

The effect of Experimental Law Variations on the Super 14 Rugby Union Tournaments

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Abstract

The aim of this study was to determine whether experimental law variations (ELV) was effective in making rugby union matches more appealing to spectators by improving continuity. All the teams of the 2006 and 2008 Super 14 rugby tournament were used in this study. Three hundred and seventy games were recorded on video and analysed by means of the Opta Sports Data software package (Opta Sportsdata Limited, Harrogate, United Kingdom, 2005). The frequency of the following performance indicators (PI) were used to address the aim of this study: Scrums, tackles, line-outs, meters gained, passes made, penalties conceded, tries scored, rucks formed and defence beaten. The frequency of PI from the various seasons was compared with one another. The results obtained were then used in mathematical calculations to determine practical significance by means of Cohan's effect sizes. The number of scrums and line-outs decreased with a large practical significant value ($d \geq 0.8$). In contrast to this, the number of tackles made, meters gained and penalties conceded all increased with a large practical significant value over the two seasons. A medium size value was found for frequency of rucks, defence beaten and passes made. The increase in action activities that promote continuity suggests that the IRB have succeeded in addressing their objective of increasing the appeal of the game with the introduction of the ELVs.

Keywords: Rugby union, game analysis, rule changes, performance indicators.

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Introduction

Sport consistently changes over time due to either technological advances and/or rule changes (Sheridan, 2007). According to Kew (1987) rule changes in contact sports can be mostly accredited to the sustainability of the viability of the sport. A problem that occurs during the adjustment of rules is that the legislators have to anticipate the effect that the rule changes would have on the sport. These anticipations are seldom evaluated and according to Eaves, Hughes and Lamb (2005) when these anticipations are evaluated the results often indicated that the desired outcomes of the new implemented rules was unsuccessful. Rugby Union

is probably a sport code that has gone through rule changes and adjustments the most. One such an era was when rugby union turned professional in 1995.

The sport became more business-orientated and the financial viability of rugby union became a great concern with crowd attendances and broadcasting rites earning the most attention (Owen & Weatherston, 2004). Research indicates that open attacking play significantly discriminates the most from all the variables that could influence crowd attendances (Owen & Weatherston, 2004). This statement was supported by Eaves and Hughes (2003) who described fast, dynamic and physical matches as the best way to attract more spectators which in turn would lead to significant commercial value.

It was therefore welcomed when the International Rugby Board (IRB) introduced the Experimental Law Variations (ELVs) in the 2008 Super 14 rugby union tournament (Lapasset, 2008) with the **enhancement of predilection** of the game and a decrease in **match-related injuries** as their motivation (Fuller, Raftery, Readhead, Targett & Molley, 2009).

Until recently, extensive research has been done on match-related injuries on rugby union with the studies of Quarrie *et al.* (1996), Fuller, Brooks, Cancea, Hall and Kemp (2007), Gianotti, Hume, Hopkins, Harawira and Truman (2008) and Quarrie and Hopkins (2008), to name just a few. Fuller *et al.* (2009) conducted a study to evaluate how effective the introduction of the ELVs was on addressing the correlation that existed on injury occurrence. The injury occurrence during the 2008 Super 14 and Vodacom provincial rugby competitions (that made use of the ELVs) was compared with results from the English premiership competition in the Northern Hemisphere (which did not make use of the ELVs). With regard to injury occurrence, it seemed that no significant differences were brought about. However, Fuller *et al.* (2007) did not give any attention to the other reason for introducing the ELVs, which begs the question: Did the ELVs make rugby more appealing to the spectators?

Eaves *et al.* (2005) and Williams, Hughes and O'Donoghue (2005) conducted studies in which they examined the effect of rule changes on specific sport codes. Both studies indicated computer notational analysis (CNA) to be the best method for examining match data. Although Handcock (1993) and Hughes and Franks (2007) warned that game/sports are notoriously difficult to analyse, the value of CNA is expressed by several researchers (Hughes & Williams, 1988; Rees, 1996; Newell, 2004; Botha, 2005; Reed & O'Donoghue, 2005; Baca, 2006; and Eaves *et al.*, 2005) stating objectivity as the biggest advantage of CNA.

