; bowling; effect size

1. Introduction

The sport of Cricket is in the midst of a revolution (Petersen, Pyne, Portus, & Dawson, 2008). Since its inception in 2003, T20 cricket has rapidly become the most lucrative and desirable format of the game, with greater media coverage and some massive cash injections through franchised-based teams. As indicated by Douglas and Tam (2010), there is little room for error during this short and relatively brief format, with huge scrutiny placed on the execution of players' skills. Consequently, one or two overs could have a significant influence on the outcome of the match, with performance analysis often pivotal in providing information on successful tactics and strategies.

There is a lack of performance analysis research conducted within cricket compared to other team sports such as football and rugby union, with the majority of studies investigating the physiological, biomechanical and psychological elements of the game (Najdan, Robins, & Glazier, 2014). Despite this, research has broadened significantly in recent years, with studies examining the characteristics of different playing positions, predicting performance

or assisting with team selection. A significant amount of research has been conducted in the 40–50 over format of the game, with any limited T20 analysis focused around player performance, or determinants of match success (Moore, Turner, & Johnstone, 2012). Studies conducted in T20 cricket by Douglas and Tam (2010), Moore et al. (2012) and Petersen et al. (2008), suggest that taking more wickets, particularly during the final six overs of the innings and having a greater run rate per over are the most significant indicators of success. Despite this, performance indicators (PI's) that contribute to successful performance have yet to be firmly established and as a result, greater knowledge of specific tactics and strategies still needs to be determined (Petersen, Pyne, Portus, Cordy, & Dawson, 2008).

This study will aim to determine the PI's that most significantly affect T20 international cricket matches, building on domestically focused research (Moore et al., 2012; Najdan et al., 2014; Petersen et al., 2008). Whilst Douglas and Tam (2010) conducted research into international cricket, the sample was taken from one global tournament and may create issues around validity, especially when generalising to other countries, where conditions can be very different. This study will therefore include games from seven different countries, across four traditional cricketing environments, to see if PI's vary depending on the conditions. Finally, this study also investigates games ranging from 2012 to 2016 and as such should reflect any subtle changes in the sport, given the rapidly changing nature of cricket, as previously mentioned by Petersen et al. (2008).

2. Methods

2.1. Participants

A total of 40 matches involving an international cricket team were analysed from the 2012 T20 World Cup through to the beginning of the 2016 T20 World Cup. The games were played across seven different countries and incorporated four different cricket environments. Ethical approval was sought and granted by the local university ethics committee.

2.2. Procedure

The matches were coded using bespoke cricket analysis software (SportsMechanics Twenty20 pro, version 1.3.4) linked to a fixed camera (Sony CX625 Handycam) clamped to a sight screen, or to local broadcasting TV footage for all televised matches. Match footage was recorded and coded on a laptop (MacBook Pro A1502) with the analysis software preloaded and the coding procedure for each delivery was carried out as outlined by (Najdan et al., 2014).

General match, batting, bowling and fielding performance indicators analysed in this study are displayed in Table 1. The PI's were chosen because of their inclusion in previous studies conducted into T20 cricket (Moore et al., 2012; Najdan et al., 2014) and were agreed with both an international coach and international performance analyst with more than 20 years involvement in international sport combined.

2.3. Reliability

Both intra-operator and inter-operator reliability tests were completed to ascertain the objectivity and reliability of the data collected. The lead author conducted an intra-operator reliability test by re-coding a randomly selected match, two weeks after the initial coding of the game. To investigate inter-operator reliability, an international cricket performance analyst

Table 1. Performance indicators for winning and losing teams analysed throughout the study.

