Development of a competitive intelligence process framework and survey for cricket coaches

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DECLARATION

The co-authors of the five articles, which form part of this thesis, Prof Ben Coetzee (Promoter), Prof Seugnet Blignaut (co-promoter) and Prof Martie Mearns (co-promoter) hereby give permission to the candidate, Mrs Liandi van den berg to include five articles as part of the PhD thesis. The contribution (advisory and supportive) of the co-authors was kept within reasonable limits, thereby enabling the candidate to submit this thesis for examination purposes. This thesis, therefore, serves as fulfilment of the requirements for the degree Doctor of Philosophy within PhASRec (Physical Activity, Sport and Recreation Focus Area) in the Faculty of Health Sciences at the North-West University (Potchefstroom Campus)

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DEDICATION

I dedicate this thesis to my two daughters,

Liné and Therése

You throw love and kindness

around like confetti

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“The LORD is my portion and my inheritance,” says my soul; “Therefore, I have hope in Him and wait expectantly for Him.” Lam 3:24 Amplified Bible

SUMMARY

Available studies do not provide a systematic and formalized structure for the sport performance analysis (PA) and coaching domain, according to which activities of coaches and support staff that are related to data collection and analysis for decision making, can be directed. However, in the business competitive intelligence (CI) domain the 4Cs process model of Weiss (2002) may serve as a theoretical framework to investigate the phenomenon of CI in the cricket coaching domain. In view of this background the theoretical objective of this study was to evaluate the relevancy of the business CI process to the sport performance analysis (PA) domain as part of the coaching process in sport and specifically cricket by using a systematic literature review (SLR). The empirical objectives of the study were as follows: to identify the key intelligence topics (KITs) of cricket coaches, using the 4Cs CI process model of Weiss (2002) as a framework and incorporating existing knowledge regarding cricket specific key performance indicators (KPIs); to identify the data collection properties of cricket coaches, using the first stage of the 4Cs CI process model of Weiss (2002) as framework; to provide a conceptual CI framework specifically developed for cricket coaches based on the 4Cs CI business process model as a theoretical foundation and to create a CI survey for cricket coaches by following the proposed five step process of Gehlbach and Brinkworth (2011).

To fulfil the above-mentioned objectives, a partially mixed sequential dominant status multi-mode research design was completed in three phases. The first phase consisted of the qualitative dominant phase whereby the SLR was performed and a preliminary interview schedule developed and qualitatively formalised. The second phase also consisted of a qualitative process during which interviews were conducted with high level cricket coaches and their support staff. The constant comparative method (CCM) was used together with the development of a codebook in order to systematically analyse the qualitative interview data through ATLAS.TI™, computer assisted qualitative analysis software. The CCM of continuous and simultaneous interview and data analysis processes were performed until data saturation.

The document analysis that was performed as part of the SLR showed substantial agreement between the business CI and the sport PA domains with regard to the four stages of the CI model. Furthermore, the SLR rendered the following five themes for the CI process of both

domains: data collection, conversion, communication, countering and the CI process as a whole. The differences and similarities between the two domains were explored within these five themes. Therefore, themes were presented as combined data networks that indicated the occurrence of the CI activities within both domains. Findings of the SLR suggested that the majority of activities within different stages of the business CI process are similar to sport PA activities that coaches follow as part of the coaching process. Despite the applicability of the CI process to the PA domain, clear differences between the two domains were also observed. These differences indicated the need for further research into the specific properties such as data collection activities and the identification of key intelligence needs (KINs), as well as the different stages of the CI process that cricket coaches perform.

Interview data was qualitatively analysed and was used to fulfil the second objective of the study, which indicated that cricket coaches' informational needs could be translated into all three of the business type KITs, namely strategic, early warning, and key player KITs. However, coaches identified inadequate exclusive strategic decision and early warning type KITs, and over-emphasized key player KITs. The identification of key performance indicators (KPIs) by coaches as part of the PA domain, were classified as a key player type KIT, since it provides information and a greater understanding of opposition. The comparison of KPIs in light of KITs and its function within the CI process, indicated that KPIs are inadequate to be used exclusively for intelligence creation, but need to be incorporated into the KITs identification and CI process. The identified KITs, with incorporated KPIs, were successfully linked to three out of the four kinds of knowledge which is created as part of the countering stage of the 4Cs CI process model.

For the fulfilment of the third objective of the study, data were also analysed qualitatively. The analysis of interview data extended to the whole data collection process and all properties of cricket coaches and support staff regarding these aspects. Overall, coaches indicated that they make use of various sources of information on competitors, own team and the environment. Data collection was usually performed by numerous persons within the team set-up and a variety of information formats were utilised. The main findings indicated that easily available sources were not effectively utilized, data collection processes were not performed in a structured manner and coaches need skill development regarding data collection and analysis. Furthermore, the lack of technology as well as the absence of a person who can collect data and a shortage of skills by the person who is responsible for data collection, were the main challenges coaches face.

The fourth objective of the study was achieved by analysing data quantitatively. A tree clustering, single-linkage, 1-Pearson Correlation Coefficient cluster analysis dendrogram of all quantitized coded interview data indices was used to identify five themes, each with sub-categories. The categories were created by conceptually concatenating the clustered codes. Therefore, a CI framework with the following themes was developed for cricket coaches: a) Strategy design, b) Review, c) Information transmission, d) CI process dynamics and e) Information parameters. The themes, together with the inter-relatedness of sub-categories, were described in light of the new framework. The newly developed framework provides coaches with a comprehensive and systematic approach that can be employed to create CI.

The newly developed CI framework was used as a foundation to fulfil the fifth objective of the study according to the five step process of Gehlbach and Brinkworth (2011). The five themes identified from the dendrogram were used as subscales, and the categories within each theme were converted into item questions. The CI survey for cricket coaches was quantitatively and qualitatively analysed by a panel of experts which resulted in acceptable content (content validity index (CVI) = 0.99) and face validity. The clarity average score was found to be 0.95. The inter-rater agreement (IRA) values on the representativeness and clarity were 0.96 and 0.82, respectively which is more than the acceptable norm of 0.80. Preliminary factorial validity was calculated to be 0.99, which can be categorised as a very high score. The newly developed CI survey is unique and its use will shed light on the dearth of knowledge regarding coaches' strategy design, review and information transmission processes, and will also indicate how they deal with CI process dynamics and address information parameters.

This study is the first of its kind within the sport domain to have investigated the encompassing CI activities of cricket coaches using the business 4Cs CI process model as a framework. The in-depth research regarding similarities and differences between the CI and PA domains, as well as results with regard to the KITs and data collection properties of coaches, aided in the development of the CI framework. The newly developed framework process will guide coaches to focus on competitor analysis in a systematic manner, while the CI survey will aid to identify strengths and weaknesses of coaches during this process.

Key words: business competitive intelligence, sport performance analysis, cricket, coaching, competitor analysis, key intelligence topics, data collection, framework, survey

OPSOMMING

Beskikbare studies bied nie ’n sistematiese en formele struktuur vir die sportprestasieanalise- (PA) en afrigtingdomein, waarvolgens die aktiwiteite van afrigters en ondersteuningspersoneel wat verband hou met data-insameling en -analise vir besluitneming, gerig kan word nie. In die besigheid mededingende intelligensie (MI) domein bestaan daar egter die 4Cs proses model van Weiss (2002) wat as ’n teoretiese raamwerk gebruik kan word om die verskynsel van MI in die krieketafrigting-domein te ondersoek. In die lig van hierdie agtergrond is die teoretiese doelwit van die studie om die toepaslikheid van die besigheid MI-proses tot die sport PA-domein te ondersoek as deel van die afrigtingsproses in sport en spesifiek krieket deur die gebruik van ’n sistematiese literatuurondersoek (SLO). Die empiriese doelwitte van die studie is as volg: om die sleutel-intelligensieonderwerpe (SIO) van krieketafrigters te identifiseer deur gebruik te maak van die 4Cs proses model van Weiss (2002) as ’n raamwerk en om bestaande kennis aangaande krieketspesifieke sleutelprestasie-indikatore (SPI) daarby te inkorporeer; om die data insamelingseienskappe van krieketafrigters te identifiseer wat gebaseer is op die eerste stadium van die 4Cs proses model van Weiss (2002); om ’n konseptuele MI raamwerk spesifiek vir krieketafrigters te ontwikkel wat op die 4Cs MI besigheidsproses-model as ’n teoretiese raamwerk gefundeer is, en die ontwikkeling van ’n MI vraelys vir krieketafrigters deur die vyf-stap-proses van Gehlbach en Brinkworth (2011) te volg.

Die studie het gebruik gemaak van ’n gedeeltelike gemengde, opeenvolgende dominante status, meervoudige wyse, navorsingsontwerp wat in drie fases afgehandel is om die bogenoemde doelwitte te bereik. Die eerste fase het bestaan uit die dominante kwalitatiewe fase waartydens die SLO uitgevoer is en die voorlopige onderhoudskedule ontwikkel en kwalitatief geformaliseer is. Die konstante vergelykende metode (KVM) is saam met die ontwikkeling van ’n kodeboek gebruik om ’n sistematiese analise van die kwalitatiewe onderhoudsdata uit te voer deur gebruik te maak van ATLAS.TI™, rekenaargesteunde kwalitatiewe analise sagteware. Die KVM van deurlopende en gelyktydige onderhoud- en data-ontledingsprosesse is uitgevoer totdat dataversadiging bereik is.

Die dokumentanalise wat uitgevoer is as deel van die SLO het ’n groot mate van ooreenstemming tussen die besigheid- en sport PA-domeine met betrekking tot die vier stadiums van die MI

model uitgewys. Verder het die SLO die volgende vir die MI van beide domeine opgelewer: data-insameling, -analise, kommunikasie, teenkanting en die MI proses as geheel. Die verskille en ooreenstemminge tussen die twee domeine is ondersoek binne hierdie vyf temas. Die temas is voorgestel as gekombineerde datanetwerke wat die voorkoms van MI aktiwiteite binne beide domeine aangedui het. Bevindinge van die SLO stel voor dat die meerderheid van aktiwiteite binne die verskillende stadiums van die besigheids- MI-proses ooreenstem met die sport PA aktiwiteite wat afrigters volg as deel van die afrigtingsproses. Ten spyte van die toepasbaarheid van die MI-proses tot die PA-domein, is duidelike verskille tussen die twee domeine opgemerk. Hierdie verskille dui die behoefte aan vir verdere navorsing aangaande spesifieke aktiwiteite van die verskillende stadiums van die MI-proses wat krieketafrigters uitvoer.

Die kwalitatief geanaliseerde data is gebruik om die tweede doelwit van die studie te bereik en het aangedui dat krieketafrigters se inligtingsbehoeftes omgeskakel kan word in al drie die besigheids-tipe SIOs naamlik strategiese, vroeë waarskuwings en sleutelspeler SIOs. Afrigters het egter onvoldoende uitsluitlike strategiese en vroeë waarskuwing tipe SIOs geïdentifiseer en sleutelspeler SIOs oorbeklemtoon. Die identifisering van SPIs deur afrigters as deel van die PA–domein, is geklassifiseer as ’n sleutelspeler tipe SIO aangesien dit inligting en ’n beter verstaan van die opposisie meebring. Die vergelyking van die SPIs in die lig van die SIOs en die funksie daarvan binne die MI-proses, het aangedui dat SPIs onvoldoende is om uitsluitlik gebruik te word vir intelligensie-skepping, maar dat dit in die SIO-identifikasie en MI-proses inkorporeer moet word. Die geïdentifiseerde SIOs, wat SPIs insluit is suksesvol gekoppel aan drie uit die vier tipes kennis wat geskep is tydens die teenkanting-stadium van die 4Cs MI-prosesmodel.

Vir die bereiking van die derde doelwit van die studie is data ook kwalitatief geanaliseer. Die analise van die onderhoudsdata is uitgebrei tot die hele data-insamelingsproses en al die eienskappe van krieketafrigters en ondersteuningspersoneel rakende hierdie aspekte. Algeheel het afrigters aangedui dat hulle gebruik maak van verskeie bronne van inligting oor opponente, eie span en die omgewing. Datainsameling is gewoonlik deur ’n verskeidenheid van persone binne die spanverband uitgevoer en ’n verskeidenheid van inligtingsformate is gebruik. Die primêre bevinding het aangedui dat maklik bekombare bronne nie effektief ingespan is nie, dat die datainsamelingsproses nie op ’n gestruktureerde manier plaasgevind het nie, en dat afrigters vaardigheidsontwikkeling benodig met betrekking tot data-insameling en -analise. Voorts is die gebrek aan tegnologie sowel as die afwesigheid van ’n persoon wat die data kan insamel, en ’n

gebrek aan vaardighede by die persoon wat verantwoordelik is vir data-insameling, die primêre uitdagings wat afrigters moet trotseer.

Die vierde doelwit van die studie is behaal deur die data kwantitatief te analiseer. ’n Boom-groepering, enkel-koppeling 1-Pearson Korrelasiekoëffisiënt trosontledings-dendrogram van alle gekwantifiseerde, gekodeerde onderhouddata indekse is gebruik om vyf temas, elk met subkategorieë te identifiseer. Die kategorieë is ontwikkel deur die konseptuele samevoeging van gegroepeerde kodes. Die MI raamwerk met die volgende temas is ontwikkel vir krieketafrigters: a) Strategie-ontwerp, b) Oorsig, c) Inligtingsoordrag, d) MI-prosesdinamika en e) Inligtingsparameters. Die temas, tesame met die interverwantskap tussen subkategorieë is verduidelik in die lig van die nuwe raamwerk. Die nuut ontwikkelde raamwerk verskaf aan afrigters ’n omvattende en sistematiese benadering wat aangewend kan word om MI te skep.

Die nuut ontwikkelde MI raamwerk is as grondslag gebruik om die vyfde doel van die studie volgens die vyf-stapproses van Gehlback en Brinkworth (2011) te bereik. Die vyf temas wat uit die dendrogram geïdentifiseer is, is as sub-skale gebruik en die kategorieë binne elke tema is in item-vrae omskep. Die MI vraelys vir krieketafrigters is kwantitatief en kwalitatief deur ’n paneel kundiges geëvalueer wat tot aanvaarbare inhoud (inhouds-geldigheidsindeks (IGI) = 0.99) en gesigsgeldigheid gelei het. Die gemiddelde duidelikheidstelling is as 0.95 bevind. Die inter-beoordeelaar ooreenkoms (IVB)-waardes van die verteenwoordiging en duidelikheid was onderskeidelik 0.96 en 0.82, wat bo die aanvaarbare norm van 0.80 is. Voorlopige faktorgeldigheid is bereken as 0.99 wat as ’n baie hoë waarde gekategoriseer kan word. Die nuut ontwikkelde MI vraelys is uniek en die gebruik daarvan sal lig werp op die gebrekkige kennis rakende afrigters se strategie ontwerp-, oorsig- en inligtingsoordrag-prosesse asook toon hoe hulle die MI proses dinamiek en inligtingsparameters hanteer.

Volgens die navorsers se kennis, is hierdie studie die eerste van sy soort binne die sportdomein wat die omvattende MI aktiwiteite van krieketafrigters ondersoek het deur gebruik te maak van die 4Cs proses model as ’n raamwerk. Die indiepte ondersoek van die ooreenkomste en verskille tussen die MI- en PA-domeine, sowel as bevindinge ten opsigte van die SIOs en data insamelingseienskappe van afrigters het bygedra tot die ontwikkeling van die MI raamwerk. Die nuut ontwikkelde raamwerkproses sal afrigters rig om op ’n sistematiese wyse op opponent analise te fokus, terwyl die MI vraelys sal help om sterk- en swakpunte van afrigters tydens hierdie proses te identifiseer.

Sleutelwoorde: besigheid mededingende intelligensie, sport prestasie-analise, krieket, afrigting, mededinger-analise, sleutel intelligensie onderwerpe, data-insameling, raamwerk, opname

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LIST OF ABBREVIATIONS

4Cs	Collection, conversion, communication and countering
CAQDAS	Computer assisted qualitative data analysis system
CCM	Constant comparative method
CI	Competitive intelligence
CIDS	Competitive Intelligence Diagnostic Survey
CSA	Cricket South Africa
CVI	Content Validity Index
FVI	Factorial Validity Index
IRA	Inter-rater Agreement
KPI	Key performance indicator
KINs	Key intelligence needs
KITs	Key intelligence topics
NWU	North-West University
P1a	Participant number 1, comment a
PA	Performance analysis
SCIP	Strategic and Competitive Intelligence Professionals
SEM	Structured Equation Modelling
SLR	Systematic literature review
SWOT	Strengths, weaknesses, opportunities, threats
κ	Cohen's Kappa

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CHAPTER 1

PROBLEM STATEMENT



1. PROBLEM STATEMENT

The provision of appropriate information to sport coaches, support staff and athletes is essential for performance improvement and increasing competitiveness (McGarry, 2009b:136). Coaches, managers, athletes and support staff are to a certain degree involved in some or other form of information collection and analysis activities such as performance analysis through sophisticated data and video analysis software programmes (Hughes & Bartlett, 2002:740; Wright *et al.*, 2012a:449). However, the literature indicates limited processes, models or activities used by coaches for gathering and analysing information in a controlled and systematic manner (Cushion *et al.*, 2006; Gould *et al.*, 1990). Furthermore, existing models do not clarify definitive concepts and principles for gaining a competitive advantage (Cushion *et al.*, 2006:84; Gould *et al.*, 1990:323). Many coaches work without any reference to a coaching process model and base their training programmes and activities on intuition, feelings and previous experience (Cross, 1995:28; Cushion *et al.*, 2003:217; Gilbert & Trudel, 2001:18). Hence, it is unclear how coaches collect, process and use information during training and competition to obtain optimal results (Groom *et al.*, 2011:16). For this reason there was a need to clarify this multifaceted process and to develop more evidence-based theories and models that can guide coaches to gain a competitive advantage (Cushion *et al.*, 2006:84; Voight, 2007:420).