CNA focuses either on time-motion analysis, in which the time and different movement activities are analysed, such as the work done by Duthie, Pyne and

Hooper (2005), Roberts, Trewartha and Stokes (2006) and Deutch, Kearney and Rehner (2007), or on the physiological and skills requirements of the individual participants in rugby union such as work done by Duthie *et al.* (2003), Scott *et al.* (2003), De La Porte and Spamer (2006) and Plotz and Spamer (2006).

McLean (1992), however, stated that the game must be analysed in totality instead of concentrating on individuals or individual actions, due to the fact that the game is intermittent. In addition, O'Donoghue (2006) stated that CNA could be a great asset to the analysis of performance indicators (PI). Hughes and Bartlett (2002) concurred and strongly advised that the focus should be redirected to determining how PIs could influence the game. In this regard PI can be defined as "a selection or combination of action variables that aims to define some or all aspects of a performance" – especially applicable during rugby matches (Hughes & Bartlett, 2002).

PI can be classified into scoring indicators and indicators related to the quality of the performance (Hughes & Bartlett, 2007). These PI are used in either media coverage or match classifications. Match classifications are defined as analyses in which the relevant PI are measured against previous performances of the same team or those of the opposition. According to Hughes, Evans and Wells (2001), PI can also be used to compile performance profiles for a specific sport code. Such a profile can then further be used to analyse the sport code. However, choosing the correct PIs to analyse sport is crucial (O'Donoghue, 2008).

Previous research that examined rugby union with the aid of PI produced diverse findings. By using PI to examine how rugby union has changed since the introduction of professional status, Eaves and Hughes (2003) found significant differences with regard to the frequency of rucks and ball-in-play. Bracewell, Meyer and Ganesh (2003) used various PI to develop a system that could be used to rate the performance of different players. Coetzee and Van den Berg (2007) investigated which PI discriminated most between the successful and less successful South African tertiary institution rugby teams during the 2004 Varsity Cup. The results indicated that percent tackles made, percent good line-outs, percent good scrums and number of kick-offs discriminated best between successful and less successful teams. Sasaki *et al.* (2007) investigated the effect of PI with relation to scoring and found that bad defence and turnover ball possession played a large part in scoring tries. Hughes and White (1997) used PI to compare the patterns in play of the forwards between successful and less successful teams. They found that frontline players in successful teams performed better than those in the less successful teams with regard to line-outs, rucks and mauls.

As previously mentioned, the process of selecting the correct PI in order to analyse the match is very important. Jones, Mellalieu and James (2002)

conducted a study in which a list was compiled to determine the PI that affected performance in rugby union. The list was compiled in the following manner: First the PI used by previous studies was gathered. Then a panel of three computer notational analysts with 40 years of combined experience and three elite coaches with 50 years of combined experience examined the list critically. Their findings, together with Hughes and Bartlett's (2002) advice that ratios or percentages had to be used for some PI, were all considered to draft the following list of PI: percent successful scrums, percent successful line-outs, percent successful rucks, percent successful tackles made, percent line-breaks, passes made, penalties conceded and tries scored.

The following research question was formulated based on the previous literature: Did the ELVs make Super 14 rugby more appealing to the spectators through continuity? This question was answered by evaluating PI by means of CNA. However, the focus was only on quantities as suggested by Hughes and Bartlett (2002), because performance was not so much evaluated as the profile of the sport itself.

The results of this study could serve as an evaluation of the effectiveness of the ELVs and might influence other role players more positive towards the rule changes.

Method

Research design

The design of this study was an observational, descriptive and *ex post facto* design.

Sample population

All the Super 14 rugby teams who participated in the competition during the 2006 and 2008 rugby season were used in this study. These included the following teams in alphabetical order: Blues, Brumbies, Bulls, Cats, Cheetahs, Chiefs, Crusaders, Highlanders, Hurricanes, Reds Sharks, Stormers, Waratahs and Western Force (Harmse, 2006).