| Indicator type | Performance indicator |
|--------------------------|---|
| General match indicators | Total number of balls faced Total number of runs scored Total number of wickets taken Innings run rate |
| Batting indicators | Runs scored in overs 1–6, overs 7–10 and overs 11–14 Run rate in overs 15–20 Total number of boundaries scored Total number of singles scored Innings boundary % Innings single % Partnerships of 25–49 runs and 50+ runs Batters scoring 25–49 runs, 50–74 runs and 75+ runs |
| Bowling indicators | Wickets taken in overs 1–6, overs 7–10, overs 11–14 and overs 15–20 Total number of dot balls bowled Innings dot ball % Total number of seam overs bowled Total number of seam wickets taken Seam bowling economy rate Total number of spin overs bowled Total number of spin wickets taken Spin bowling economy rate Number of bowlers taking 2+ wickets and 3+ wickets |
| Fielding indicators | Total number of catches taken Total number of run outs |

with 10 years international cricket experience, coded one innings of a randomly selected match, before comparing results to that of the lead author. Pearson's moment product correlation for all performance indicators analysed produced reliable values for both intra-operator reliability ($r > .98, p < .05$) and inter-operator reliability ($r > .96, p < .05$), see Table 1.

2.4. Statistical analysis

Data were entered into a specifically designed spreadsheet in Microsoft Excel (version 2011, Microsoft Corporation, Redmond, WA) with means (\pm standard deviation) calculated for all PI's of interest. An independent t -test was used to determine the significance of each of the PI's investigated ($p < .05$) and in line with past research outlined by (Petersen et al., 2008), effect size was calculated ($ES = \text{change in } x/SD$) to allow for the relative comparison of the various indicators of success. Determining the magnitude of each effect size is based on measurements used by Hopkins, Marshall, Batterham, and Hanin (2009), where: trivial ($<.2$), small ($.2-.6$), moderate ($.6-1.2$), large ($1.2-2.0$) and very large (>2.0). Effect sizes were presented in descending order to give an indication of the strength of the relationship between the particular PI and a successful performance. Positive values indicated the PI contributed towards the success of the winning team, whilst negative values indicated that the losing team achieved a better score for the particular PI.

3. Results

3.1. General match performance indicators

All general match PI's analysed are summarised in Table 2. The biggest difference observed between winning and losing teams was the total number of wickets taken ($ES = 1.45$), with a higher innings run rate ($ES = 1.21$) and greater number of runs scored ($ES = .48$) also

Table 2. General match performance indicators for winning and losing teams.

| Performance indicator | Winning teams | Losing teams | Effect size |
|-------------------------------|---------------|--------------|-------------|
| Total number of balls faced | 105.0 ± 21.9 | 117.9 ± 6.3 | -.81* |
| Total number of runs scored | 137.1 ± 31.0 | 123.0 ± 27.6 | .48* |
| Total number of wickets taken | 7.9 ± 1.6 | 4.9 ± 2.4 | 1.45* |
| Innings run rate | 8.0 ± 1.6 | 6.2 ± 1.3 | 1.21* |

*Denotes a significant ($p \leq .05$) difference between teams.

contributing to a successful result. In contrast, facing a higher number of balls ($ES = -.81$) had a negative impact on the team's chance of success.

3.2. Batting performance indicators

Batting PI's for both winning and losing teams are presented in Table 3. Partnerships of 50 + runs ($ES = .98$), run rate in overs 15–20 ($ES = .95$) and runs in overs 1–6 ($ES = .93$) were found to be the main contributors to success. The importance of scoring boundaries was illustrated through the large effect sizes of both innings boundary % ($ES = .86$) and total boundaries scored ($ES = .77$). Moreover, accumulating runs through singles had a negative impact on performance, with losing teams achieving both a higher single % ($ES = -.75$) and scoring a greater number of singles ($ES = -.21$) throughout their innings.

3.3. Bowling performance indicators

Table 4 displays the bowling PI's for winning and losing teams. The biggest difference observed was between the total numbers of dot balls bowled ($ES = 1.49$), with the number of bowlers taking 2 + wickets ($ES = 1.16$) found to be another large contributor to success. The importance of dot balls is further emphasised with a higher dot ball % also carrying a large effect size rating ($ES = 1.14$). As would be expected, a higher economy rate for seam bowlers ($ES = -1.06$) and spin bowlers ($ES = -.51$) had a negative impact on a team's chance of success in a match.