According to Chapalet and Bayle (cited by Van Hoeke *et al.*, 2013a:88), one of the greatest challenges for sport coaches is to ensure that they have the necessary skills to lead a high performing entity. In recent times this has included the utilization and adaptation of systems and processes from the traditional business environment to a sport context. In the business realm the term used to explain "a systematic and ethical program for gathering, analysing and managing external information that can affect your organization's plans, decisions and operations", is competitive intelligence (CI) (Weiss, 2002:41). In other words, CI is a management function used within the business realm to describe the legal collection of information on competitors and the overall business environment (Weiss, 2002:41). Although CI related activities are a fairly new occurrence in the South African business industry, it is one of the fastest growing domains (Muller, 2004:15) due to its use in strategic decision-making to enhance global business competitiveness (Sewdass & Du Toit, 2014:186).

Nonetheless, CI as a phenomenon has never been researched or implemented within the South African sport environment and worldwide very few studies have investigated CI in the sport industry (Hughes & Beasley, 2007:93). Hughes and Beasley (2007) investigated CI in each of

the five major professional United States' leagues: National Basketball Association, National Football League, Major League Baseball, National Hockey League and Major Soccer League. They investigated the use of CI, types of CI activities used, frequency of usage, perceived effectiveness of CI and the level of experience among administrators, management, owners, coaches, personnel and scouts. Results indicated that 62 percent of the major league teams use CI activities to provide direction with regard to personnel and players' decisions and to identify market opportunities (Hughes & Beasley, 2007:93). Another study indicated that 94.9 percent of all professional football clubs in Turkey completely or partly maintain CI activities (Varol, 2012a:4). These clubs' primary reasons for carrying out CI activities were to provide tender and transfer leverage to the club (40%) and to improve club image (38%) (Varol, 2012a:5). Although these studies investigated CI in a sporting environment, it was within a sport business operations context and not as a coaching function to gain a competitive advantage during competitions. This current study aimed to use the existing business CI process model as a framework to investigate the occurrence of the process elements and specific properties within a sport coaching context, where coaches engage in data collection and analysis with the aim to counter opposition strategies during competitions.

Various CI process cycles and models are utilized to describe the general steps followed by organizations to achieve a competitive advantage (Cloutier, 2013:66; Dishman & Calof, 2008b:779; Fleisher & Bensoussan, 2003:6; Weiss, 2002:43). However, literature indicates a need for the development of a universal CI process model (Pellissier & Nenzhelele, 2013:572) since diversified opinions and models exist which hamper the development of the CI domain (Du Toit & Muller, 2004:309). Pellissier and Nenzhelele (2013:569) indicated that the majority of models showed property similarities with overlapping stages and phases. The CI 4Cs process model of Weiss (2002:43) (see Figure 1) is a simple yet effective model and has potential for the exploration of the CI phenomenon in a sport coaching context. This model involves the collection, conversion, communication and countering of information (Weiss, 2002:43), where information consists of processed data, with data referring to symbols that represent the properties of objects and events (Ackoff, 1999:171). The difference between information and data is, therefore, functional and not structural, and when referred to as information, it includes data as well as represents the processes directed at increasing the usefulness of data (Ackoff, 1999:121). Each stage of the 4Cs process model includes a number of sub-processes of which the first is to define the user's key intelligence topics (KITs) (i.e. the nature and scope of the organisation's or user's intelligence needs) (Herring, 1999:4). The key intelligence needs (KINs)

are assigned to one of three functional KITs categories of: 1) strategic decisions and actions; 2) early-warning topics; and 3) descriptions of key players (Herring, 1999:4). The main objective of KITs is to provide the focus to conduct effective intelligence operations (Herring, 1999:4). Strategic decisions as a type of KIT, are very noticeable and provide the most tangible measure of intelligence success and value (Weiss, 2002:43). Player KITs very often include the full profile of a competitor, his/her strengths, weaknesses and general approach (Weiss, 2002:43). During this first stage, the intelligence user determines the KITs and the direction followed for data collection and analysis (Weiss, 2002:43). It is however seldom that the intelligence user, also referred to as the decision maker, will be involved in the conversion and analysis phase (Viviers *et al.*, 2002:28; Weiss, 2002:43). Large organizations have departments with numerous employees assigned to CI activities (Jaworski *et al.*, 2002:280), which correspond to support staff such as performance analysts in the sport coaching context (Lyons, 2005:161).

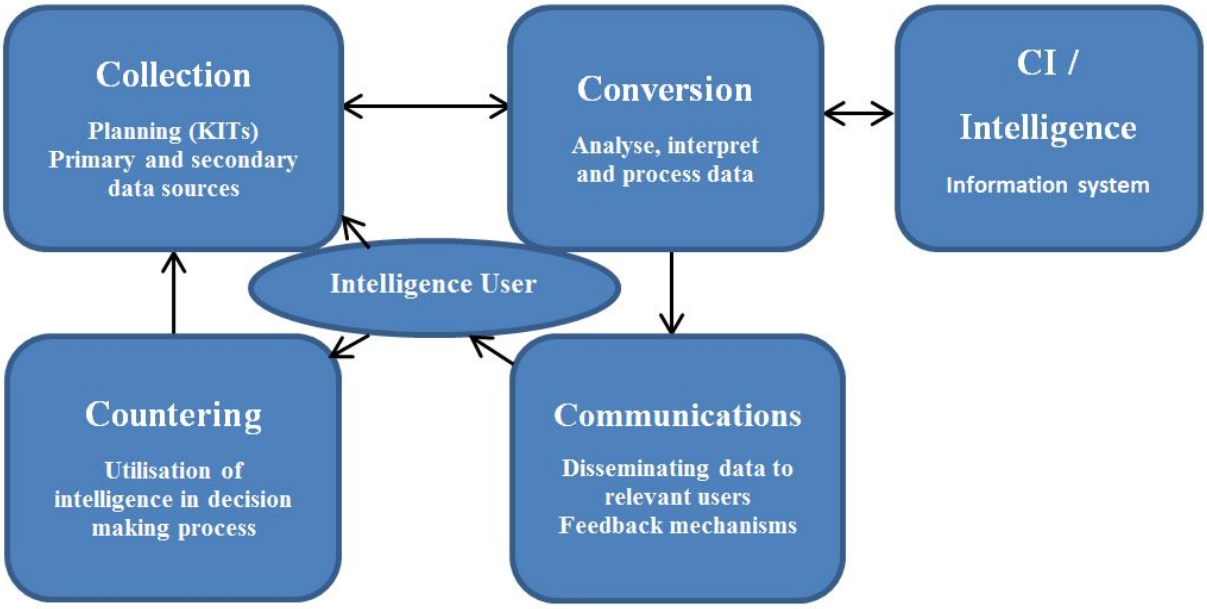


Figure 1: The 4Cs process model (Weiss, 2002:43).

The second stage of the 4Cs model is conversion, whereby data are integrated with other data-related elements, analysed and interpreted so that it can be utilized (Weiss, 2002:45). For this part of the process, information systems could be applied to collate and catalogue data with the emphasis on assessing the reliability and accuracy of data (Weiss, 2002:45). This step also intends to identify trends or patterns and to put data into context so that the KITs that guide the research process can be defined (Weiss, 2002:45). The third stage in the 4Cs process model focuses on communication and endeavours to identify and develop the most suitable channels

and frequency of communication to enhance the intelligence distribution and decision making (Weiss, 2002:45). The last stage of the process is countering, which utilises four different categories of knowledge about competitors and the competitive environment for decision-making purposes and for the development of specific strategies (Weiss, 2002:46). The interaction between the four types of knowledge obtained during the countering stage is explained in Figure 2. In this regard all four types of knowledge are needed to obtain a comprehensive view of the business environment and it is only by understanding one's own position within the overall environment, the rivals and own environment that appropriate decisions can take place and countering strategies be developed (Weiss, 2002).

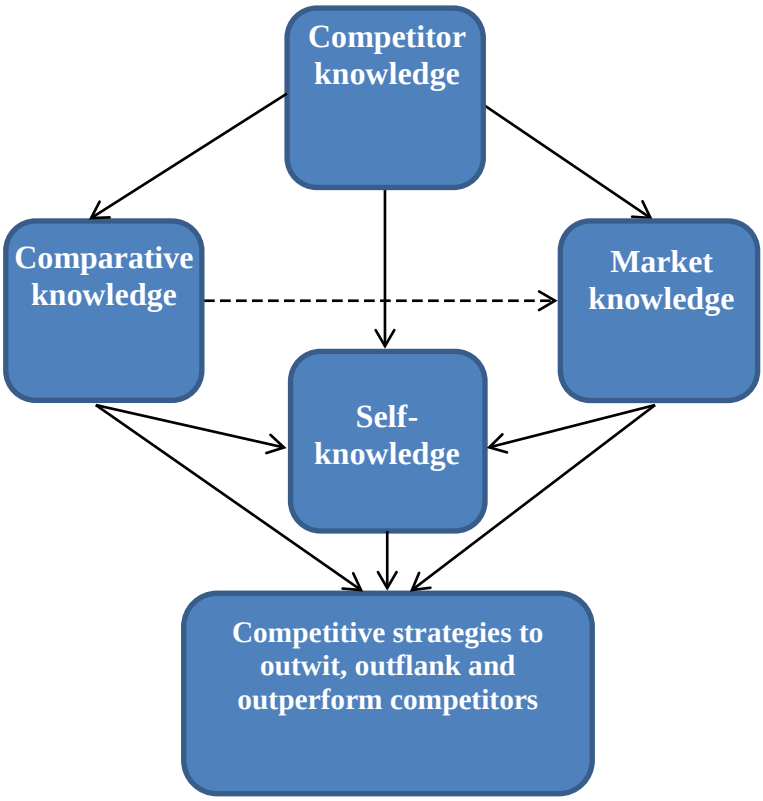


Figure 2: Types of knowledge and how they lead to strategy (Weiss, 2002)

Despite the possible benefits of the 4Cs model for the sport-coaching context, the suitability of this model for the sport-coaching context has not been investigated thus far. The empirical establishment of various constructs of the CI process is a relatively new occurrence in research and various questionnaires have been employed for CI research within South African businesses (Saayman *et al.*, 2008:387; Van Niekerk, 2013:6). One of the questionnaires that were used in this context contains 38 CI-related questions that are based on theoretical constructs and preliminary research results (Saayman *et al.*, 2008:387; Viviers *et al.*, 2002:32). The 38 items

evaluate the following factors: i) communication and analysis, ii) collection, iii) planning and focus, with the contextual factors of iv) awareness, v) internal information, vi) formal infrastructure and vii) employee involvement (Saayman *et al.*, 2008:393). These factors are also included in the CI Diagnostic Survey (CIDS) of Van Niekerk (2013), which was designed to measure CI variables so that organisational development and effectiveness could be improved. The CIDS questions address the skills and capabilities of the business/organisation to undertake the CI processes and are related to the following topics: 1) CI awareness/culture; 2) planning, identification and focus; 3) collection; 4) collation; 5) analysis and interpretation; 6) communication/dissemination; and 7) process/structure. The last-mentioned surveys have the potential to be adapted for use in a sport-coaching context with the sub-scales to guide the development of a sport CI survey. The development of a sport specific survey could enable sport coaches, support staff and athletes to implement business strategic operational functions into a sport coaching context in order to improve competitive advantage.

Despite the lack of empirical data, anecdotal evidence suggests that sport coaches, teams and individuals are as competitive and analytical in their endeavour to achieve success as the business industry (Hughes & Beasley, 2007:96). However, although sport-related professionals may currently conduct informal activities of CI, they do not view it as such or employ a systematic system to achieve intelligence creation (Hughes & Beasley, 2007:96). In this regard, Schoeman *et al.* (2006) applied data mining as part of the CI business data collection process to a South African cricket competitive environment in order to gain a competitive advantage. Apart from the South African focused cricket research by Schoeman *et al.* (2006) very little research has thus far investigated CI in the South African sport context, which necessitated a study that explores the existence and implementation of CI activities, processes and models in this context. Findings by Schoeman *et al.* (2006) indicated the suitability of CI property application within the South African cricket context and this study's investigation of CI in a specific sport such as cricket will elaborate on previous findings. Furthermore, the findings of this study will broaden sport performance analysis research to address a wider range of knowledge and applications in cricket (Najdan *et al.*, 2014:277). Apart from the contribution of this research to current sport scientific and CI knowledge, results could provide sport coaches, managers and sport federations with a fundamental framework structure by which CI properties, strategies and processes can be implemented. Realisation of a CI conceptual process framework for sport coaches could also strengthen the current coaches' educational and sport performance analysis' programmes. The development of a CI survey could also provide sport coaches with a unique instrument to

evaluate current CI processes, highlighting areas of successful CI creation as well as activities that need improvement. In view of these benefits, the study was based on the following theoretical research question: Which properties of the business CI process is relevant to the sport performance analysis (PA) domain as part of the coaching process in sport and specifically cricket? To answer this theoretical research question, a systematic literature review (SLR) was used to determine the relevancy of CI properties to sport PA. Furthermore, the study was based on the following empirical research questions: What are the identified key intelligence topics (KITs) of cricket coaches when the 4Cs CI process model of Weiss (2002) is used as a framework and existing knowledge regarding cricket specific key performance indicators (KPIs) is incorporated? What are the identified data collection properties of cricket coaches when the first stage of the 4Cs CI process model of Weiss (2002) is used as a framework? What will the layout be of a conceptual CI framework that is specifically developed for cricket coaches and that is based on the 4Cs CI business process model as a theoretical foundation? What will the layout be of a CI survey for cricket coaches that was developed by following the five step process of Gehlbach and Brinkworth (2011).

2. OBJECTIVES

The following research objectives were formulated from the research questions:

Theoretical objective:

- To evaluate the relevancy of the business CI process to the sport PA domain as part of the coaching process in sport and specifically cricket by using a systematic literature review (SLR).

Empirical objectives:

- To identify the KITs of South African cricket coaches, using the 4Cs CI process model of Weiss (2002) as a framework and incorporating existing knowledge regarding cricket specific key performance indicators (KPIs);
- To identify the data collection properties of South African cricket coaches, using the first stage of the 4Cs CI process model of Weiss (2002) as framework;
- To provide a conceptual CI framework specifically developed for South African cricket coaches based on the 4Cs CI business process model as a theoretical foundation;
- To create a CI survey for South African cricket coaches by following the proposed five step process of Gehlbach and Brinkworth (2011).

3. PREMISES

This study is based on the following premises:

- Substantial similarities between the CI and PA domains exist, which will be indicated through the SLR, thereby confirming the relevancy of the CI 4Cs process model to a sport PA and cricket coaching context.
- South African cricket coaches' KITs will be identified by using the CI 4Cs process model incorporating current sport KPIs.
- Although South African cricket coaches' data collection properties will be similar to CI 4Cs process model, coaches do not follow a structured data collection process.
- The key elements of a newly developed conceptual CI process framework for South African cricket coaches will be similar to the CI 4Cs process model.
- A new CI survey for South African cricket coaches will be developed by following a five step process, and will render acceptable content and face validity.

4. STRUCTURE OF THE THESIS

The thesis will be submitted in article format as approved by the Senate of the North-West University and structured as follows:

Chapter 1: Problem statement, objectives and premises. A reference list is provided at the end of the chapter in accordance with the guidelines of the North-West University (NWU-Harvard style).

Chapter 2: Methodology of study. A reference list is provided at the end of the chapter in accordance with the guidelines of the North-West University (NWU-Harvard style).

Chapter 3: Article 1: Relevancy of the business competitive intelligence process to sport performance analysis: A systematic literature review. This article was submitted for possible publication to the *International Journal of Performance Analysis in Sport.* This chapter and the reference list at the end of the chapter were compiled in accordance with the guidelines of the last-mentioned journal (see Addendum N). Tables and figures were included in the text to make the article easier to read and understand. Furthermore, the margins of the article were set at 2.5 cm left, 2 cm right, 2 cm top and 2 cm bottom as to conform to the layout of the rest of the thesis.