Procedures of data management:

Three hundred and seventy games were recorded on video and analysed by means of the Opta Sports Data software package (Opta Sportsdata Limited, Harrogate, United Kingdom). The analyses were performed by the Opta Sportsdata Company itself. The 2006 data were provided to SARugby.com (2006) and the 2008 data were provided directly to the researchers. Written permission was obtained from SARugby.com to use their data for research

purposes. The data of the 2007 Super 14 season were disregarded due to New Zealand's decision to withhold all their national players from most of the tournaments in 2007 due to the Rugby World Cup also taking place in that year.

Statistical Procedures

The Statistical Consultation Services of The North-West University determined the statistical methods and procedures for the analyses of the research data. The Statistical Data Processing package (Statsoft Inc., 2010) was used to process the data. Initially a power calculation was done to determine the stability of the data based on the size of the tested population. Hughes *et al.* (2001) suggested that a sample size of at least seven matches had to be analysed in order to consider the data as normative. Analysing three hundred and seventy games does therefore give an acceptable stability rating. The power calculation was followed by descriptive statistics, and an independent t-test was done to determine the statistically significant differences between the PIs of the two seasons. Due to the fact that this is an inferential study, the p-value of < 0.5 was not used to determine significant differences. Instead, practical significance of differences between the variables was determined by means of Cohen's effect sizes (ES): an ES of 0.8 or larger is regarded as a large practical significance, an ES between 0.79 and 0.21 as medium and an ES of 0.2 or smaller as small (Cohen, 1988).

Results and Discussion

The descriptive statistics of the PIs for all the rugby teams of both the 2006 and 2008 Super 14 rugby union seasons are presented in Table 1. The independent t-test results as well as the practically significant values, determined by means of Cohen's effect sizes, are also indicated.

Table 1: Descriptive statistics and the independent t-test results of the different performance indicators for the 2006 and 2008 Super 14 rugby seasons

Performance Indicator (frequency)	2006 Mean	2008 Mean	Cohen's effect size = d
Scrum	142.29	130.79	0.94 ^{ΔΔΔ}
Tackle	1322.36	1418.78	0.97 ^{ΔΔΔ}
Line-outs	216.86	167.5	2.18 ^{ΔΔΔ}
Meters gained	5342.36	6208.93	1.09 ^{ΔΔΔ}
Passes	1437.29	1548.64	0.49 ^Δ
Penalties conceded	140.14	155.97	0.86 ^{ΔΔΔ}
Tries scored	33.5	34.5	0.12
Rucks won	820.29	874.7	0.49 ^{ΔΔ}
Beat defence	155.14	172	0.42 ^{ΔΔ}

ES = ^Δ d < 0.2=small; ^{ΔΔ} d = 0.2 -0.79=medium; ^{ΔΔΔ} d ≥ 0.8=large

The comparison of the PIs between the 2006 and 2008 Super 14 seasons indicated that the number of scrums and line-outs decreased practically significantly ($d \geq 0.8$). In contrast to this, the number of tackles made, meters gained and penalties conceded all increased with a large practical significance ($d \geq 0.8$) over the two seasons. Moderate practical significance was found in comparing rucks won, beat defence and passes made, where the 2008 season had the highest frequency in all of these PIs.

The large practical significant decrease in the frequency of scrums found in this study ($d=0.95$) was in line with that found by Eaves *et al.* (2005) and Quarrie and Hopkins (2007). However, all of these studies, found a non-significant but moderate decrease in the frequency of scrums. The researchers believed that the reason for this decrease may be credited to the fact that players spend more time training handling skills and pitch technologies that made handling easier. In addition to this, referees also played the advantage rule more often in order to create less static activities during play (as indicated by the significant increase in meters gained), thus increasing the flow of the game to the delight of the spectators. The decrease in scrum frequency does raise some concerns, especially as observed by Milburn (1993) and Gianotti *et al.* (2008) who emphasized the importance of scrums, claiming that scrimmaging epitomises the physical nature of rugby. The reasons for the decrease in scrums may be due to the new ELV 20 that restricts the opposition back-line to a 5-meter off-side line. This allows more space and time for the backline players to run with the ball which in turn probably leads to fewer handling errors. Another reason for the decrease in scrums may be related to ELVs 7-10 which were all configured to ensure clean line-out balls; thus reducing handling errors in the line-out resulting in less scrums.