3.4. Fielding performance indicators

Fielding PI's for winning and losing teams are outlined in Table 5. The biggest difference observed was the total number of catches taken ($ES = .92$), with the total number of run outs ($ES = .45$) also associated with a successful performance outcome.

3.5. Performance indicator significance

All analysed PI's are presented in descending order in Table 6 to indicate the strength of the relationship between a particular indicator and their affect on a successful performance. Total number of dots bowled ($ES = 1.49$), total number of wickets taken ($ES = 1.45$) and innings run rate ($ES = 1.21$) has the largest effect size rating and thus, were deemed the most significant indicators of success. Conversely, innings single % ($ES = -.75$), number of balls faced ($ES = -.81$) and seam economy rate ($ES = -1.06$) all carried negative effect size ratings and therefore, had a negative effect on performance.

Table 3. Batting performance indicators for winning and losing teams.

| Performance indicator | Winning teams | Losing teams | Effect size |
|-----------------------------------|---------------|--------------|-------------|
| Runs scored in overs 1–6 | 47.5 ± 14.8 | 36.0 ± 9.4 | .93* |
| Runs scored in overs 7–10 | 27.7 ± 8.0 | 22.9 ± 7.6 | .62* |
| Runs scored in overs 11–14 | 28.2 ± 10.1 | 24.1 ± 8.8 | .43 |
| Run rate in overs 15–20 | 9.0 ± 2.0 | 7.3 ± 1.5 | .95* |
| Total number of boundaries scored | 16.4 ± 5.0 | 12.6 ± 4.6 | .77* |
| Total number of singles scored | 39.3 ± 12.3 | 41.3 ± 6.3 | –.21 |
| Innings boundary % | 53.2 ± 11.8 | 44.1 ± 9.3 | .86* |
| Innings single % | 28.9 ± 8.1 | 34.9 ± 8.0 | –.75* |
| Partnerships of 25–49 runs | 1.5 ± 1.0 | 1.4 ± 1.0 | .18 |
| Partnerships of 50+ runs | .8 ± .6 | .3 ± .4 | .98* |
| Batters scoring 25–49 runs | 1.6 ± .9 | 1.2 ± 1.1 | .39 |
| Batters scoring 50–74 runs | .5 ± .5 | .2 ± .4 | .46* |
| Batters scoring 75+ runs | .1 ± .3 | .0 ± .2 | .23 |

*Denotes a significant ($p \leq .05$) difference between teams.**Table 4.** Bowling performance indicators for winning and losing teams.

| Performance indicator | Winning teams | Losing teams | Effect size |
|-------------------------------------|---------------|--------------|-------------|
| Wickets taken in overs 1–6 | 2.0 ± 1.1 | 1.3 ± 1.0 | .63* |
| Wickets taken in overs 7–10 | 1.4 ± 1.0 | .7 ± .8 | .80* |
| Wickets taken in overs 11–14 | 1.4 ± 1.0 | 1.4 ± 1.1 | .04 |
| Wickets taken in overs 15–20 | 3.3 ± 1.7 | 2.2 ± 1.5 | .72* |
| Total number of dot balls bowled | 56.0 ± 8.0 | 41.7 ± 11.0 | 1.49* |
| Innings dot ball % | 47.7 ± 7.5 | 39.8 ± 6.3 | 1.14* |
| Total number of seam overs bowled | 12.9 ± 3.5 | 10.9 ± 3.8 | .55* |
| Total number of seam wickets taken | 5.5 ± 2.4 | 3.3 ± 2.3 | .92* |
| Seam bowling economy rate | 6.4 ± 1.7 | 8.3 ± 1.8 | –1.06* |
| Total number of spin overs bowled | 8.8 ± 8.1 | 8.7 ± 12.3 | .01 |
| Total number of spin wickets taken | 2.5 ± 1.7 | 1.7 ± 1.5 | .49* |
| Spin bowling economy rate | 6.5 ± 1.9 | 7.6 ± 2.6 | –.51* |
| Number of bowlers taking 2+ wickets | 2.3 ± .8 | 1.3 ± .9 | 1.16* |
| Number of bowlers taking 3+ wickets | .7 ± .7 | .5 ± .5 | .30 |