Chapter 4: Article 2: Directing the competitive intelligence process in sport: key intelligence needs and performance indicators identified by high level cricket coaches. This article was submitted for possible publication to the *International Journal of*

Performance Analysis in Sport. This chapter and the reference list at the end of the chapter were compiled in accordance with the guidelines of the last-mentioned journal (see Addendum N). Tables and figures were included in the text to make the article easier to read and understand. Furthermore, the margins of the article were set at 2.5 cm left, 2 cm right, 2 cm top and 2 cm bottom as to conform to the layout of the rest of the thesis.

Chapter 5: Article 3: The competitive intelligence process in sport: data collection properties of high-level cricket coaches. This article was submitted for possible publication to the *International Journal of Performance Analysis in Sport*. This chapter and the reference list at the end of the chapter were compiled in accordance with the guidelines of the last-mentioned journal (see Addendum N). Tables and figures were included in the text to make the article easier to read and understand. Furthermore, the margins of the article were set at 2.5 cm left, 2 cm right, 2 cm top and 2 cm bottom as to conform to the layout of the rest of the thesis.

Chapter 6: Article 4: The development of a competitive intelligence framework for cricket coaches. This article was submitted for possible publication to *Sport Management Review*. This chapter and the reference list at the end of the chapter were compiled in accordance with the guidelines of the last-mentioned journal (see Addendum R). In accordance with the guidelines of the journal, tables were included in the text to make the article easier to read and understand. Furthermore, the margins of the article were set at 2.5 cm left, 2 cm right, 2 cm top and 2 cm bottom as to conform to the layout of the rest of the thesis.

Chapter 7: Article 5: The novelty of a competitive intelligence survey for cricket coaches. This article was submitted for possible publication to *Sport Management Review*. This chapter and the reference list at the end of the chapter were compiled in accordance with the guidelines of the last-mentioned journal (see Addendum R). In accordance with the guidelines of the journal, tables and figures were included in the text to make the article easier to read and understand. Furthermore, the margins of the article were set at 2.5 cm left, 2 cm right, 2 cm top and 2 cm bottom for the rest as to conform to the layout of the rest of the thesis.

Chapter 8: Summary, conclusions, limitations and recommendations.

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CHAPTER 2

METHODOLOGY OF STUDY



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1. MULTI-MODE RESEARCH DESIGN

The use of a single methodological research approach has long been criticized and the use of quantitative and qualitative approaches within one study are increasingly advocated (Creswell, 2009:102; Denscombe, 2008:273). The integration of different approaches allows for confirmatory and exploratory research, as well as induction and deduction to take place in addressing research questions (Cohen *et al.*, 2011:22). The combination of different polarised research methods gave rise to mixed method research, or multi-mode research (Johnson *et al.*, 2007:113). Leech and Onwuegbuzie (2009:265) explain multi-method as follows: "mixed method research represents research that involves collecting, analysing and interpreting quantitative and qualitative data in a single study or in a series of studies that investigate the same underlying phenomenon." Multi-mode research can contribute towards data accuracy and provide for a more detailed account of the phenomenon built on original data (Denscombe, 2008:272). This approach also enables a comprehensive understanding of the phenomena, adding contextual complexity with an internal and external perspective on constituent parts as well as the whole (Cohen *et al.*, 2011:24). Numerous multi-mode designs have arisen with variances in priority (quantitative or qualitative approach dominating), timing of implementation, integration (level and scope), independence or interaction and method characteristics (Cohen *et al.*, 2011:25). In this regard, a three-dimensional typology of multi-mode research design was created, conceptualizing the following three dimensions: level of mixing (partially mixed vs. fully mixed), time orientation (concurrent vs. sequential) and emphasis of approach (equal status vs. dominant status) (Leech & Onwuegbuzie, 2009:268). According to this typology, the current study is categorised into the partially mixed sequential dominant status multi-mode design (Leech & Onwuegbuzie, 2009:269).

The partially mixed sequential dominant status design used within this study, first involved two qualitative phases, whereafter the quantitative phase followed (Leech & Onwuegbuzie, 2009:270). The qualitative research phases consisted of the systematic literature review (SLR), the interview schedule design and analysis through intra-university peer interviews, cricket coach and support staff interviews and analyses. This was followed by the quantitative analysis from the quantitized qualitative data (Saldanha & O'Brien, 2013:23). Therefore, the qualitative research method formed the dominant method of use (Leech & Onwuegbuzie, 2009:270). Figure 1 denotes a diagrammatic representation of the study's research phases, activities and sequences to delineate the multi-mode method research typology.

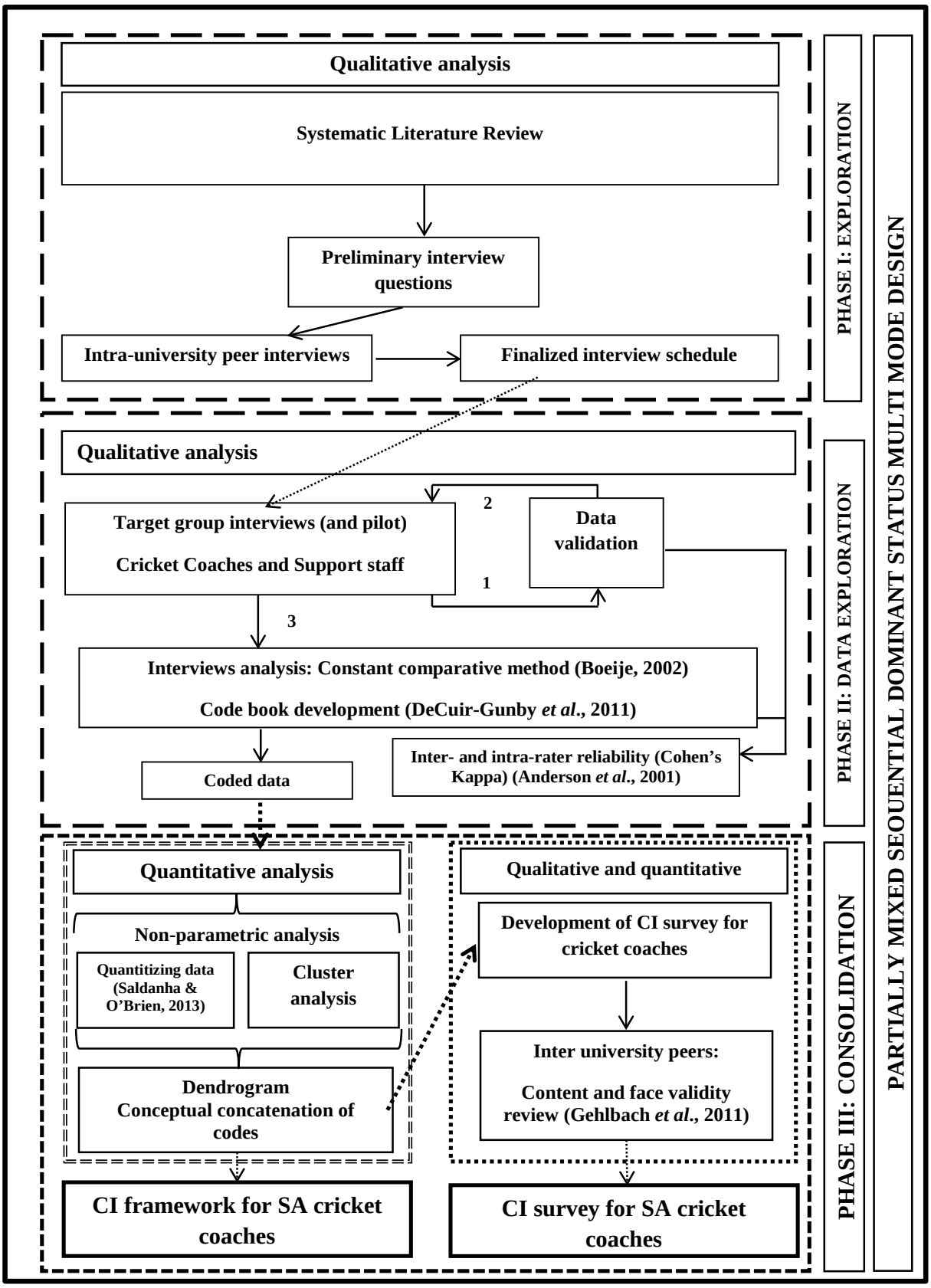


Figure 1: Schematic flow diagram of the multi-mode research design

2. PHASE 1: EXPLORATION

2.1 Systematic literature review

Qualitative data collection strategies could include *inter alia* interviews, observations or document analysis (Merriam, 2009:139). The selection of documents from expert authors and evidence based research for inclusion in a systematic literature review (SLR) serves multiple purposes such as integrating different theoretical stances to a phenomenon to analyse and synthesize data for purposive writing of a complex and integrative literature review (Combs & Onwuegbuzie, 2010:2; Merriam, 2009:140). A SLR further provides information about the effects of a phenomenon across a wide range of settings and can provide evidence that the phenomenon is robust and transferrable (Kitchenham, 2004:4). Similarly this ensures a level of rigor in reviewing research evidence as the first and crucial step in a research enquiry (Hemingway, 2009:5). The selection of documents for the qualitative analysis should adhere to the same precision as the selection of suitable participants for research interviews (Merriam, 2009:154). In conducting a SLR, the cumbersome process of conducting a narrative literature review can be enhanced by the selection of appropriate, sufficient and applicable documents to authenticate the literature review (Hemingway, 2009:6).

A SLR is based on the following principles: i) it could be repeated at any given time, ii) it incorporates a documented trail of the standardized selection process and methods, and iii) it includes an assessment record with the exclusion and inclusion of documents according to a hierarchy of decisions (Cronin *et al.*, 2008:38; Kitchenham, 2004:16). The process of a SLR should adhere to criteria of validity, reliability and trustworthiness with a minimum of researcher bias (Briner, 2013:6). To ensure unbiased research activities in document analysis, scholars should adhere to specific criteria while conducting a systematic process. These criteria include documenting of the search process, stating of the documentation selection criteria and assuring quality assessment of primary documents (Kitchenham, 2004:18). The six steps that were followed in completion of the SLR are summarized in Table 2, whereafter each step is described (Centre for Reviews and Dissemination (CRD), 2009:18(CRD); Kitchenham, 2004).

Table 1: Six key steps in conducting a SLR

Key steps		Activities performed
1	Development of a review protocol	• A list of key words was compiled (Jesson *et al.*, 2011:3). • Methods used to undertake the SLR were specified (Kitchenham, 2004:12).
2	Identification and extraction of research	• Electronic databases were accessed and searched by using keywords. • Research documents were refined by applying inclusion and exclusion criteria.
3	Quality assessment	• Documents were evaluated and quality assessment was applied by using the hierarchy of evidence (Kitchenham, 2004:21). • Documents were evaluated by experts in the field.
4	Qualitative content analysis	• A document analysis was conducted (Boeije, 2002:391) • Cohens' Kappa was calculated to determine the agreement of documents (Wood, 2007:2).
5	Synthesis	• Individual and combined data networks for CI and PA were synthesized.
6	Report	• Quotations, codes, categories and themes (Atlas.TI™ networks) were used to compile the SLR (chapter 3) (Jesson *et al.*, 2011:108).

2.1.1 Development of a review protocol

Researchers planned the review protocol in conjunction with an expert information specialist in the Faculty of Economic Science and Information Technology on the Vaal Triangle Campus of the North-West University. In order to reduce the possibility of researcher bias, a review protocol that stipulated specific steps and methods through which the SLR was compiled, was established (Kitchenham, 2004:18). Firstly, a list of key words was compiled and discussed amongst researchers and the information specialist (Jesson *et al.*, 2011:3). The following key words were identified: "competitive intelligence (CI)," "performance analysis (PA)," "data analysis," "match analysis," "sport" and "cricket". Secondly, suitable databases for the different domains were identified and documented, as well as specific criteria set for initial inclusion and exclusion. Research selection criteria intended to identify primary sources that provided direct scientific evidence of the research topic and questions, were also compiled (Kitchenham, 2004:18). Aspects that influenced the selection process included language, journals, authors, research design and publication date (Kitchenham, 2004:18). Criteria stipulated that only articles that were published between the years of 2000 and 2016 should be included in the literature searches in order to gain knowledge about the most recent research on the different topics. Full text, scholarly and peer reviewed articles in accredited journals and conference proceedings that

included the identified key words in the title and that were available to researchers, were selected.

2.1.2 Identification and extraction of documents

The process when performing a SLR must, as far as possible, be transparent and replicable (Kitchenham, 2004:16). To achieve these goals, the review must be sufficiently documented for readers to assess the thoroughness of the search. In this regard, Addendums 2.1-2.10 are included to provide detail concerning the process that was followed to compile the SLR. Each search was numbered and dated with the specific search engine and keywords provided. The number of hits per search as well as included articles were documented and the inclusion and exclusion criteria were clearly stated. A total of eighteen searches were performed independently and in conjunction with an information specialist.

The identified keywords were used to conduct searches on the following databases: Academic Search Premier, EbscoHost™, Business Search Premier™, Scopus, MasterFILE Premier™, Regional Business News™, Emerald Insight™, SACat™, Web of Science™, and SAePublications™. The inclusion of manual searches is strongly recommended and author searches were performed using Google Scholar (Kitchenham, 2004:16) (Addendum 2.1). A variety of searches with the keywords “PA”, “data analysis,” “match analysis,” “sport” and “cricket” were conducted through EbscoHost™, SPORTDiscus™, Web of Science™, and Scopus databases after which manual searches were performed on Google Scholar and eJournals. Author searches for the most prominent authors in PA were also conducted. A third search was conducted by combining the keywords of “CI” and “sport” on Scopus, EbscoHost™ and SPORTDiscus™, MasterFILE™, Academic Search Premeir™, Web of science™ databases after which manual searchers were again conducted on Google Scholar (Addendum 2.2). During the first round of searches for CI-related documents, 86 articles with the keyword “CI” in the title were included for further scrutiny (Addendum 2.3). During the second round of selection the occurrence of CI related aspects namely: data collection, data conversion, information communication, countering and an overall process description (Weiss, 2002:43), were used as inclusion criteria. Articles had to contain at least three of the CI aspects in the abstract and full text to be included in the next selection step, and 85 information sources were included (Addendum 2.4).

The selection process of the PA documents of the SLR followed a similar pattern to that of the CI component. Initial selection criteria were also applied and a search commenced for literature sources with key words in the title, which rendered 46 documents (Addendum 2.5). Thereafter, selection criteria were set to also include CI aspects, PA, sport and cricket and those information sources that contained at least two of these qualities in the title (Addendum 2.6). Information sources were also selected based on the occurrence of two of the following CI related aspects: data collection, data conversion, information communication, countering and an explanation of a process that can be used within sport PA. Articles with at least two related CI aspects in the full text were included for further scrutiny and led to the exclusion of thirteen documents which brought the number of documents to thirty (Addendum 2.7). A combined search on CI and PA were conducted after separate searches, however no journal articles and titles emerged which included all the key words within the title. Three separate documents relating to CI in a sport context were identified during the manual CI search however, two of the documents were not available as full articles and the other article was in Chinese. These three articles were therefore omitted from the study.

2.1.3 Quality assessment

Additional to the application of general inclusion and exclusion criteria, it is also important to evaluate the quality of the primary research documents and this was achieved by using the hierarchy of evidence (Kitchenham, 2004:21). In this regard, the National Health and Medical Research Council of Australia (National Health and Medical Research Council (NHMRC), 2000) proposed five levels of study design hierarchy and identified documents were assessed accordingly to guarantee a minimum level of quality. The first hierarchy level included systematic reviews, however researchers excluded these documents to enhance the level of hierarchy and opted to include individual, primary and observational studies, which are classified on hierarchy level four (Addendum 2.8). (Kitchenham, 2004:13). The hierarchy of evidence application excluded 51 CI documents which were either, systematic reviews, secondary sources or not observational studies. The level of hierarchy was further enhanced by allowing distinct experts in the fields of CI and PA, respectively to scrutinize the list of selected documents for inclusion or exclusion according to the qualitative analysis (Kitchenham, 2004:25). The experts' SLR protocol review process provided an enhanced inspection, which refined and finalised the quality of the document search (CRD, 2009:33).