The medium practical significant decrease in line-outs found in this study ($d= 2.18$) corroborate with the findings of Eaves *et al.* (2005) who found significantly less line-outs during the professional era (after 1995) compared to the amateur era (before 1995). Although no significant decreases were found by Quarrie and Hopkins (2007), a decrease in line-outs of a moderate value was detected. They accredited this decrease in line-outs to rule changes that caused teams to contest the opposition's ball more with a larger percentage of success. The reason for the decrease in line-outs in this study may be explained by the ELV 5 which had the intention of less line-outs due to safer quick throw-in balls.

The large practical significant increase of penalties ($d=0.86$) found in this study, does not agree with the results of Van Rooyen, Lambert and Noakes (2006). The latter study investigated which PIs discriminated between four teams during the 2003 Rugby World Cup tournament and found no significant differences. The reason for the difference in the findings of this study and that of Van Rooyen *et al.* (2006) may be that the current study compared the penalty count over two

different seasons with law changes in-between, where Van Rooyen's study compared the penalty count for different teams in the same season. It is therefore the researchers' assumption that the penalty count significantly increased in this study, because the players were still adapting to the new laws.

A large practical significant increase was also found for tackles made ($d=0.97$) and meters gained ($d=1.09$). In line with this finding, Quarrie and Hopkins (2008) also found a large increase in the frequency of tackles made since rugby turned professional in 1995. Coetzee and Van den Berg (2007) did, however, determine that there was a statistically significant difference for effective tackles made between successful and less successful South African tertiary-level rugby teams. To the knowledge of the researchers, no studies could be found where meters gained were examined. The reason for the increase in tackles and meters gained may both be due to the ELVs 4 and 5. These laws encourage players to take a quick throw-in of the ball and prevent them from kicking the ball directly into touch. This probably leads to more counterattacks which in turn lead to more tackles made and meters gained during the match. Despite the fact that numerous PIs were practically significantly different, it did not have any significant effect on the number of tries scored.

Conclusion and Recommendation

In conclusion, this study demonstrated a practically significant decrease in the number of scrums and line-outs between the 2006 and 2008 Super 14 season. There was also a practically significant increase for the frequency tackles made, meters gained and penalties conceded. Values of medium size were found for frequency of rucks, beat defence and passes made.

The practical significant decrease in static activities (scrums and line-outs) as well as the practical significant increase in action-related activities (tackles made and meters gained) indicated that the effect of the new laws on rugby union is eminent. It does appear as if the ELVs led to more continuity and action-orientated rugby games. One can only assume that the appeal of the game will increase even more among the spectators once the players have adapted to the new laws, and the penalty count has decreased. It is therefore the belief of the researchers that the IRB have succeeded in addressing their objective of increasing the appeal of the game with the introduction of the ELVs.

It is recommended that future studies should investigate the time it took the players to adapt to new laws and what effect that adaptation time had on the popularity of the game. Another recommendation for a research study could be to determine how many times the laws of rugby union have changed in correlation with other sport codes.