*Denotes a significant ($p \leq .05$) difference between teams.**Table 5.** Fielding performance indicators for winning and losing teams.

| Performance indicator | Winning teams | Losing teams | Effect size |
|-------------------------------|---------------|--------------|-------------|
| Total number of catches taken | 4.6 ± 1.9 | 2.9 ± 1.8 | .92* |
| Total number of run outs | .6 ± .9 | .3 ± .6 | .45 |

*Denotes a significant ($p \leq .05$) difference between teams.

3.6. Environmental considerations

The five most significant PI's for each of the four different cricketing environments are presented in Table 7. Total dot balls bowled and total wickets taken were deemed to be significant indicators of success across all four environments, with innings run rate and seam economy rate significant indicators across three and two different environments, respectively.

Table 8 demonstrates the scores achieved by winning teams across the four different environments for selected PI's. In matches played in the sub-continent, winning teams achieved the highest number of runs scored (153.6), but also took the least number of opposition wickets (7.0). The number of runs scored in overs 1–6 was significantly higher

Table 6. Descending effect size rating between winning and losing teams for all performance indicators analysed.

| Performance indicator | Effect size | Rating |
|-------------------------------------|--------------------|--------------|
| Total number of dot balls bowled | 1.49 [*] | Large |
| Total number of wickets taken | 1.45 [*] | |
| Innings run rate | 1.21 [*] | Moderate |
| Number of bowlers taking 2+ wickets | 1.16 [*] | |
| Innings dot ball % | 1.14 [*] | |
| Partnerships of 50+ runs | .98 [*] | |
| Run rate in overs 15–20 | .95 [*] | |
| Runs scored in overs 1–6 | .93 [*] | |
| Total number of catches taken | .92 [*] | |
| Total number of seam wickets taken | .92 [*] | |
| Innings boundary % | .86 [*] | |
| Wickets taken in overs 7–10 | .80 [*] | |
| Total number of boundaries scored | .77 [*] | Small |
| Wickets taken in overs 15–20 | .72 [*] | |
| Wickets taken in overs 1–6 | .63 [*] | |
| Runs scored in overs 7–10 | .62 [*] | |
| Total number of seam overs bowled | .55 [*] | |
| Total number of spin wickets taken | .49 [*] | |
| Total number of runs scored | .48 [*] | |
| Batters scoring 50–74 runs | .46 [*] | |
| Total number of run outs | .45 | |
| Runs scored in overs 11–14 | .43 | |
| Batters scoring 25–49 runs | .39 | Trivial |
| Number of bowlers taking 3+ wickets | .31 | |
| Batters scoring 75+ runs | .23 | |
| Partnerships of 25–49 runs | .18 | |
| Wickets taken in overs 11–14 | .04 | |
| Total number of spin overs bowled | .01 | Small (–) |
| Total number of singles scored | –.21 | |
| Spin bowling economy rate | –.51 [*] | Moderate (–) |
| Innings singles % | –.75 [*] | |
| Total number of balls faced | –.81 [*] | |
| Seam bowling economy rate | –1.06 [*] | |

^{*}Denotes a significant ($p \leq .05$) difference between teams.

in Middle Eastern (53.2) and sub-continent (49.4) conditions, whilst English conditions (9.2) produced the highest run rate in overs 15–20. Total number of boundaries scored was similar in English and Middle Eastern conditions, with a clear increase in sub-continent (19.8) and decrease in Southern Hemisphere (8.8) conditions. Finally, the number of wickets taken during overs 1–6 and overs 15–20 was highest in Middle Eastern conditions (2.5 & 3.2) and significantly lower in sub-continental conditions (1.5 & 1.6).