A total of 51 articles were excluded during the evidence of hierarchy round of extraction, and rendered 34 CI articles for document analysis. The list of 34 included articles (Addendum 2.8) was sent to an international expert in the field of CI who added additional literature for scrutiny. The CI expert researcher had previously completed a literature review on CI, and a total of 114 documents were referred. These documents were scrutinized according to the same criteria set during the initial search and a total of 49 documents were excluded because they did not contain CI as part of their titles. Twenty three information sources were also excluded due to the fact that they were books and eleven articles written prior to 2000. A total of nineteen articles constituted researchers' initial searches and included documents, which left a possible twelve new articles for further scrutiny before inclusion. From the twelve newly identified documents, only five documents were available to the researcher and they were scrutinized according to the CI-related aspects (Addendum 2.9). These five articles had to contain at least three of the CI related aspects within the abstract and full text. Only one article met the criteria and was added to the final document list for the document analysis, bringing the total CI documents to 35 (Addendum 2.10). During the document analysis two of the CI articles were deemed unsuitable for application within the study and were omitted, resulting in 33 CI articles analysed.

The PA document search, extraction and inclusion followed the same hierarchy of evidence method to evaluate the design and methodology of thirty documents and excluded all review articles, bringing the total from thirty to 28 PA documents (Addendum 2.11). The remaining articles were sent to an expert in the field of sport PA and his recommendations were used to enhance the search (Addendum 2.11). On the PA expert recommendation, a further ten searches were completed within numerous databases related to the key words of "notational analysis," "sport" and "cricket," as well as author specific searches of key researchers within the field of PA (Addendum 2.12). This was fed into the different search engines with the hits and inclusions documented (Addendum 2.12). No supplementary documents were added to the existing and final list of PA documents for analysis, since they did not adhere to the criteria initially set, or were already included within the list of documents.

2.1.4 Qualitative content analysis

A purposeful approach to the qualitative analysis systematizes work procedures and increases traceability to the implemented approach. It also enhances the verification and credibility of qualitative reports (Boeije, 2002:391). At the core of qualitative analysis lies the constant comparative method (CCM), where a comparison is the primary intellectual tool used (Boeije,

2002). The simultaneous comparing and contrasting of data and information during analysis, created codes and categories, established code and category definitions, assigned segments to codes and categories as well as summarized their content (Tesch 1990 as cited in Boeije, 2002:392). This enabled the researcher to develop a theory inductively on the basis of answering questions that arose from the analysis and the reflection of previous data (Boeije, 2002:392). The researcher conceptualised concepts that existed within CI and sport PA as subject themes, and searched for commonalities and differences of the phenomenon within the two domains, which provided a foundation for generalized concepts and relations between the different domains (Boeije, 2002:395). The CCM qualitative analysis was performed using ATLAS.TI™ version 7, a computer assisted qualitative data analysis system (CAQDAS), through the creation of codes and categories.

i) Coding procedure

The content analysis commenced with deductive theme identification from the business domain CI literature, which included data collection, information conversion, communication and countering as overarching themes (CRD, 2009:55; Weiss, 2002:39). Together with these four aspects, the process occurrences and process elements were identified as the fifth theme. Firstly, CI documents were analysed and every passage was studied to determine the meaning thereof and to label each passage with an adequate code through the inductive or open coding process. Coding data is seen as "the formal representation of analytic thinking" (Marshall & Rossman, 1999:155) and through an intellectual analysis, the researcher generated codes and categories. Inductive coding implies the identification of meaning units or codes, which are defined as "tags or labels for assessing units of meaning to the descriptive or inferential information compiled during a study" (DeCuir-Gunby *et al.*, 2011:137). Codes or meaning units contain specific ideas or views which are able to stand on their own (Côté *et al.*, 1993:131). With the identification of a code or meaning unit, the researcher studied the documents for further similar emerging fragments or meaning units, and referenced similar codes and relatedness to a specific code or category (Boeije, 2002:395). In this manner, codes were created and compared to find new information with the aim to conceptualize the subject (Boeije, 2002:395). Each code was evaluated to define the CI concept within a business domain and to discover code combinations, their relatedness to specific categories and ultimately to assign each code to one of the overarching themes. The researcher defined all created codes, linking a clear explanation to the code and establishing the meaning unit (Addendum 2.13). The numerous meaningful codes represented all relevant categories and themes of CI within the documents (Boeije, 2002:397).

The substantial number of codes created during the CI document analysis provided researchers with a comprehensive overview of CI activities and aspects from the business domain that guided the comparative analysis process of PA documents that followed. The CCM analysis of PA documents followed a coding procedure similar to that of the CI documents, during which codes were created and defined. In this manner insights into similarities and differences between the two domains regarding the overarching themes of data collection, information conversion, communication, countering and the related process were produced. Results of the PA document analysis were comparable to the codes created from the CI document analysis and provided a conceptual summary of relationships (Boeije, 2002:408).

The CCM procedure focused on a qualitative comparison between the business CI and sport PA domain documents to identify similarities and differences. The interpretation of meaning units as well as the creation and the application of codes in a valid and consistent manner were calculated with Cohens' Kappa during the initial stages of the document analysis, thereby establishing inter- and intra-rater reliability (Wood, 2007:1).

ii) Cohen's Kappa calculation

Cohen's Kappa is defined as "an index of inter-rater reliability commonly used to measure the level of agreement between two sets of dichotomous ratings or scores" (Wood, 2007:1). The researcher performed a content analysis of two documents in creating codes and definitions and reviewed and discussed the codes with a colleague researcher. During the collaborative revision of codes and definitions, data were analysed within the context of the documents and were redefined or refined (DeCuir-Gunby *et al.*, 2011:141). The research colleague coded the documents separately and used the following formula for calculating Kappa (Figure 2).

KAPPA CALCULATION

$$\kappa = \frac{Pr(a) - Pr(e)}{1 - Pr(e)}$$

Figure 2: Kappa calculation (McHugh, 2012:280)

Pr(a) represents the actual observed agreement and Pr(e) the chance agreement. The sample size consists of the number of observations made across which raters are compared and Kappa is based on the chi-square table and Pr(e) obtained by the following formula:

Pr(e) Calculation

$$\text{Expected Agreement} = \frac{\left(\frac{cm^1 \times rm^1}{n}\right) + \left(\frac{cm^2 \times rm^2}{n}\right)}{n}$$

$$\text{Expected Agreement} = \frac{\left(\frac{157 \times 150}{222}\right) + \left(\frac{65 \times 72}{222}\right)}{222}$$

$$\text{Expected Agreement} = \frac{108.08 + 21.08}{222} = .57$$

Figure 3: Kappa calculation: Pr(e) (McHugh, 2012:280).

Where: cm^1 represents column 1 marginal,
cm^2 represents column 2 marginal,
rm^1 represents row 1 marginal,
rm^2 represents row 2 marginal and
n represents the number of observations.

Table 2: Data for Kappa calculation example (McHugh, 2012:280)

DATA IN TABLE FORMAT

		Rater 1		Row Marginals	
		normal	abnormal		
Rater 2	normal	147	3	150	rm^1
	abnormal	10	62	72	rm^2
Column Marginals		157	65	222	n
		cm^1	cm^2		

Raw % Agreement

$$\frac{147 + 62}{222} = .94$$

The level of inter-rater reliability is deemed good enough for research purposes if a Kappa value of between 0.60 and 0.70 is obtained. A Kappa value that falls in this range is also an indication that research is breaking new grounds with concepts which are rich in analytical value (Anderson *et al.*, 2001:12). Ratings applied to decisions about particular individuals should show higher reliability with a Kappa value of at least 0.80 or 0.90 (Wood, 2007:6). The inter-rater reliability on the SLR qualitative document analysis was $\kappa = 0.89$ and calculations are provided in

Addendum 2.14. Likewise, intra-rater reliability was calculated using the same formula, and was found to be $\kappa = 0.84$. In this regard, the researcher performed a second coding process on two arbitrary selected documents, more than seven days apart (Addendum 2.15). The substantial agreement indicated the discriminant capability of the researcher to create and apply codes, and to consistently and unambiguously categorize text (Campbell *et al.*, 2013:301).

2.1.5 Synthesis

The SLR provided key academic theories on the topic of CI and included current research by key scholars (Jesson & Lacey, 2006:145). The summarized CI activities and involved process aspects were compared and contrasted to the ideas and activities performed within the sport PA domain. Knowledge gaps were identified together with areas of agreement as analysed from two different domains' current research (Jesson & Lacey, 2006:144). Significant agreements and various differences between the two domains were reported in data network format (Chapter 3). Individual data maps for each theme were established for the CI and PA domains, respectively. Combined data networks were also explained within the SLR article (Chapter 3), emphasising the coherent and cohesive argument for the context of the full study (Jesson & Lacey, 2006:144). The synthesis of selected and analysed documents were presented in table format (see Addendum 2.16), and described the purpose of selected documents, the CI-related aspects and processes as well as CI conclusions and findings (CRD, 2009:51).

2.1.6 Report

Report writing is seen as an integral part of the SLR process and can be presented in numerous ways (CRD, 2009:77; Kitchenham, 2004:23). The SLR article (Chapter 3) was completed according to the author guidelines of the International Journal of Performance Analysis in Sport. The SLR satisfied the proposed structure and different core elements in developing a review protocol, defining the identification and extraction of documents, assessing the document quality, producing a valid qualitative content analysis, synthesising data and reporting findings (CRD, 2009:78; Kitchenham, 2004:25). This completed process led to the development of preliminary interview questions.

2.2 Preliminary interview questions

Researchers followed the seven stages of Kvale (1996) as cited in Cohen *et al.* (2011:415) in planning interview-based research procedures. These seven stages include: thematizing, designing, interviewing, transcribing, analysing, verifying and reporting (Cohen *et al.*,

2011:415). Researchers completed the proposed seven stages during the interview schedule preparation (Phase I: Exploration), before continuing to the primary data collection through interviews with cricket coaches and support staff (Phase II: Data exploration). These seven stages will be discussed within the research mode design structure of Phase 1.

2.2.1 Thematizing

The preliminary thematizing stage of the interview schedule (a written questionnaire purposed to guide interviews, De Vos *et al.*, 2005:296) was performed with the assembly of the SLR, which outlined the theoretical basis and objectives of the study (Cohen *et al.*, 2011:415). The five themes identified through the document analysis provided a fundamental understanding of the CI domain and identified the research application within a sport coaching context.

2.2.2 Designing

In the next stage of interview schedule design, research questions and the purpose to adequately address what the researcher was trying to explore (the CI process and aspects of cricket coaches and support staff) were compiled. In this regard, the researcher specified and labelled the CI variables under investigation through the SLR with related codes, categories and identified themes (Cohen *et al.*, 2011:415). The proposed interview schedule consisted of questions related to the four stages of data collection, conversion, communication and countering of the CI process model from Weiss (2002:43) as well as two questions related to CI awareness, culture, planning, identification and focus (key intelligence topics). During the interview schedule design stage, the researcher considered the question format and response mode as well as the following factors: objectives of interviews, nature and subject matter, respondents' level of education and expected information (Cohen *et al.*, 2011:415). Six open-ended questions were created and allowed interview process flexibility, probing, clarification of misunderstandings, establishing rapport and enabling the interviewer to explore examples and applications of the constructs by participants (Cohen *et al.*, 2011:416). Setting up questions, attention was given to the use of simple, unambiguous language, the avoidance of prejudicial language, double-barrelled and personal questions. Researchers also did not assume that respondents would have the required knowledge or information to ask leading questions (Arksey & Knight, 1999:93). Direct and factual questions specific to the CI-related aspects were posed; however, opinion questions were also included (Cohen *et al.*, 2011:417). Furthermore, a topic introduction, idea follow-up, probing for additional information or a response as well as requests for examples were also considered during interview schedule set-up (Cohen *et al.*, 2011:417).

A semi-structured interview schedule, where topics and open-ended questions are posed, does not need exact wording or sequence to be followed, since a series of prompts are set which aim to discuss the topic at hand, and the order of interview questions is readjusted according to participants' responses (Cohen *et al.*, 2011:421). Semi-structured, one-to-one interviews allowed researchers to obtain a detailed picture of participants' beliefs, perceptions or specific topic accounts, since the participant was seen as the expert and was allowed to voice his/her story (De Vos *et al.*, 2005:296). The proposed interview schedule contained six questions which adhered to the suggested guidelines of less than ten interview questions (De Vos *et al.*, 2005:309). The six questions held numerous probes or prompts, which aimed to enable the interviewer to clarify topics or questions and to extend and elaborate on provided detail, adding depth of response and richness to data received (Morrison, 1993:66) (Addendum 2.21). An introductory section which explained the CI business process and the application thereof to a coaching set-up was also included in the interview schedule (Doody & Noonan, 2013:31). Furthermore, the introductory section presented the study aims and an invitation to participants to ask questions when needed (Doody & Noonan, 2013:31). The interview schedule was sent to intra-university peers for evaluation. Feedback from intra-university peers was then used to adapt and finalise the interview schedule.

2.3 Intra-university peer interviews

2.3.1 Interviewing

Pilot testing of new interview schedules is crucial and university peers were used to complete this task (De Vos *et al.*, 2005:309). The primary researcher obtained a letter of goodwill from the different intra-university peers' school directors to engage in voluntarily one-to-one or group interviews, performed face-to-face, via Skype or telephonically. Intra-university peers refer to colleagues in a sport scientific or sport management domain with at least three years of academic and research experience from the same university as the researcher, but who worked on a different campus than the researcher. A colleague researcher obtained written consent from the intra-university peers after which each person was contacted to arrange a suitable date, time and place for interviews (Addendum G). Intra-university peers who did not initially respond, or who did not complete and send back the written consent form, were excluded from the study. Intra-university peers who were not able to engage in a face-to-face, one-to-one or group interviews or who did not want to be voice recorded, were also excluded from participation.

The primary researcher emailed the preliminary interview schedule to intra-university peers prior to the interview date and requested feedback on the six proposed interview questions and probes within a two-week period (Addendum 2.21). In this regard, one Skype interview, one telephonic interview and a face-to-face interview with two intra-university peers were conducted. The face-to-face interview was conducted at the participants' campus in their school's boardroom, which was a familiar setting and prevented interruptions from occurring (Cohen *et al.*, 2011:421). Participants gave permission for the interviews to be voice recorded which allowed the primary researcher to obtain detailed information of each interview. Therefore, there was no need for the interviewer to constantly make notes, which allowed her to conversationally engage more with participants. These interview opportunities also provided the primary researcher with valuable practical interview experience which supplemented the qualitative in-house workshops attended and training received in setting up interview schedules and conducting interviews, before commencement of the actual interviews with cricket coaches and support staff (De Vos *et al.*, 2005:287).

2.3.2 Transcribing

The process of transcribing recorded interviews has the potential for data loss and the reduction of data complexity, which accentuates the quality and usefulness of transcriptions (Cohen *et al.*, 2011:426). The interviewer and primary researcher performed transcriptions of voice recorded data and this allowed her to become immersed in the data and to generate evolving insights (De Vos *et al.*, 2005:336). Accuracy and validity of the transcribed interviews were ensured by emailing the typed documents to participants, who were requested to validate data authenticity and correctness as well as verify that data were a true reflection of interview feedback (Creswell, 2003:196) (Addendum 2.18).

2.3.3 Analysing

The validated and transcribed interview documents were also qualitatively analysed by reducing raw data to meaning units through the creation of inductive codes by making use of CAQDAS (DeCuir-Gunby *et al.*, 2011:138). Codes were defined for clarification purposes and divided into two distinct categories of CI specific content and general schedule comments data networks (DeCuir-Gunby *et al.*, 2011:138) (Addendum 2.19 and 2.20). The researcher followed the CCM (Boeije, 2002) whereby data are collected through interviews, whereafter qualitative analysis is performed sequentially until no new ideas emerge or new codes are created, which indicates data saturation (Guest *et al.*, 2006:76). The interview process and data analysis ended after four

interviews with no new feedback regarding interview schedule changes or answers on CI-related aspects.

2.4 Finalized interview questions

2.4.1 Verifying

During and after the coding process, the researcher, together with study promoters, evaluated the plausibility of the developed understanding and exploration of the data (De Vos *et al.*, 2005:338). Respondent validation or participation confirmation in the transcribing stage, as well as peer debriefing of audit trails of evidence, verified data rigour according to the validity criteria (Cohen *et al.,* 2011:181). Changes were made to the initial interview schedule according to intra-university peer feedback as qualitatively analysed, and aspects such as introduction clarification, insertion of probes and small question adaptations were addressed. Positive feedback confirmed topic clarity, comprehensive stated questions, as well as information that is expected. The preliminary interview schedule (Addendum 2.21) was adapted and finalized according to intra-university peers' feedback, the qualitative analysis and through a peer-revision of codes (DeCuir-Gunby *et al.*, 2011:146) (Addendum 2.22).

2.4.2 Reporting

The final product of the explorative phase and reporting of the study was the CI interview schedule for use with cricket coaches and support staff (Addendum 2.22).