References

- Baca, A. (2006). Innovative diagnostic methods in elite sport. *International Journal of Performance Analysis in Sport*, 6(2), 148-156.
- Botha, Z. (2005). Science and sport: Athletes and sports teams turn to technology to gain winning edge. *Engineering News*, 16, 11.
- Bracewell, P.J., Meyer, D. & Ganesh, D. (2003). Creating and monitoring meaningful individual rugby ratings. *Research Letters in the Information and Mathematical Sciences*, 4, 19-21.
- Coetzee, B. & Van den Berg, P. H. (2007). Game analysis of the eight top ranked tertiary institution rugby teams in South Africa. *Journal of Human Movement Studies*, 52(1), 49-63.
- Cohen, J. (1988). Statistical power analysis for the behavioural sciences (2nd ed.). Hillsdale: Erlbaum, p. 567.
- De la Porte, Y. & Spamer, E.J. (2006). The physical and game skills profile of the elite South African schoolboy rugby player. *Journal of Human Movement Studies*, 51, 291-306.
- Deutsch, M.U., Kearney, G.A. & Rehrer, N.J. (2007). Time-motion analysis of professional rugby union players during match-play. *Journal of Sports Sciences*, 25(4), 461-472.
- Duthie, G., Pyne, D. & Hooper, S. (2003). Applied physiology and game analysis of rugby union. *Sports Medicine*, 33(13), 973-991.
- Duthie, G., Pyne, D. & Hooper, S. (2005). Time motion analysis of 2001 and 2002 super 12 rugby. *Journal of Sports Sciences*, 23(5), 523-530.
- Eaves, S. & Hughes, M. (2003). Patterns of play of international rugby union teams before and after the introduction of professional status. *International Journal of Performance Analysis in Sport*, 3(2), 103-111.
- Eaves, S. & Hughes, M.D. & Lamb, K. L. (2005). The consequences of the introduction of playing status on game action variables in international northern hemisphere rugby union football. *International Journal of Performance Analysis in Sport*, 5(2), 58-86.
- Fuller, C.W., Brooks, J.H.M., CANCEA R.J., Hall, J. & Kemp, S.P.T. (2007). Contact events in rugby union and their propensity to cause injury. *British Journal of Sport Medicine*, 41, 862-867.
- Fuller, C.W., Raftery, M., Readhead, C., Targett, G.R. & Molloy, M.G. (2009). Impact of the International rugby board's experimental law variations on the incidence and nature of match injuries in southern hemisphere professional rugby union. *South African Medical Journal*, 99(4), 232-237.

- Gianotti, S., Hume, P.A., Hopkins, W.G., Harawira, J. & Truman, T. (2008). Interim evaluation of the effect of a new scrum law on neck and back injuries in rugby union. *British Journal of Sports Medicine*, 42(6), 427-430.
- Handcock, P. (1993). Physical preparation for rugby union. *Journal of Physical Education*, New Zealand, 26(3), 7-9.
- Harmse, J.J. (2006). Sport. Rapport:1, May, 7.
- Hughes, M. & Williams, D. (1988). The development and application of a computerized rugby union notation system. *Journal of Sports Sciences*, 6, 254-255.
- Hughes, M.D. & White, P. (1997). An analysis of forward play in the 1991 rugby union World Cup for men. In M.D. Hughes (Ed.), *Notational Analysis of Sport - I and II* (pp. 183-191). Cardiff: University of Wales Institute.
- Hughes, M., Evans, S. & Wells, J. (2001). Establishing normative profiles in performance analysis. *International Journal of Performance Analysis in Sport*, 1(1), 1-21.
- Hughes, M. & Bartlett, R.M. (2002). The use of performance indicators in performance analysis. *Journal of Sports Sciences*, 20, 739-754.
- Hughes, M. & Bartlett, R.M. (2007). Notational analysis of sport. In M. Hughes & I.M. Franks (Eds.), *The Use of Performance Indicators in Performance Analysis* (pp. 166-188). London and New York: Routledge.
- Hughes, M. & Franks, I.M. (2007). Notational analysis of sport. In M. Hughes & I.M. Franks (Eds.), *Notational Analysis – A Review of the Literature* (pp. 59-106). London and New York: Routledge.
- Jones, N.M.P., Mellalieu, S.D. & James, N. (2002). Team performance indicators as a function of winning and losing in rugby union. *International Journal of Performance Analysis in Sport*, 4(1), 61-71.
- Kew, F. (1987). Contested rules: An explanation of how games changed. *International Review for the Sociology of Sport*, 22(2), 125-135.
- Lappaset, B. (2008). The international rugby board guide to experimental law variations [Web]:<https://portal.irb.com/Training/Shared%20Docs%20%20ENG/ELV%20guide/ELV%20Guide%20EN.pdf> [Date of use: 6 Jan.2010].
- McClean, D.A. (1992). Analysis of the physical demands of international rugby union. *Journal of Sports Sciences*, 10, 285-296.
- Milburn, P.D. (1993). Biomechanics of rugby union scrummaging: Technical and safety issues. *Sport Medicine*, 16(3), 168-179.
- Newell, K. (2004). Winning solutions. *Coach and Athletic Director*, 74(2), 54-60.