4. Discussion

The aim of this study was to investigate the performance indicators that have the greatest affect on a successful outcome in a game of international T20 cricket. The findings of the study suggest that the major differences between winning and losing teams are the total number of dot balls bowled (ES = 1.49), the total number of wickets taken (ES = 1.45) and the innings run rate (ES = 1.21). A greater number of wickets taken and a higher innings run rate is in line with previous research (Douglas & Tam, 2010; Moore et al., 2012; Petersen et al., 2008), while bowling a higher number of dot balls is also in agreement with studies conducted by Douglas and Tam (2010) and Petersen et al. (2008). The average winning score

Table 7. Most significant performance indicators across four different cricketing conditions.

| Performance indicator | English/European (<i>n</i> = 12) | Middle Eastern (<i>n</i> = 13) | Southern Hemisphere (<i>n</i> = 4) | Sub-Continent (<i>n</i> = 11) |
|------------------------------|--------------------------------------|------------------------------------|--|-----------------------------------|
| Total dot balls bowled | ✓ ES = 1.18 | ✓ ES = 1.70 | ✓ ES = 1.46 | ✓ ES = 1.82 |
| Total wickets taken | ✓ ES = 1.63 | ✓ ES = 1.55 | ✓ ES = 1.43 | ✓ ES = 1.41 |
| Innings run rate | ✓ ES = 1.17 | ✓ ES = 1.77 | | ✓ ES = 1.22 |
| Seam economy rate | | ✓ ES = -1.67 | ✓ ES = -1.88 | |
| Bowlers taking 2+ wickets | | | ✓ ES = 1.83 | |
| Innings boundary % | ✓ ES = 1.65 | | | |
| Innings singles % | | ✓ ES = -1.59 | | |
| Innings dot ball % | | | ✓ ES = 1.49 | |
| Wickets in overs 7–10 | | | | ✓ ES = 1.23 |
| Total balls faced | | | | ✓ ES = -1.23 |
| Number of run outs | ✓ ES = 1.07 | | | |

Table 8. Winning team environmental differences for selected performance indicators.

| Performance indicator | English/European (<i>n</i> = 12) | Middle Eastern (<i>n</i> = 13) | Southern Hemisphere (<i>n</i> = 4) | Sub-Continent (<i>n</i> = 11) |
|----------------------------|--------------------------------------|------------------------------------|--|-----------------------------------|
| Total runs scored | 135.8 ± 31.0 | 133.6 ± 30.5 | 106.5 ± 10.0 | 153.6 ± 25.9 |
| Total wickets taken | 8.2 ± 1.7 | 8.2 ± 1.5 | 8.8 ± .8 | 7.0 ± 1.6 |
| Runs in overs 1–6 | 43.4 ± 8.2 | 53.2 ± 16.2 | 36.5 ± 10.3 | 49.4 ± 16.3 |
| RR in overs 15–20 | 9.2 ± 3.1 | 6.5 ± 3.8 | 4.6 ± 2.8 | 5.9 ± 4.9 |
| Total boundaries scored | 16.6 ± 4.1 | 15.5 ± 3.5 | 8.8 ± 3.6 | 19.8 ± 4.7 |
| Wickets in overs 1–6 | 1.8 ± .9 | 2.5 ± 1.3 | 2.3 ± .4 | 1.5 ± 1.0 |
| Wickets in overs 15–20 | 3.3 ± 2.3 | 3.2 ± 1.5 | 2.8 ± 1.9 | 1.6 ± 1.6 |
| Total dots bowled | 53.8 ± 6.9 | 58.9 ± 8.6 | 60.5 ± 7.5 | 53.5 ± 6.6 |
| Innings dot ball % | 47.1 ± 7.8 | 49.9 ± 8.2 | 50.9 ± 5.6 | 44.5 ± 5.5 |

(137.1) is lower than previous studies, with an average innings run rate (8.0) similar to that found by Douglas and Tam (2010) but again, generally lower than past research. Winning teams taking an average of 7.9 wickets is almost identical to previous studies (Douglas & Tam, 2010; Najdan et al., 2014; Petersen et al., 2008).