3. PHASE II: DATA EXPLORATION

The second phase of the overall research design was data exploration, and this once again adhered to the seven stages of planning and conducting interview-based research by Kvale (1996) as cited in Cohen *et al.* (2011:415). The seven stages, namely thematizing, designing, interviewing, transcribing, analysing, verifying and reporting, were used to address and manage key issues during interview data collection and analysis (Cohen *et al.*, 2011:409). However, the first stage of thematizing was already completed through the SLR during phase I as the research objectives were already defined. The SLR (Chapter 3) rendered research questions on coaches' key intelligence topic identification (Chapter 4), data collection activities (Chapter 5), the development of a cricket specific CI framework (Chapter 6) as well as the creation of a CI survey (Chapter 7), and provided the themes and framework for further research enquiry. In this regard, the development and the testing of the interview schedule were also completed during phase I. However, these activities also fulfilled the requirements of the designing stage. The next

stage, namely the third stage (interviews) during the data exploration phase, will now be discussed.

3.1 Target group interviews

Sport coaches were selected as target group since the research questions focused on the business domain construct of CI, whereby information is gathered, analysed and used for decision-making purposes and coaches are known to engage in such activities (Wright *et al.*, 2012a:437). Cricket coaches were specifically selected since research has indicated that CI-related activities such as data mining are applied in a competitive cricket analysis environment (Schoeman *et al.*, 2006). Expenses, time and accessibility also influenced the decision to use cricket coaches as the specific target group (Cohen *et al.*, 2011:143). In qualitative research non-probability sampling methods such as purposive sampling techniques are commonly used since researchers seek individuals and groups where specific processes and phenomena tend to occur (De Vos *et al.*, 2005:328). In purposive sampling, clear identification and selection criteria for participants need to be set and adhered to (De Vos *et al.*, 2005:329).

In this regard the following criteria for the inclusion of cricket coaches were formulated: the coach should have at least five years of coaching experience, must have coached at university, provincial or professional level, or have obtained high level coaching certification from the national governing body (Côté *et al.*, 1993:68; Nash & Sproule, 2009:122). The inclusion criteria for support staff such as assistant coaches, analysts or sport scientists included the following: the person must have a tertiary qualification in the human movement science field or certification in strength and conditioning or applicable sport analysis field, and a minimum of three years' experience in team coaching and analysis set-up (Cooper *et al.*, 2007:106). These criteria were aimed at excluding lower level coaches and including high level or expert coaches, operating on competitive levels of coaching and competition, since purposive sampling intends to access knowledgeable people with in-depth knowledge and experience on the particular subject of enquiry (Cohen *et al.*, 2011:157).

3.1.1 Target group recruitment

The coaching manager of Cricket South Africa (CSA) was contacted and an overview of the proposed study communicated to him, whereafter he provided a list of coaches who met the inclusion criteria. In this regard, senior provincial, professional (franchise), SA "A" and National Academy cricket coaches from immediate surrounding provinces such as Gauteng, North West

and Free State were contacted for possible participation in the study. Additionally, university cricket team coaches and analysts were approached through university sport bureaus after permission for participation was obtained from the sport bureau managers. The coach education manager and sport bureau managers were regarded to be secondary gatekeepers to participant access (Cohen *et al.*, 2011:168). Coaches and analysts from nearby provinces and universities were contacted first, since the proximity allowed the researcher to travel to the respective offices and conduct face-to-face interviews. Coaches at universities and provincial cricket teams in distant provinces were contacted when recruitment from nearby teams and universities was not possible and when data saturation was not emphatically reached.

The contact and the recruitment of participants were performed according to the ethical guidelines of the Declaration of Helsinki (World Medical Association, 2013) and the NWU Health Research Ethics Committee (NWU Ethics number NWU-00185-15-S1). A research colleague of the primary researcher contacted the sample group via email or telephonically to obtain voluntary informed consent (Addendum I). The research colleague was chosen to obtain consent to ensure that the process of obtaining informed consent was absolutely voluntary, fair and equitable and to act as the first gatekeeper. Coaches who did not respond to the research colleagues' initial contact to participate and who did not provide a signed informed consent form, were not included in the study. Participants who did not wish to be voice recorded or who were unable to fulfil a date and time agreement within a two-month period from initial contact were excluded from the study.

Coaches who were willing to participate, completed and signed the consent form and returned it to the research colleague (Addendum H). Coaches were asked to identify colleagues and support staff, who were also contacted *via* email or telephonically, repeating the process of obtaining informed consent in a snowball sampling manner. Snowball sampling allowed researchers to identify hard-to-reach individuals as little information on potential participants was available (De Vos *et al.*, 2005:330). In instances where a coach and his/her support staff agreed to partake in the study, participants could decide to engage in one-to-one interviews or be interviewed together or in a group setting. In a paired or group interview setting, the work relationship between the coach and his/her support staff potentially rendered additional information because of the interaction between staff members (De Vos *et al.*, 2005:312). The closed group setting between the coach and support staff provided a stimulating and safe environment for members to express own ideas without fear of criticism. Furthermore, participants' comments to group

members' answers provided valuable data to researchers in order to gain further insights into behaviours (De Vos *et al.*, 2005:312).

3.1.2 Interviews

i) Pilot interviews

Besides interview discussions performed with intra-university peers and an analysis that followed (phase I), the interview schedule was also tested with a small number of participants with similar characteristics than those of the target group (De Vos *et al.*, 2005:206). The pre-testing of a measuring instrument is seen as a pilot study and determines the appropriateness of the methodology, sampling, instrument and analysis within a setting and with individuals representative of the planned main inquiry target population (De Vos *et al.*, 2005:209). A pilot study potentially improves the success and effectiveness of the investigation and aids the researcher to orientate herself and to decrease the occurrence of errors during the interview process (De Vos *et al.*, 2005:205). The pilot study was executed in the same manner as was planned for the main investigation, with the researcher contacting and setting-up a face-to-face individual interview with a university level support staff member after written and informed consent was obtained. The interview took place in the university office of the support staff member and ensured that there was little chance of interruptions and an acceptable social context to the participant, and at a time and on a date convenient to the participant (Doody & Noonan, 2013:31; Ryan *et al.*, 2009:311). The researcher emailed the interview schedule without the probes to the participant two days ahead of the arranged interview for the person to familiarize himself with the CI questions that would be discussed (Doody & Noonan, 2013:31) (Addendum 2.23).

The introductory section of the interview schedule explained the business CI process and the application to a sport coaching context, which provided guidance to the participant concerning the required detail (Doody & Noonan, 2013:30). At the onset of the interview, the participant first completed a demographic questionnaire on aspects such as general contact details, date of birth, gender, ethnicity and coaching background (qualifications and experience) (Addendum J). Demographic questions at the onset of the interview provided an opportunity for the participant to relax, and for both interviewee and interviewer to become accustomed to each other (Ryan *et al.*, 2009:311). The use of a semi-structured schedule and one-to-one interview setting enhanced the social interaction between the interviewer and interviewee, extending the contact to a purposeful discussion (De Vos *et al.*, 2005:292; Ryan *et al.*, 2009:312). The interview type and

method allowed the interviewer to gain a detailed picture of the participants' beliefs, perceptions, experience and knowledge on particular CI topics. The researcher also had an opportunity to test the question order, the use of probes and follow-up questions in order to ensure a natural flow in the conversation and that all questions were covered (De Vos *et al.*, 2005:296; Doody & Noonan, 2013:30). The interview was voice recorded, which allowed the interviewer to constantly engage with the interviewee in conversation (De Vos *et al.*, 2005:335; Doody & Noonan, 2013:31).

3.2 Transcription

The transcription of voice recorded interviews establishes a link between data collection and analysis. In this regard, researchers are of the opinion that analysis already commences during data collection, as the researcher has the opportunity to grasp initial concepts and gain an understanding of the research topic, which ultimately will guide the succeeding collection and analysis process (Marshall & Rossman, 1999:151; Patton, 2002:436). The researcher also becomes emerged in the data during the transcription process as it allows a transition between fieldwork and analysis (De Vos *et al.*, 2005:337). The voice recorded interview data and typed documents were organised into computer folders with numerical numbers assigned as file labels which ensured participant anonymity (De Vos *et al.*, 2005:336; World Medical Association, 2013). Data verification was obtained by emailing the typed versions of interviews to participants within a week after interviews so that they could substantiate the authenticity and accuracy of the interview data (Creswell, 2003:196) (Addendum 2.18). This form of respondent validation is used to ensure qualitative research validity. Therefore, participants had to sign, scan and send back an acceptance of the typed versions of interviews to the researcher and thereby verified the acceptability of the transcribed interviews (Teddlie & Tashakkori, 2003:296). This two-step process completed the initial data validation process of Phase II: Data exploration (Figure 1). Subsequently, interview document analysis could commence.

3.3 Analysis

3.3.1 Deductive code and theme creation

The identification of themes, recurring ideas, behaviour, patterns and beliefs is the analytical process which demands a heightened awareness and a data focus (De Vos *et al.*, 2005:338). In this step qualitative information is taken apart by searching for and classifying dimensions, categories or themes. This analysis usually involves identifying five or six general themes (De Vos *et al.*, 2005:338). The SLR allowed researchers to identify the following overarching themes

(four steps of the CI process model): data collection, conversion, communication and countering as well as the CI process as a whole. Themes are defined as "recurrent unifying concepts or statements about the subject of inquiry" (Bradley *et al.*, 2007:1761). The themes were used to create deductive codes with the ATLAS.TI™ software, which provided a tool for recording, indexing and storing typed interview documents (Leech & Onwuegbuzie, 2007:577).

The use of a CAQDAS system advanced an audit trail of analytical decisions by the researcher and allowed for the enhancement of qualitative analysis flexibility and rigour through the investigation into and revision of concepts during the search for and retrieving of categorised data (Leech & Onwuegbuzie, 2007:578). Deductive reasoning was firstly employed during the coding process since it allows for the identification of a broad or general pattern that might be logically or theoretically expected and observed within a specific setting or occurrence (De Vos *et al.*, 2005:47). Essentially, deduction was applied to the four steps in the business CI process model to be tested in the observation of the expected pattern occurrence within a cricket coaching context. The deductive theme identification and initial code creation in ATLAS.TI™, provided the foundation for interpreting and understanding the cricket coach and support staff interview data in light of business related CI steps and activities (Marshall & Rossman, 1999:116). The deductive code creation was followed by inductive coding of interview data.

3.3.2 Inductive code creation

Inductive reasoning moves from particular and specific occurrences or observations to the discovery of patterns (Babbie, 2001:34). Inductive code creation was employed to analyse the cricket coach and support staff interview data in order to identify a sample of specific instances and to draw conclusions about CI activities and processes used by these participants (Leedy & Ormond, 2001:35). Data coding allowed for the creation of codes in the form of selective key words (Marshall & Rossman, 1999:155). Codes or units of meaning are seen as ideas or information that can function as separate entities (Côté *et al.*, 1993:131).

The cricket coach interview data were evaluated and broken down into lines, paragraphs or sections, which were labelled or coded, whereafter fragments were rearranged to produce new understanding that explored similarities and differences across cases (Cohen *et al.*, 2011:599). Two types of coding were further employed: open and axial coding. Open coding involved data exploration through the identification of meaning units, actions and behaviour (Ezzy, 2002:94). New codes were created and integrated until all data had been evaluated, whereafter axial coding

took place. Axial coding linked the created codes to categories and indicated the interconnectedness of categories (Creswell, 1998:57). During the code creation process the codes and their interrelatedness were explored and compared to existing theory (Cohen *et al.*, 2011:600). Connections between coded ideas, categories and concepts led to denser concept-based relationships and the formulation of theory (Flick, 2004:19).

3.3.3 Constant comparative method (CCM)

The process of employing open and axial coding is described as the CCM and aims to systemize the qualitative analysis process (Boeije, 2002:392). The analysis of data at hand by coding in ATLAS.TI™, and their comparison to new data, allowed the researcher to conceptualize similarities to refine categories and discover patterns (Tesch, 1990:96). The interaction between the data and researcher was the creative process, whereby the CI data collection, conversion, communication and countering activities as well as the CI process of cricket coaches and support staff were explored (Boeije, 2002:394). The coding and analysis therefore consisted of two parts, namely open coding or fragmentation and axial coding or connection, which is seen as steps within the CCM (Boeije, 2002:394; Dey, 1993:178). The fragmentation of data involved the exploration of, for example, the method by which coaches or support staff collected data, and within the same document, comparisons were made and new methods of data collection identified. New codes were also created, and similar fragments found later in the interview document were assigned to the already existing codes (Boeije, 2002:394).

The second part of CCM involved axial coding or connection of new data, whereby new interview data from a second participant, were analysed and compared with previously analysed interviews (Boeije, 2002:397). This was performed by comparing fragments from different interviews (Boeije, 2002:397). For example, the researcher applied several of the data collection method codes created during the first interview, within the analysis of the second pilot study interview, but also created new codes when new information arose (Cohen *et al.*, 2011:600). This cycle of adding and comparing codes and categories of “old” and “new” interview data was repeated several times when new interviews were conducted, transcribed and analysed (Boeije, 2002:393; Cohen *et al.*, 2011:600). The CCM increased the internal validity of findings through a conceptualization of a variety of concepts identified from the interviews (Boeije, 2002:393). The CCM also allows for verification of external validity, especially when sampling of a homogeneous group is performed, which creates a solid basis for generalizing concepts and relationships between fragments or codes and categories (Boeije, 2002:393). The CCM embeds

the fundamental element of qualitative research through simultaneous and continuous data analysis and collection (Boeije, 2002:391; Cohen *et al.*, 2011:238).

3.3.4 Development of a codebook

In order to organize and guide the qualitative analysis of cricket coach and support staff interviews through the coding procedure, a codebook was developed (DeCuir-Gunby *et al.* (2011). The interview coding procedure is seen as a common step in qualitative analysis; however, very few researchers explain the manner in which coding is completed, and the development of a codebook aims to establish coding procedures that can be replicated (DeCuir-Gunby *et al.*, 2011:137).

i) Step 1

The development of a codebook encompasses open and axial coding by systematically organizing theory and data driven codes (Creswell, 1998:57; Ezzy, 2002:94). Theory driven codes are generated similarly to deductive codes, while data driven codes are developed by inductively reducing raw data into information (DeCuir-Gunby *et al.*, 2011:141). Data-driven codes created during codebook development followed the process of CCM whereby codes were constantly compared and categorized (DeCuir-Gunby *et al.*, 2011:141). With the creation of data-driven codes, attention was given to give precise code names, adequately define each code and to add an example from interviews to each code (DeCuir-Gunby *et al.*, 2011:147) (Addendum 2.31).

ii) Step 2

The creation and interpretation of codes needed verification which was achieved through a critical analysis by another qualitative research colleague (De Vos *et al.*, 2005:346; DeCuir-Gunby *et al.*, 2011:148). This second step of codebook development involved the revision of codes by a colleague researcher within the data context (DeCuir-Gunby *et al.*, 2011:148). The colleague inspected the list of codes with definitions and examined the examples together with the researcher, and the evaluation of the codebook in the context of the data, led to the creation of new data driven codes or a revision of existing codes (DeCuir-Gunby *et al.*, 2011:148). The appropriateness of code names, definitions and examples were verified as part of the last step of codebook development (De Vos *et al.*, 2005; DeCuir-Gunby *et al.*, 2011:149).

iii) Step 3

The third step of codebook development requires the establishment of intra- and inter-rater reliability or a verification of the code application consistency by die primary researcher and multiple raters (DeCuir-Gunby *et al.*, 2011:149). Although several statistical techniques for measuring intra- and inter-rater reliability exist, the calculation of Cohens' Kappa Coefficient was used (Cohen, 1960 as cited in DeCuir-Gunby *et al.*, 2011:149). During a second round of analysis on the data of two pilot study interviews more than a week apart, the primary researcher calculated the Cohen's Kappa. The intra- and inter-rater reliability for the pilot study interviews were both calculated to be $\kappa = 0.80$. Inter-rater reliability was determined through the research colleague, who also analysed the two pilot study interview data documents, and performed the Cohens' Kappa calculation accordingly (Addenda 2.24 and 2.25). This process and the amount of agreement demonstrated that the inquiry was conducted in such a manner that the subject was accurately identified and described (De Vos *et al.*, 2005:346). The consistent manner in which the codes were created and applied validated the qualitative analysis method employed. Therefore, the primary researcher concluded the pilot study and continued with interview data collection and further analysis of additional cricket coach and support staff interviews in a similar fashion (Campbell *et al.*, 2013:314; DeCuir-Gunby *et al.*, 2011:150).