- O'Donoghue, P. (2006). The use of feedback videos in sport. *International Journal of Performance Analysis in Sport*, 6(2), 1-14.
- O'Donoghue, P. (2007). Reliability issues in performance analysis. *International Journal of Performance Analysis in Sport*, 7(1), 1-14.
- O'Donoghue, P. (2008). Principal components analysis in the selection of key performance indicators in sport. *International Journal of Performance Analysis in Sport*, 8(3), 145-155.
- Owen, P.D. & Weatherston, C.R. (2004). Uncertainty of outcome and super 12 rugby union attendance: Application of a general-to-specific modelling strategy. *Journal of Sports Economics*, 5(4), 347-370.
- Plotz, A.F. & Spamer, M.J. (2006). A comparison of talented South African and English youth rugby players with reference to game specific-, anthropometric-, physical and motor variables. *South African Journal for Research in Sport, Physical Education and Recreation*, 28(1), 101-107.
- Quarrie, K.L., Handcock, P., Waller, A.E., Toomeys, M.J. & Chalmers, D.J. (1996). The New Zealand rugby injury and performance project. *British Journal of Sports Medicine*, 30, 53-56.
- Quarrie, K.L. & Hopkins, W.G. (2007). Changes in player characteristics and match activities in Bledisloe cup rugby union from 1972 to 2004. *Journal of Sports Sciences*, 25(8), 895-903.
- Quarrie, K.L. & Hopkins, W.G. (2008). Tackle injuries in professional rugby union. *The American Journal of Sports Medicine*, 36(9), 1705-1716.
- Roberts, S., Trewartha, G. & Stokes, K. (2006). A comparison of time-motion analysis methods for field-based sports. *International Journal of Sports Physiology and Performance*, 1, 388-399.
- Reed, D. & O'Donoghue, P. (2005). Development and application of computer-based prediction methods. *International Journal of Performance Analysis in Sport*, 5(3), 12-28, D.
- Rees, D. (1996). Let's go to the video! *Coach and Athletic Director*, 65(6), 26-27.
- Sarugby.com (2006). Stats centre. [Web:] http://www.sarugby.com/news/Stats_Centre/catid=14.html [Date of access: 7 Aug. 2006].
- Sasaki, K., Furukawa, T., Murakami, J., Shimozono, H., Nagamatsu, M., Miyao, M., Yamamoto, T., Watanabe, I., Yasugahira, H., SAITO, T., Ueno, Y., Katsuta, T. & Kono, I. (2007). Scoring profiles and defence performance analysis in rugby union. *International Journal of Performance Analysis in Sport*, 7(3), 46-53.

Scott, A.C., Roe, N., Coats, A.J.S. & Piepoli, M.F. (2003). Aerobic exercise physiology in a professional rugby union team. *International Journal of Cardiology*, 87, 173-177.

Sheridan, H. (2007). Evaluating technical and technological innovations in sport: Why fair play isn't enough? *Journal of Sport and Social Issues*, 31(2), 179-194.

Statsoft, INC. (2010). Statistica (data analysis software system), version 7 www.statsoft.com. Date of access: 14 January 2010.

Van Rooyen, M.K., Lambert, M.I. & Noakes, T.D. (2006). A retrospective analysis of the IRB statistics and video analysis of match play to explain the performance of four teams in the 2003 rugby world cup, *International Journal of Performance Analysis in Sport*, 6(1), 57-72.

Williams, J., Hughes, M. & O'Donogue, P. (2005). The effect of rule changes on match and ball in play time in rugby union. *International Journal of Performance Analysis in Sport*, 5(3), 1-11.