When examining batting performance indicators, partnerships of 50+ runs (*ES* = .98) carried the greatest effect size rating, supporting the previous findings (Douglas & Tam, 2010; Najdan et al., 2014). The number of runs scored during certain stages of the innings also appeared significant, with the run rate during overs 15–20 (*ES* = .95) and the number of runs scored during overs 1–6 (*ES* = .93) the sections that most significantly indicate success. Despite carrying low significance ratings in past research, the importance of boundary scoring is emphasised through the strong effect size ratings of both the number of boundaries scored (*ES* = .77) and innings boundary % (*ES* = .86). In concordance with existing findings, the number of singles scored (*ES* = -.21) and innings single % (*ES* = .75)

carried a negative effect size rating and thus is viewed as being detrimental to a team's chance of success.

The analysis of bowling performance indicators presents differences in comparison to existing studies whereby, wickets during overs 1–6 ($ES = .63$) and wickets during overs 15–20 ($ES = .72$) had less of an impact on the outcome of the match. In contrast, the number of wickets during overs 7–10 ($ES = .80$) was deemed to be the most significant “wicket-taking” stage of the game, an area that has not been brought to light throughout past research. Supporting the previous findings (Douglas & Tam, 2010; Petersen et al., 2008), the importance of bowling dot balls is highlighted through the large effect size ratings of both total dot balls bowled ($ES = 1.49$) and innings dot % ($ES = 1.14$). The number of bowlers taking 2+ wickets also carries a large effect size rating ($ES = 1.16$) and offers support to the work of Najdan et al. (2014).

Based on the analysis and as expected, batting sides should look to maximise their run rate per over throughout the entire innings. This emphasises the need to select batsmen with high strike rates and supports the notion of “batting index” (average + strike rate) as a good indicator of an individual's effectiveness in this format of the game. The number of 50+ partnerships being a larger indicator of success than individual scores, suggests that several batters who contribute fewer runs, but at a quicker rate is preferable to 1 or more individual batters that contribute a large individual score as sought after in ODI and Test match cricket. Furthermore, whilst it is important to maximise the amount of runs throughout the entire innings, it seems that the amount of runs scored at the start (overs 1–6) and end of an innings (overs 15–20) are the most critical stages. As previously suggested (Douglas & Tam, 2010; Petersen et al., 2008), specialised batsmen should be utilised during the first six overs of the innings, to combine maximum run scoring with an element of wicket retention. Similarly, batsmen with the highest strike rate should be deployed towards the end of an innings, to increase run rate during overs 15–20. The role of the “finisher” in white ball cricket is reflective of the importance placed on this stage of the game, with several teams picking 1 or more batters exclusively due to their ability to execute during these phases. Finally, teams should aim to score a high percentage of their runs through hitting boundary fours and sixes, with strike rotation and scoring singles seen as somewhat detrimental to success. The shift in mindset of batters has made boundary hitting the norm within white ball cricket and has even developed new specialist coaching roles in “power hitting” to take elements of other sports to try and maximise a batters ability to score as high a percentage of boundaries as possible.