3.3.5 Data saturation

The analysis processes of inductive coding or data-driven code creation and the application of a codebook were simultaneously performed while interviews were conducted during the CCM. The complete process was repeated with fifteen more participants, following the same procedures of recruitment, obtaining informed consent, interview arrangement, interview completion, transcription, participant validation and data analysis as described for the pilot study interviews. After thirteen interviews, the same codes were continuously being applied and no new information emerged. The occurrence of no new cases, codes, insights, properties, constructs, relationships, categories or dimensions indicated that data saturation had been achieved (Boeije, 2002:393; Cohen *et al.*, 2011:601; De Vos *et al.*, 2005:294). Two more interviews were conducted and analysed to confirm data saturation and to test if new data could emerge and refute the existing theory (Cohen *et al.*, 2011:601). However, no new codes or categories emerged, which verified the achievement of data saturation (Boeije, 2002:393). Additionally, the qualitative expert scrutinized the audit trail of the conducted research as well as the created codes and themes during the analysis process, to ensure validity and trustworthiness as well as confirming data saturation (Jones, 2015:283). Another indication that data saturation

was reached, was the fact that theory was able to explain the data fully and satisfactory (Cohen *et al.*, 2011:601). The four constructs of CI, activities and sub-components as well as the CI process as a whole was fully explained within cricket coaches and support staff's operations, and the primary researcher was able to critically arrive at plausible explanations and relationships through the empirical data (De Vos *et al.*, 2005:339).

3.3.6 Verifying

The process of sampling, data collection, coding, constant comparison, reliability calculation and saturation resulted in a data-derived theory (Cohen *et al.*, 2011:601). The accuracy of the derived theory was verified by evaluating parallels between theory and data as well as the ability of the theory to explain day-to-day situations of cricket coaches and processes they followed (Glaser & Strauss, 1967:237). In this regard, rigour was achieved through various steps of the whole qualitative analysis process (Teddlie & Tashakkori, 2003:295). The transparent and documented process, the audit trails of evidence such as the codebook development, the establishment of intra-and inter-rater reliability through Cohens' Kappa calculation, as well as peer debriefing substantiated the validity of qualitative methods employed (Cohen *et al.*, 2011:181; Onwuegbuzie & Leech, 2006:243). Peer debriefing included an evaluation of emergent themes and the relatedness between theory and findings (Cohen *et al.*, 2011:181; De Vos *et al.*, 2005:311). The CI activities, as applied by coaches and support staff and identified through the interview analysis, were discussed and compared to business CI and sport PA literature - equating to the development of structural relationships as another step in achieving validity (Cohen *et al.*, 2011:183). Participant validation, as performed through typed interview document verification, was another manner by which data verification was established (Cohen *et al.*, 2011:181). Phase II was concluded and the last stage of reporting will be discussed under phase III of data consolidation.

4. PHASE III: CONSOLIDATION

As part of the qualitative interview data analysis as the third stage during data exploration, a quantitative data analysis was performed. The quantitative analysis was performed to increase the scope of the analysis as well as to escalate both confirmatory and exploratory research conducted, strengthening the interpretations and answering of research questions (Creswell, 2009:102). Through the multi-mode research approach, both the process and analysis of outcomes were reinforced to generate theory (Creswell, 2009:102). In this regard, the multi-mode research method that was followed increased the accuracy of data, provided a more

complete picture of the CI phenomenon within a sport coaching context and enabled the analysis to build on the original data (Denscombe, 2008:272). Furthermore, consolidation of the quantitative analysis enhanced the seventh and final stage in the planning and conduct of qualitative research (i.e. reporting) by the creation of a quantitative visual image (Kvale, 1996 as cited in Cohen *et al.*, 2011:415; De Vos *et al.*, 2005:339). The quantitative data consolidation phase resulted in the creation of a CI process framework for cricket coaches, which aimed to direct coaches' data collection, analysis and decision-making activities to counter opposition strategy. Additionally, the consolidation phase rendered the innovation of a CI survey for cricket coaches to measure current CI activities and constructs within a sport coaching context. The dominant quantitative process in the establishment of both the framework and survey will be discussed next.

4.1 Competitive intelligence framework for cricket coaches

4.1.1 Quantitative data analysis

The study's partially mixed sequential dominant status design was upheld during the quantitative analysis in phase III (Leech & Onwuegbuzie, 2009:269). Coaches' and support staff's interview analysis rendered 4338 meaning units, which were created within 71 codes and placed under five themes (Addendum 2.26). Each unit was quantitized by a statistician (Newman *et al.*, 2015:17; Saldanha & O'Brien, 2013:23).

4.1.1.1 Quantitizing

Quantitizing refers to the conversion of the qualitative data analysis into numerical data by dichotomizing themes and categories and by counting qualitative codes (Saldanha & O'Brien, 2013:23; Sandelowski *et al.*, 2009:208). A tabulated representation of the qualitative interview data analysis was produced in the form of scores by assigning a score of "1" or "0" to each participant, category and codes (Newman *et al.*, 2015:17) (Addendum 2.26). In this regard, the process of quantitizing pronounced the CI phenomenon's intensity, frequency, direction, presence and content in a manner that enabled data exploration (Collingridge, 2013:79). Quantitized data allowed the researcher to report on the qualitative analysis' results in a precise manner by indicating the frequency and relationships of variables (Newman *et al.*, 2015:17; Saldanha & O'Brien, 2013:24). Quantitized data were exported to a Microsoft Excel™ spread sheet whereafter further statistical analysis was performed.

4.1.1.2 Cluster analysis

Tabulated data were entered into a multivariate cluster analysis to detect natural groupings of data (Wilkinson *et al.*, 2009:I-65). In this type of analysis, neither the number nor the members or subgroups were known when objects were classified into subgroups (Wilkinson *et al.*, 2009:I-65). A single-linkage, 1-Pearson correlation coefficient cluster analysis of all indices was performed with the quantitized data presented in the form of a tree-diagram or dendrogram (Addendum 2.27) (Wilkinson *et al.*, 2009:I-69). The linkage distance for detecting of different clusters was set at four which rendered five themes.

4.1.1.3 Dendrogram

The five themes were explored in light of overall meaning, significance and relatedness to CI, as well as connection to the clustered codes, with the aim to develop new concepts or theories (Cohen *et al.*, 2011:351). The five themes were subjectively labelled to denote the overarching theme through the factual evidence analysis of the codes linked to the specific categories within the theme cluster. Clustered codes were investigated and individually evaluated to conceptualize encompassing categories linked to the cluster theme (Cohen *et al.*, 2011:344). The conceptual concatenation of codes and categories through the dendrogram, described the CI phenomena within a cricket coaching context and depicted the overarching five CI themes for cricket coaches. The concatenated codes provided categories and five phases within the conceptual CI framework for cricket coaches (Addendum 2.27). The conceptually concatenated codes, categories and themes were also used to design a CI survey for cricket coaches, with questions denoting different categories under the themes of the newly developed CI cricket coaches framework. The codes and categories were verified in relation to the data and concatenated to fit the specific definition and theme scope.

4.2 Survey development

A second aim during the consolidation as part of phase III of the study was to develop an instrument that could measure the CI of cricket coaches. In other words, to develop a measurement instrument that allows researchers to evaluate the activities that coaches perform to collect and analyse data, as well as make decisions regarding their competitors and the environment. The survey development was preceded by the development of a CI framework for cricket coaches. This framework was developed by applying the business CI process model as theoretical framework to investigate the occurrence of intelligence creation and strategy design

by cricket coaches. The framework development process is also explained in Chapter 6 and the development of a CI survey additionally in Chapter 7.

Survey development within a previously unexplored construct, such as CI within the sport coaching domain, need specific guidelines (Burton & Mazerolle, 2011:28; Gehlbach & Brinkworth, 2011:380). Therefore, the following five steps were used to create a CI survey for cricket coaches (Gehlbach & Brinkworth, 2011:380): i) a literature review, ii) the use of focus group/interview data, iii) a synthesis of data into a comprehensive list, iv) the development of items and v) a review by experts before executing a pilot test (Gehlbach & Brinkworth, 2011:385). This approach relies on diverse techniques, while also depending on experts in the field to aid in item development and to determine validity at the onset of survey creation, resulting in more efficient and shorter scales (Gehlbach & Brinkworth, 2011:385). In the next section the development of a CI survey for cricket coaches by making use of the afore-mentioned five steps will be discussed.

4.2.1 Literature review

Relevant literature was explored by researchers through a SLR of the business CI and sport PA domains as part of the first step of survey development (Gehlbach & Brinkworth, 2011:387; Lauber *et al.*, 2003:337). The complete SLR is included in chapter 3. Through the SLR, substantial similarities and specific differences between the business CI and sport PA domains were recognized and resulted in the identification of constructs and definitions (Gehlbach & Brinkworth, 2011:384; Walker *et al.*, 2008:387). The constructs and definition are presented in chapter 7 Table 1. A review of literature also aided the researcher to examine pre-existing CI scales within the business domain, which aided in defining the constructs for the development of a sport related CI survey (Burton & Mazerolle, 2011:28; Gehlbach & Brinkworth, 2011:384).

4.2.2 Focus group and interview data use

Researchers aimed to refine the conceptualized SLR CI constructs to match the occurrence thereof in the sport domain, examining the terminology and application by the research population (Gehlbach & Brinkworth, 2011:387). An interview schedule was developed and tested, and interviews were conducted with high level cricket coaches and support staff.

4.2.3 Synthesis of literature and interview data

The third step in the survey development process merged literature and theory with empirical construct evidence (Gehlbach & Brinkworth, 2011:385). The merger provided a full conception of constructs and allowed researchers to develop a comprehensive list of indicators for item development (Gehlbach & Brinkworth, 2011:386). Researchers used the quantitative analysis of the qualitative interview data to develop items. The quantitative analysis of a single-linkage, 1-Pearson correlation coefficient cluster analysis of all indices rendered five themes which indicated the CI process framework followed by cricket coaches. Themes were defined and categories assigned through the conceptual concatenation of individual codes within each cluster. The themes and a definition or description as well as the concatenated categories are presented in Table 2 in chapter 7.

4.2.4 Item development

The process of categorizing quantitized data and placing them under conceptual categories and themes, allowed researchers to compile preliminary items to address identified cluster constructs and to synthesize interview data into indicators (Gehlbach & Brinkworth, 2011:387). Each of the established categories and its overarching definition was used to create separate survey items (Gehlbach & Brinkworth, 2011:387). Through the synthesis of theory and empirical evidence, the final survey item numbers were reduced to twenty-eight, which enhances the potential administering and ease of completion by participants as well as response rate (Gehlbach & Brinkworth, 2011:387; McGartland Rubio *et al.*, 2003:94). Researchers guarded against the use of ambiguous language, bias, double-barrelled questions and requiring sensitive information during the construction of questions (Burton & Mazerolle, 2011:96; Gehlbach & Brinkworth, 2011:387). Best practices in item development were applied by avoiding the over use of reverse scored items and numeric labels, and by using five response anchors of “strongly agree”, “agree”, “neutral”, “disagree” and “strongly disagree” (Gehlbach & Brinkworth, 2011:387; Turocy, 2002:S-175). The items within its correlating concept, which aim to measure the specific concept as part of the bigger construct or sub scale, are provided in Table 3 in chapter 7. Additionally, researchers compiled a rationale from literature to describe each correlating concept and item in terms of a “strongly agree” score. The description and rationale aimed to corroborate the items created from the conceptual concatenation of codes and quantitized categories by substantiating each through literature. The newly developed items needed to be validated before further pilot testing could take place and researchers reverted to an expert review process to do this.

4.2.5 Expert review process

i) Validation

McGartland Rubio *et al.* (2003:95) developed a measure that allows researchers to operationalize a construct and test its validity during its conceptualization. Consequently, this measure was used to determine the content validity ("the extent to which the items on a measure assess the same content or how well the content material was sampled in the measure") of the developed survey (McGartland Rubio *et al.*, 2003:94). Content validity is characterised by face and logical validity where face validity indicates that the measurement instrument or items appear to be valid, whereas logical validity uses a rigorous process during which an expert panel evaluates the content validity of the measurement instrument (McGartland Rubio *et al.*, 2003:100). Therefore, the study made use of research specialists to establish construct relevance as well as content validity (Gehlbach & Brinkworth, 2011:385; Turocy, 2002:175). The purpose of this step was also to obtain information on item clarity, representativeness, language use and other item-related concerns that research specialist highlighted (Burton & Mazerolle, 2011:28; Gehlbach & Brinkworth, 2011:383). Research specialists' feedback enhanced the quality of the newly developed instrument and provided objective criteria to measure each item. This is seen as a necessary pre-step before the effort is made to test construct validity through pilot studies (McGartland Rubio *et al.*, 2003:96).

The content validity evaluation provided information on the representativeness and clarity of each item as well as a preliminary analysis of the factorial validity (McGartland Rubio *et al.*, 2003:96). The content validity analysis by the expert review panel was performed according to the guidelines of McGartland Rubio *et al.* (2003:96), which suggest that the representativeness and clarity of items as well as preliminary factorial validity are evaluated through a response form (Addendum 2.29). The reliability or inter-rater agreement was also calculated from the expert reviewer responses. Representativeness refers to an items' ability to represent the content domain as described through a theoretical definition, while the clarity of an item is evaluated on the basis of how clearly an item was worded (McGartland Rubio *et al.*, 2003:96). Anchors of "1=Not at all representative / clear", "2=Major revisions", "3=Minor revisions" and "4=Very much representative / clear" indicated through the value of 1 or 2 that an item was not very representative of the domain and unclear, with a value of 3 or 4 that indicated that the item was clear and representative (McGartland Rubio *et al.*, 2003:97). Items were grouped together and experts were asked to indicate if the items fitted the subscale and therefore allowed for the preliminary assessment of the factorial structure. Each item was individually measured according

to these criteria and space was provided for paragraph type comments to be inserted after each item. The survey measurement was set up on a Google docs form and the link sent to experts to complete (Addendum 2.29).

ii) Expert panel

A new list of potential items needed to be validated at the onset of the process and researchers turned towards an academic audience to establish the construct relevance and validity of each individual item (Gehlbach & Brinkworth, 2011:380). The feedback from inter-university peers provided information on item clarity and construct complexities and allowed the chance to quantify the content validity of the scale (Gehlbach & Brinkworth, 2011:387). An expert panel from universities other than the primary researcher's university was selected according to each person's experience in the fields of sport science and management (McGartland Rubio *et al.*, 2003:96). The inter-university peers were from different universities, had to have more than three years' research and teaching experience in the sport domain, and had to sign and return an informed consent form (Addendum I). A total of ten experts, of which six experts responded, were contacted by a research colleague. One respondent did not complete the entire survey and this response was omitted from the results. The number of respondents was above the recommended minimum number of three and within the range of two to ten (Lynn, 1986:382; McGartland Rubio *et al.*, 2003:95). The expert panel's recommendations were used to improve the measurement instrument before the commencement of a pilot study to measure other psychometric properties (McGartland Rubio *et al.*, 2003:98). The pilot testing of the survey does not fall within the scope of this study. The panel's online feedback that was provided according to the response form, was analysed to determine content and preliminary factorial validity (Gehlbach & Brinkworth, 2011:385).

iii) Survey data analysis process

Three types of analysis on the preliminary CI survey were performed, namely an analysis to test the content validity of the measure, an analysis to test the factorial validity of each item and an analysis to test inter-rater agreement (McGartland Rubio *et al.*, 2003:98).

<u>Content validity index</u>

Content validity was based on the representativeness of items and the content validity index (CVI) was calculated by counting the number of experts who rated the item as three or four (indicating "minor revisions" and "very much representative" respectively) and by dividing that

number by the total number of experts. This provided a value for each item as a proportion of the experts who deemed the content as valid (McGartland Rubio *et al.*, 2003:97). The CVI of each subscale was calculated as the average for the items per subscale, and the CVI for the instrument calculated as the average of all the subscales. The CVI of the new CI survey subscales are presented in Table 4 of chapter 7 and according to McGartland Rubio *et al.* (2003:97) should be above 0.80 (Addendum 2.30).

Clarity validity

The clarity values per item, subscale and instrument were calculated in the same manner as the CVI. The number of experts, who rated the item clarity as three or four (indicating "minor revisions" and "very much clear" respectively) was counted and this value divided by the total number of experts. This provided a value for each item as a proportion of the experts who deemed the item wording clear (McGartland Rubio *et al.*, 2003:97). The clarity values of the new CI survey subscales are presented in Table 4 in chapter 7.

Inter-rater agreement

Inter-rater agreement (IRA) determines the extent to which the experts are reliable in their ratings and is calculated as per representativeness and clarity values for each item (McGartland Rubio *et al.*, 2003:97). The IRA per item was calculated by dividing the number of items considered to be a hundred percent reliable by the total number of items (individually and in the subscale or the instrument as a whole) (McGartland Rubio *et al.*, 2003:101). A more conservative method to calculate the IRA can be followed, whereby the number of items with an IRA of at least 0.8 is divided by the total number of items (within the subscales and as a whole) (McGartland Rubio *et al.*, 2003:101). The IRA values are presented in Table 4 in chapter 7. For instances were IRA values were below the proposed 0.8 mark, researchers performed a second method of analysis and obtained values above 0.8. Likewise, the qualitative feedback on items was evaluated and minor changes were effected.

Factorial validity index

The calculation of a Factorial Validity Index (FVI) is proposed to determine the degree to which experts consider items to be associated within the respective subscales (McGartland Rubio *et al.*, 2003:102). The FVI for each item was calculated by dividing the number of experts who associated the item as representative by the total number of experts. The FVI value for each subscale was calculated by averaging items within the subscale, and for the instrument as a

whole by averaging all the subscales (McGartland Rubio *et al.*, 2003:102). Even though there is currently no criteria for an acceptable FVI, a value of 0.8 is proposed (McGartland Rubio *et al.*, 2003:102). Preliminary factorial validity results of the new CI survey for cricket coaches are presented in Table 4 of chapter 7 and Addendum 2.30. The full degree of factorial validity can be assessed by conducting a pilot study with the revised measure to assess other psychometric properties through a factor analysis (McGartland Rubio *et al.*, 2003:103).

Revision of the instrument

After the quantitative data analysis of the expert reviewers on the items of the newly developed CI survey for cricket coaches, researchers could turn to the qualitative feedback per item to determine the necessary revisions (McGartland Rubio *et al.*, 2003:102). Minor adjustments in word and language use were necessary to improve the instrument (McGartland Rubio *et al.*, 2003:102). Researchers discussed the qualitative responses of experts and revisions were made until agreement was achieved. The revised CI survey that was developed from the quantitative and qualitative analysis that was performed in phase III of consolidation, is presented in Table 5 in chapter 7 and Addendum 2.31.

The execution of the above-mentioned steps allowed researchers to compile a CI survey for cricket coaches. The survey was compiled by the synthesis of several known techniques within survey development which balance the use of diverse techniques rather than rely predominantly on psychometric analysis alone (Gehlbach & Brinkworth, 2011:380). The use of the diverse steps and experts in the field to establish the content and factorial validity at the onset of item and scale development, increased instrument efficiency and effectiveness prior to pilot testing (Gehlbach & Brinkworth, 2011:386). The development of a CI survey for cricket coaches also served as the end-product of the partially mixed sequential dominant status multi-mode research process that was followed.

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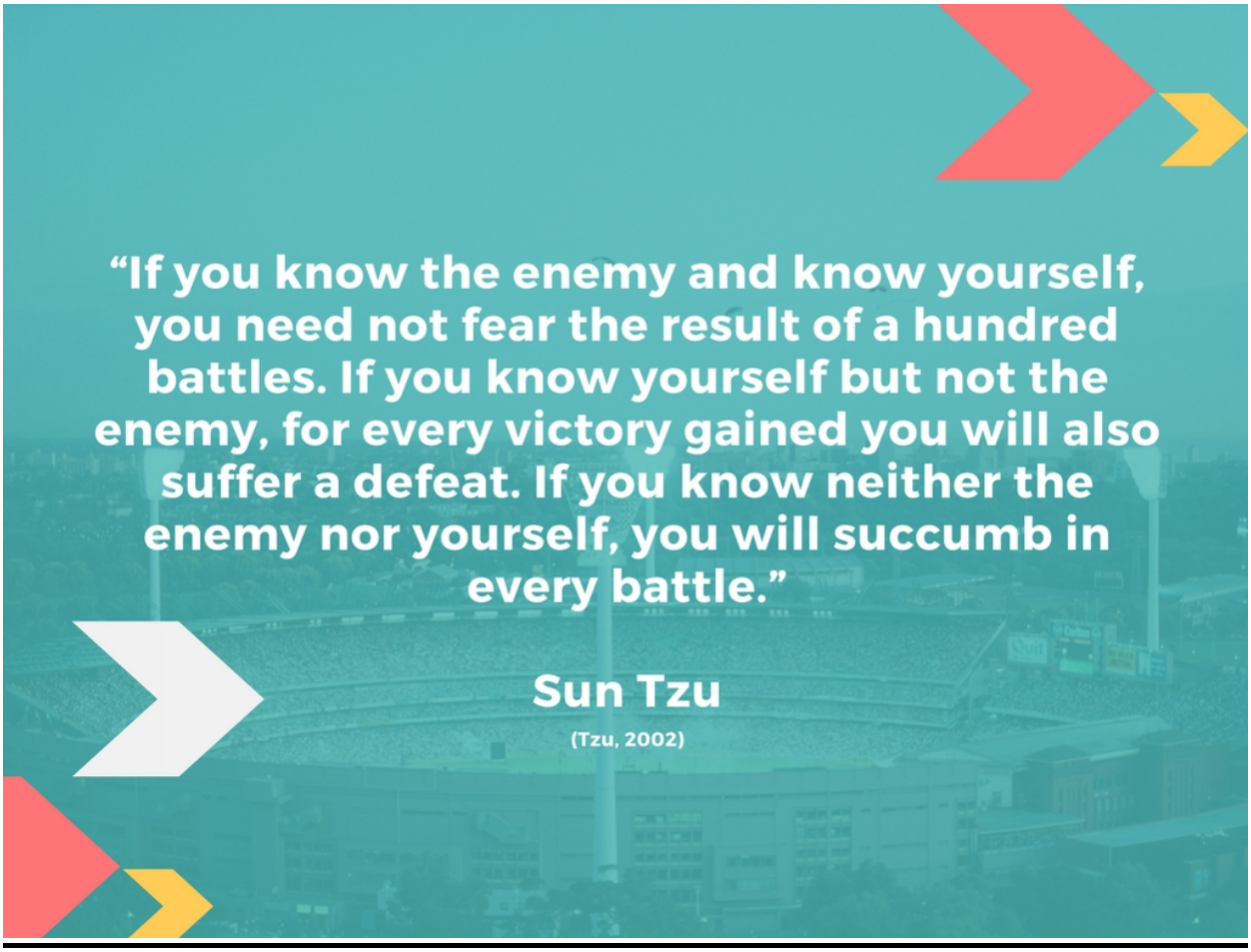
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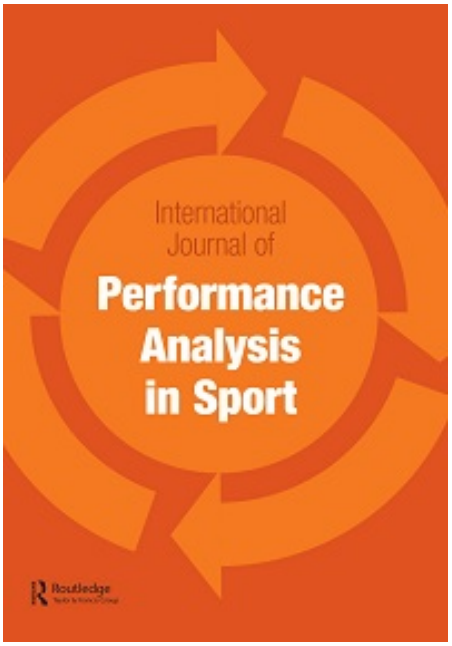
CHAPTER 3



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ARTICLE 1:

RELEVANCY OF THE BUSINESS COMPETITIVE INTELLIGENCE PROCESS TO SPORT PERFORMANCE ANALYSIS: A SYSTEMATIC LITERATURE REVIEW



This article was submitted to the *International Journal of Performance Analysis in Sport* and is currently under review.

Relevancy of the business competitive intelligence process to sport performance analysis: A systematic literature review

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Abstract

Sport coaches employ specific performance analysis (PA) activities to attain a competitive edge. However, existing studies do not provide specific information that allows coaches to enhance their competiveness through a systematic approach of competitor data collection, conversion and countering. Within the business domain, competitive intelligence (CI) is a methodical process applied to enhance organisations' competitiveness. Therefore, the purpose of this systematic literature review was to present similarities and differences between the business CI process and sport PA domain. A total of 61 articles within the CI (34) and PA (27) domains were included. Qualitative content analysis revealed substantial similarities of the current sport PA process to the 4Cs CI process model of Weiss regarding data collection, conversion, information communication, countering and the process as a whole. Consequently, the study concluded that the formal CI process and activities performed within the business domain are applicable to the sport PA domain for use by coaches to analyse competitors. However, specific differences between the two domains indicate that more research is needed to describe and verify initial key intelligence topics (KITs), data collection activities of coaches, and to develop a CI framework and measurement instrument for coaches to evaluate their CI activities.

Keywords: Business competitive intelligence, sport performance analysis, cricket, sport coaching, competitor analysis, key intelligence topics.

1. Introduction

Competitive intelligence (CI) is the systematic procedure for gathering and analysing information on competitors, aiming to know their plans (Teo & Choo, 2001). Knowledge of competitor strategies can be applied to an organisation in order to influence the organisation's own strategic plans, decisions and operations so that a competitive advantage can be gained and maintained (Calof & Wright, 2008; Weiss, 2002). While sport and various types of businesses have been employing a structured CI process to gain a competitive advantage over their competitors for the past three decades, sport performance analysis (PA) aimed at extensive competitor statistical analysis was only brought into the spotlight in 2003 (Hendrickson, 2012). Furthermore, although statistical sport competitor analysis methods have been successfully employed by professional sports franchises in numerous countries for some time now, the process is still in its infancy stage, especially in South African sport (Najdan *et al.*, 2014). Additionally, despite the facts that sport coaches deem pre-match analysis of the opposition to be important, and that opposition analysis forms an important category of video-based PA, there is a dearth of knowledge on the use of PA information by coaches, especially aimed at competitor analysis (Groom *et al.*, 2011; Wright *et al.*, 2013). Inadequate disclosure of coaches' practices

regarding competitor analysis within PA and coaches' subsequent strategy design is largely due to elite sport coaches' prerogative to hold on to their "competitive edge" (Wright *et al.*, 2012a). In this regard, the majority of PA research focuses mainly on the improvement of the quality, specificity and accuracy of coaches' plans that are aimed at modifying players' sporting skills through deliberate practice (Garganta, 2009; Groom *et al.*, 2011). Ultimately, through *inter alia* PA, coaches aim to enhance players' on-field competition performances, win matches and finally leagues through an enhancement of player and team skills (Wright *et al.*, 2012a).

Sport coaches and athletes hold winning as sovereign and therefore continuously seek new methods and PA applications to achieve a competitive edge (Mallett & Côté, 2006; Smith & Stewart, 2008). An example of a sport where the increase in popularity has led to vast amounts of money being invested into PA to gain knowledge of game strategies and tactics, is Twenty-twenty cricket (Bhattacharjee & Saikia, 2014; Najdan *et al.*, 2014). In this regard, a number of PA studies aimed at uncovering key cricket performance indicators (KPIs) through statistical analysis have been published (Petersen *et al.*, 2008a; Petersen *et al.*, 2008b; Sharma *et al.*, 2012). However, these studies do not provide specific and structured activities and processes by which coaches' decision-making can be guided (Cushion *et al.*, 2006). Neither do studies provide information that will allow coaches to enhance their competiveness through a systematic approach of competitor data collection, conversion and countering (Cushion *et al.*, 2006; Groom *et al.*, 2011). This necessitates research into the development of a systematic competitor analysis approach, such as the business CI process, that coaches can use as part of the PA process (Voight, 2007).

In this regard, Schoeman *et al.* (2006) applied data mining as part of the CI business data collection process to a cricket competitive environment in order to gain a competitive advantage. Although other researchers have more recently made an attempt also to apply another portion of selected activities from the business CI process to the sport coaching process (Zhou, 2015), the similarities and differences between the comprehensive business CI and sport PA processes still need to be substantiated. A summary of empirical evidence, existence, benefits and limitations of domain specifics will allow researchers to identify consistencies in the current application of a formalised CI process from the business domain to a non-formalised process within the sport PA domain (Kitchenham, 2004). These findings may support the development of a formalised process, appropriating new research activities and suggesting areas of further investigation (Kitchenham, 2004). Therefore, the aim of this systematic literature review (SLR) is to evaluate the relevancy of the business CI process to the sport PA domain as part of the coaching process in sport and specifically cricket.

2. Competitive intelligence - definition and objectives

Many definitions of CI are interchangeably used by researchers (Cloutier, 2013; Franco *et al.*, 2011; Pellissier & Nenzhelele, 2013), and scholars have accentuated the need for consensus on the definition of CI (Du Toit & Muller, 2004; Pellissier & Nenzhelele, 2013). One of the accepted definitions for CI was compiled by the Strategic and Competitive Intelligence Professionals (SCIP) as: "the process of ethically collecting, analysing and disseminating accurate, relevant, specific, timely, foresighted and actionable intelligence regarding the implications of the business environment, competitors and the organisation itself" (Cloutier, 2013:58). CI objectives include organisation competitiveness enhancement, environment fluctuations prediction, strategic decision-making support, opportunities and threats identification, problem solving and early warning signs signalling regarding the business environment and competitor activities (Michaeli & Simon, 2008; Muller, 2005; Pellissier &

Nenzhelele, 2013).

2.1 The competitive intelligence process

The implementation of an appropriate intelligence process and structure is vital for intelligence development (Du Toit & Muller, 2004). The CI process consists of interrelated stages with the objective to enhance top managements' decision-making within organisations (Nasri, 2011a; Wright *et al.*, 2009). Numerous CI process models exist and describe CI activities; however, the following characteristics encompass all aspects of the CI process: (i) planning and direction identified (Nasri, 2011a); (ii) collection of data (Dishman & Calof, 2008b); (iii) processing or analysis of data (Nikolaos & Evangelia, 2012); (iv) dissemination or communication of data (Herring, 1999), and (v) decision-making by accountable individuals (Cloutier, 2013; Pellissier & Nenzhelele, 2013).

The 4Cs CI process model of Weiss (2002) (Figure 1), is a simple model which involves four separate stages, namely: the collection, conversion, communication and countering of data and information. Each primary stage of the 4Cs process model includes a number of sub-stages and during the first primary stage, the first sub-stage is to define the user's key intelligence topics (KITs) (i.e. the nature and scope of an organisation's or user's intelligence needs) (Herring, 1999). KITs therefore specify key information needs (KINs) of decision makers and if the need for intelligence drives decisions and actions, it can be seen as legitimate KITs (Herring, 1999). The KITs then direct data collection and analysis activities (Herring, 1999; Nasri, 2011a). Various sources are utilised during data collection and include internal and external sources of qualitative and quantitative nature, human as well as textual information (Dishman & Calof, 2008b). Sources should also be evaluated for reliability (Saayman *et al.*, 2008) and are categorized as primary or secondary sources (Nasri, 2011b). The second and core stage of the CI process is the analysis of data (Rouach & Santi, 2001) and researchers and implementers regard this as the most challenging part of the CI process (Nikolaos & Evangelia, 2012).

During this analysis or conversion stage, CI professionals employ various analytical techniques such as competitor profiling, SWOT analysis (acronym for strengths, weaknesses, opportunities and threats) and industry analysis (Cloutier, 2013; Fleisher & Bensoussan, 2003). Linked to this conversion stage, is a CI information or operating system, which supports the identification of trends or patterns and contextualization of data (Weiss, 2002). Actionable information described as "intelligence" is then communicated to decision makers as part of the third stage of the CI process (Pellissier & Nenzhelele, 2013).

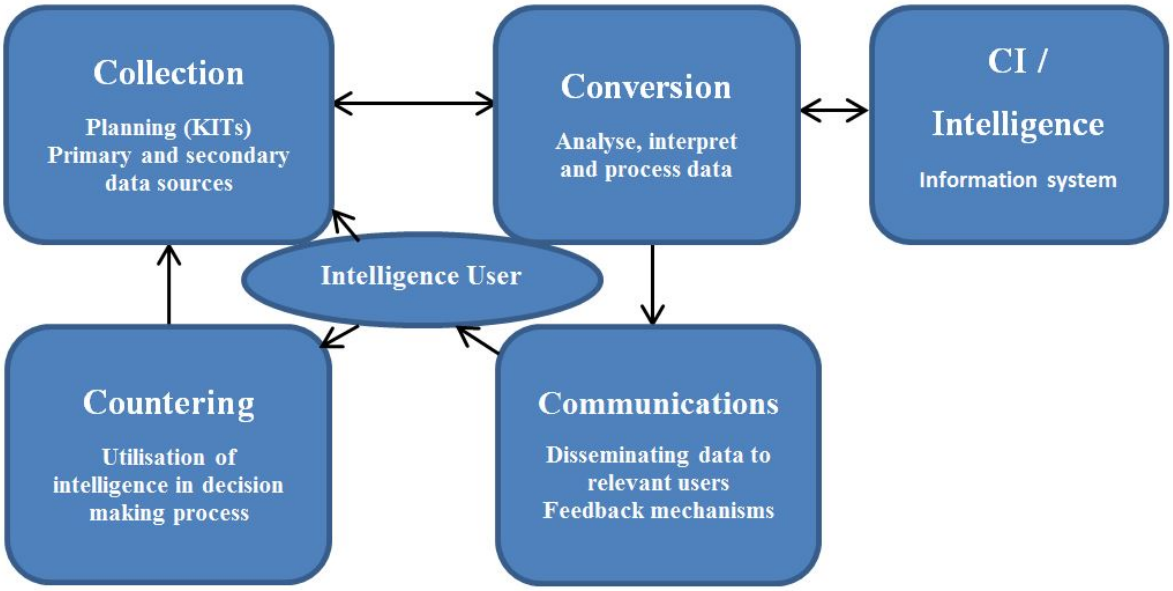


Figure 1. The 4Cs process model (Weiss, 2002)

Decision makers are seen as those who have "the authority and responsibility to act on the findings" within the organisation and are centrally placed within the 4Cs process model (Saayman *et al.*, 2008). Various methods of communication are used during this stage of the process with appropriate channels being employed, depending on the type of information used (Cloutier, 2013). The fourth and last stage of the process, namely countering, uses different categories of knowledge about competitors and the competitive environment for decision-making purposes as well as for the development of specific strategies (Weiss, 2002). Decision makers' use of CI information is the principal objective of the process and research indicates a scarcity of knowledge in the CI literature regarding this fourth and final stage (Cloutier, 2013).