From a bowling perspective, sides should look to maximise the number of dot balls they bowl throughout the innings. Once outside the initial six-over powerplay block, captains can deploy up to five fielders outside the 30-yard circle, but should consider having the four fielders inside the circle “saving one” at all times to try and maximise the number of dot balls. Similarly, they should consider bringing extra fielders up inside the circle during periods of the innings, especially to new batsmen, to build pressure and further increase the number of dot balls. As often emphasised during past studies, the importance of taking wickets is a vital component of success in T20 cricket. As a result, wicket-taking bowlers, often seen as bowlers with extra pace, left arm seamers, or “mystery” spinners, should be selected where possible. In addition, captains should try to set attacking fields (slips or close catchers), both to increase the number of dots bowled and to give their bowlers the greatest chance of taking a wicket. Previous studies

have promoted the importance of taking wickets during the first and last six overs of the innings, which is also acknowledged here, but this study suggests that the number of wickets taken during overs 7–10 has the greatest impact on success. This is possibly reflective of the use of “mystery” spinners immediately following the end of the initial powerplay and captains should consider utilising their wicket-taking bowlers for stages during this period, when batting sides are generally looking to consolidate following the first six over powerplay block.

A secondary aim of this study was to examine whether the significance of certain PI's altered across different cricketing environments or conditions. As outlined in Table 7, the total number of dot balls bowled, total number of wickets taken and innings run rate remains a significant indicator of success across all environments and as such, the recommendations from the overall study seem to apply in different conditions around the world. From a batting perspective, the average winning score is almost 20 runs higher in sub-continent conditions, with the first 6 over powerplay scores particularly high in sub-continent and Middle Eastern conditions. A lower more conservative powerplay score in English conditions may be reflective of conditions that will swing and seam early on, making stroke play more difficult, but is counteracted by a high run rate (9.2) towards the end of the innings. In contrast, the lower run rate at the death in sub-continent and Middle Eastern conditions could be due to the effect of reverse swing in the latter overs and certain bowlers ability to execute death skills and slower balls more consistently in these conditions.

With regard to bowling, although the total numbers of wickets taken are relatively similar across the four environments, the importance of wicket taking at certain stages seems to differ quite substantially. The lower number of wickets taken in the first six-over powerplay in English and sub-continent conditions may be reflective of the batters conservative approach and the advantageous batting conditions, respectively. In contrast, the high number of wickets at the start and end of an innings in Middle Eastern conditions counteract the very low number of wickets taken during the middle phases (overs 7–14), where the generally unresponsive wickets make it very difficult for the bowling side to dismiss batsmen during periods of consolidation.

Whilst this study has brought to light new areas of research and updated previously analysed matches, it can be developed further in order to provide coaches and players with more useful information to devise tactics and strategies. Although there was a distinction made between seam and spin bowlers, the style of bowler can be broken down further in order to give greater detail about the types of bowler that are suited to certain conditions and what bowlers should be deployed at certain points of the game. As in past studies (Moore et al., 2012; Najdan et al., 2014), batters scoring areas and bowlers pitch maps can also be incorporated, to provide an extra layer of detail about the zones batters tend to score in and most effective areas for bowlers depending on the conditions and stage of the game. To develop this further it would be worth examining the types of delivery (e.g. slower balls or outswingers) to see if the most effective style of delivery varies depending on environmental conditions. Information such as the effectiveness of slower balls into the wicket in sub-continent conditions, or the need for seam or swing movement in English conditions can increase the relevance and effectiveness of the tactics and strategies that are devised from these findings.

5. Conclusion

This study has built upon existing research in this area to identify the performance indicators that most significantly affect a game of international T20 cricket. Batting strategy should focus on maximising run rate throughout the entire innings, with a particular focus on the first and last six overs of the innings. Batters with high strike rates or batting index should be selected where possible and utilised during the appropriate phases of the game. The importance of boundary hitting was also emphasised and “power hitters” should look to be both selected and developed by teams. Bowling sides should set more attacking fields and select wicket taking bowlers to increase the number of wickets taken and maximise the number of dot balls bowled. These bowlers should also be deployed during the 7–10 over block, in addition to stages of the first and last 6 overs of an innings as previously suggested. Furthermore, it seems the main indicators of success remain consistent across different cricketing environments, with run scoring and batting determinants generally higher in sub-continent conditions.

Disclosure statement

No potential conflict of interest was reported by the authors.

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