Several contextual factors influence CI and the application thereof within organisations. They include: organisational awareness and culture of CI, formal infrastructures, employee involvement and skills, policies, procedures and management support (Cloutier, 2013; Pellissier & Nenzhelele, 2013). CI creates a competitive advantage and enhances competitiveness since it converts information on competitors and the environment into knowledge (Tej Adidam *et al.*, 2012). This advantage could be used to anticipate and counter competitors' potential moves as well as to exploit a competitor's weaknesses rather than merely reacting to competitor actions (Viviers *et al.*, 2008). In the sport domain, PA is a process with similar objectives to those of CI, as both allow users to determine their own strengths and weakness, but also to analyse opponents' strengths and weaknesses in order to govern competition tactics (Horwill 1991 as cited by Lames & McGarry, 2007; O'Donoghue, 2009).

3. Performance analysis - definition and objectives

PA refers to the process of recording and analysing athletes' performances during practice and competition, with the main focus of providing objective data that inform and support the coaching process (Lees, 2003b). PA data mainly refers to the position, action, time and outcome of an event during competition and focuses on recording discrete categories of behaviours (Lees, 2003a; McGarry, 2009a). These categories include biomechanical, match, technical and tactical performance aspects of an individual athlete or collectively of a team (Hughes, 2005). All these

aspects are instrumental in the coaching process for the development of informed practice, and ultimately PA is utilised with the goal to enhance performance (Hughes & Bartlett, 2002; Wright *et al.*, 2012a). Notational analysis, as a method that is used to perform sport PA, is defined as: "an objective way of recording performance so that key elements of that performance can be quantified in a valid and consistent manner" (Hughes, 2004; Neville *et al.*, 2008). Hence, sport coaches gather and analyse data by utilizing numerous techniques and software programmes in order to provide immediate feedback; for database development; to identify areas of improvement; to evaluate specific performance aspects, and to develop selection criteria (Hughes, 2008). Therefore, the objective of recording sport performances is to quantify key elements in a valid and consistent manner so as to assess and improve an individual athlete or team's performance (Hughes, 2004). Even though PA is used as a practical coaching tool within the coaching processes, only a small portion of time, resources and effort is aimed at competitor analysis (Bampouras *et al.*, 2012; Cushion *et al.*, 2006; Hughes, 2005). Since CI focuses on competitor analysis and countering, this research aims to close the gap within sport PA by establishing a systematic and structured approach and process to gain a sport competitive advantage.

3.1 Performance analysis and process models

In sport PA research, a number of studies have been devoted to the coaching process, the development thereof, as well as the role and activities of PA within the coaching process (Bampouras *et al.*, 2012; Cushion *et al.*, 2006; Franks & Goodman, 1986; Hughes & Franks, 2004). The objective of the coaching process is to instigate measurable changes in athlete achievement (Hughes, 2004). However, coaching and teaching of skills depend heavily on PA results and feedback to affect improvements in performance (Hughes, 2007). Various studies and models describe the PA process and complexities, including aspects such as data gathering, organisation of data, performance profiling as well as providing a broad interpretation of the roles and relationships between key participants such as the analyst, coach and athlete (Bampouras *et al.*, 2012; Cushion *et al.*, 2006; Franks & Goodman, 1986; Hughes, 2005). Existing PA models and flow diagrams are cumbersome and are only focussed on the episodic delivery of coaches' feedback and planned training sessions with the main objective to improve athlete performance (Bampouras *et al.*, 2012; Cushion *et al.*, 2006). Additionally, existing PA models do not clarify definitive concepts, principles and processes for gaining a competitive advantage through competitor and environmental analysis (Cushion *et al.*, 2006; Gould *et al.*, 1990). In this regard, the systematic literature review as conducted in this study aims to provide a relevant theoretical foundation from the business CI domain to a sport coaching and PA context.

4. Method of the systematic literature review

4.1 Design

The review was conducted from the functionalist quadrant of the four paradigms for the analysis of social theory (Burrel & Morgan, 1979). The functionalist paradigm assumes societies have a concrete existence following a specific order which can produce explanatory knowledge of the reality as assessed objectively by the scientist (Burrel & Morgan, 1979). The goal of scientists who follow this paradigm is to provide rational explanations of social affairs and use mechanical analogies for modelling and understanding a particular phenomenon (Burrel & Morgan, 1979). In this regard, the business CI process model was used as theoretical framework to objectively assess and explain the particular phenomenon of sport PA activities, specifically as it relates to the PA and the cricket coaching environment.

4.2 Paper selection

A review protocol was established by researchers with the primary researcher performing the systematic literature review search in three steps with assistance from a skilled information specialist. Firstly a search on the identified keywords of "competitive intelligence" using the following databases was conducted: Academic Search Premier, EbscoHost™, Business Search Premier™, Scopus, MasterFILE Premier™, Regional Business News™, Emerald Insight™, SACat™, Web of Science™, and SAePublications™. The inclusion of manual searches is strongly recommended (Kitchenham, 2004) and were done via Google Scholar by performing expert author searches. Secondly, a variety of searches were performed with the keywords "performance analysis," or "data analysis," or "match analysis," or "sport" and "cricket" on EbscoHost™, SPORTDiscus™, Web of Science™, and Scopus databases with Google Scholar and eJournals being used for specific journal searches. Author searches for the most prominent authors within the PA field of study were also conducted. A third search was conducted by combining the keywords of "competitive intelligence" and "sport" from Scopus, EbscoHost™ and SPORTDiscus™, MasterFILE™, Academic Search Premeir™ and Web of science™ databases with Google Scholar included for manual searches. Searches for the identification of literature relevant to this review were arbitrarily narrowed down to only include articles from the last 17 years (2000-2016). Full text, English, scholarly and peer reviewed articles in accredited journals and conference proceedings that were available to researchers were selected with the keywords "competitive intelligence," or "performance/match/data analysis," or "sport" or "cricket" within the title. Cricket is singled out as a sporting code, since the review forms part of a larger cricket specific research project.

The primary researcher systematically screened the article abstracts and content and selected articles based on the occurrence of aspects within the CI process as identified by literature, namely: data collection, conversion, information communication, countering and an overall process description (Weiss, 2002). Articles had to contain at least three of the five CI process aspects in the abstract and content to be included. Remaining articles were then scrutinized according to their research design and methodology (Kitchenham, 2004). Further exclusions were made regarding review articles and articles with low relevancy to the five CI aspects (Kitchenham, 2004). The remaining articles were sent to international experts in the field of CI and PA respectively, who added additional literature for further scrutiny. After careful consideration of expert recommendations, the list of 35 CI and 28 PA articles was finalised. During the document analysis two of the CI articles where deemed unsuitable for application within the study and were omitted. Table 1 (Appendix 1) presents the results of each of the 61 articles that were analysed.

4.3 Coding procedure

Content analysis was completed using ATLAS.TI™ computer assisted qualitative data analysis software. Content analysis commenced with deductive theme identification of the CI process stages from literature whereby data collection, information conversion, communication and countering were created. Together with these stages, the occurrence of a process and components thereof was identified as a fifth theme. Deductive reasoning allowed the researcher to move from a pattern that is logical and theoretically expected to observations that test whether the expected pattern does in fact occur (De Vos *et al.*, 2005). Thereafter, inductive coding of the selected CI and PA articles were performed whereby the researcher first identified meaning units, which is seen as ideas or information able to function as a separate entity (Côté *et al.*, 1993). During the meaning unit identification the researcher created clear and meaningful codes and established a precise definition of the code construct (DeCuir-Gunby *et al.*, 2011). The specific instances or occurrences of identified meaning units and code creation were used in the inductive process to

draw conclusions about the entire class of meaning units and codes (De Vos *et al.*, 2005), which were then cited under the existing themes. In order to establish the reliability of the coding procedure, inter- as well as intra-reliability was determined using Cohen's kappa. For inter-reliability in the coding process, an independent coder was briefed on the identification of the meaning units, the code creation practice as well as the definitions of the codes developed. Thereafter independent coding was conducted on two arbitrary selected articles. Inter-reliability which can be defined as the "agreement among coders about the categorization of content" (Anderson *et al.*, 2001:12) was $\kappa = 0.9$. Intra-reliability on codes was $\kappa = 0.84$ as the researcher performed a second coding process on two arbitrarily selected articles, more than seven days apart. Reliability values between 0.8 to 0.9 are deemed to be an indication of rich analytical data, and the substantial agreement indicates the consistency in creating and applying codes by the researcher, and validates the qualitative method utilised (Anderson *et al.*, 2001; Campbell *et al.*, 2013).

5. Results and discussion

The content analysis of 61 articles rendered code data networks on the five main themes which are indicated by Figures 2 to 6. Similarities and differences between the business CI and sport PA processes are evident and will be discussed with the created code(s) indicated by *italic text*.

5.1 Data collection

Ten out of a possible thirteen codes are similar between CI and PA articles (Figure 2) as literature mentions the *collection of data* within the CI (Gatsoris, 2012; Tej Adidam *et al.*, 2012; Viviers *et al.*, 2002; Wright *et al.*, 2012b) and PA processes (Bhattacharjee & Saikia, 2014; Lames & McGarry, 2007; Moore *et al.*, 2012; O'Donoghue, 2006). The first sub-stage in the CI data collection stage involves that users of CI such as senior management, executives, departmental managers and decision makers assign CI projects to the CI specialists or analyst, employees or sales personnel as the *person collecting data* (Du Toit & Sewdass, 2014b; Marin & Poulter, 2003; Rapp *et al.*, 2011; Wright *et al.*, 2002). The *persons involved* with the activity of sport PA data collection is the coach, who is the main user of PA information and who ideally directs the sport scientist or a performance analyst in the collection process (Bampouras *et al.*, 2012; Wright *et al.*, 2012a). However, very few coaches have access to a skilled analyst and coaches are often the main *person involved*, who complete their own data collection and formal match analysis (Wright *et al.*, 2012a).

Parallel to this, business managers as users of CI also tend to sometimes be the *person collecting* the data during the collection process (Qiu, 2008). However, many organisations have CI specialists who conduct data collection and analysis (Fleisher & Wright, 2010; Salvetat & Laarraf, 2013). These CI specialists are dependent on effective communication from the CI users such as managers, who must convey their initial key information needs (KINs), specified as *Key Intelligence Topics (KITs),* to the specialists (Fleisher & Wright, 2010). CI analysts use these *KITs,* which are identified and organised according to three functional categories or types , to plan and direct the collection and analysis process (Fatti & Du Toit, 2013). In this regard, Qiu (2008) posits that managers need specific *knowledge* in order to assign the *KITs* and collection of information from meaningful sources. *KITs* are also described as types of information related to aspects such as strategic decisions, early warning signals and description of key competitors (De Pelsmacker *et al.*, 2005). The success of the CI process is very dependent on this initial sub-stage. During the sport PA process, the coaches' *knowledge* determines the appropriate competition *key performance indicators* (*KPIs*) to be analysed which directs the collection, sources and analysis of data (James *et al.*, 2007; Wright *et al.*, 2012a). In various instances

though, analysts, researchers and players are also involved in defining the key *KPIs* (Wright *et al.*, 2012a).

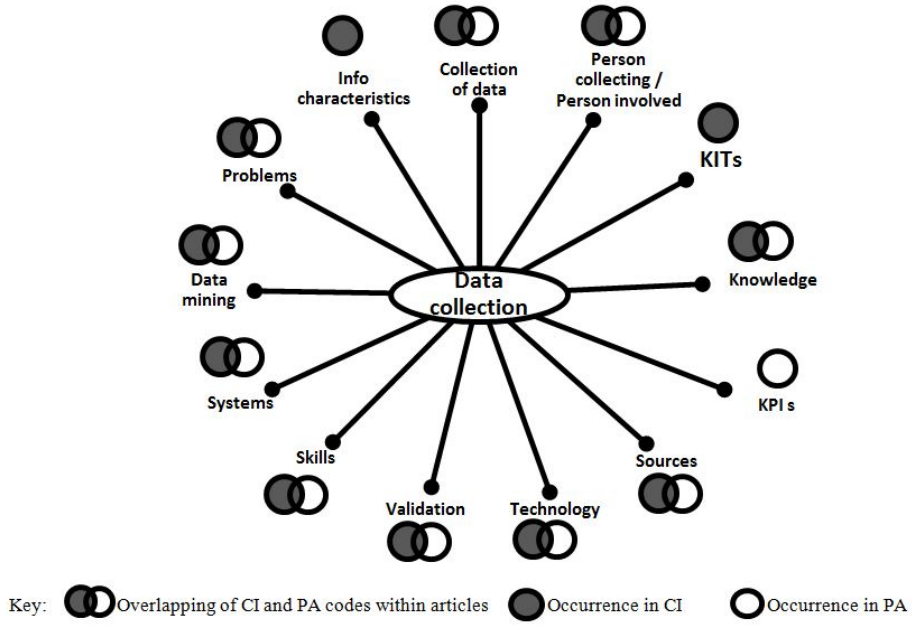


Figure 2. CI and PA data network on the data collection stage

KPIs refer to specific and measurable variables that a coach and/or analyst value or associate with successful competition outcomes and the majority of coaches use *KPIs* to analyse performance (Wright *et al.*, 2012a). Through the *KPIs* coaches assess athletes' efforts, tactical and technical aspects as well as movement-related activities (Wright *et al.*, 2012a). Specific examples of *KPIs* in cricket include runs scored, wickets taken, dot balls bowled, run rate and boundaries scored (Moore *et al.*, 2012). On the surface it would seem that KITs and KPI are alike, however, they differ. In this regard, KITs are more thematic in nature and related to issues that are important for the CI user, such as changes in the economic environment, or alterations made by opposition businesses (Dishman & Calof, 2008b). On the other hand, KPIs designate specific measured pieces of information, which in light of CI, could be classified within a specific KIT category (Petersen *et al.*, 2008b). The overarching description of "key performance parameters", which influence the selection of KPIs, are more closely related to KITs (Wright *et al.*, 2012a). The use of this term is limited within the PA SLR documents.

Analysts in both domains use specific *sources* to collect information. Within the PA set-up, coaches often use video footage or edited clips of their athletes' performances to code KPIs and to provide feedback (Moore *et al.*, 2012). The coding of live or recorded matches, is a rich *source* of information and entails the assignment and quantification of specific match behaviours and allows for performance information to be gained or KPIs to be observed and noted (Moore *et al.*, 2012). Additionally, various sensors and devices are incorporated into sport equipment or fitted to athletes, so that athlete specific data can be transmitted to receiving stations or systems for data collection (Baca, 2006). The coding of matches or sensor data are seen as primary *sources* of information whilst match and statistical data obtained from internet websites are regarded to be secondary information sources (O'Donoghue, 2009). During the CI process, primary *sources* of information are utilised for data collection specific for the CI project and include customers' and suppliers' feedback, knowledge of own employees and competitors' feedback (Du Toit & Sewdass, 2014b; Sewdass & Du Toit, 2014). Secondary *sources* are described as existing or already available sources of data which was originally collected for a

different purpose, but is still relevant to the CI project and include exhibitions, trade journals, publicly available databases and various internet sources (Du Toit & Sewdass, 2014b; Rapp *et al.*, 2011). CI secondary *sources* are important to CI professionals since it supplements data from primary sources (Teo & Choo, 2001). CI articles commonly refer to primary and secondary data sources (Begg & Du Toit, 2007; Dishman & Calof, 2008b; Du Toit & Sewdass, 2014b; Fatti & Du Toit, 2013), whereas these terms are only mentioned once in PA articles (O'Donoghue, 2009). In PA research, match and athlete statistics are mainly used as data sources, and interviews that journalists conduct with players, coaches or teams are rarely employed to obtain information (O'Donoghue, 2006). Additionally, primary data sources such as live coded matches are used in the sport domain, however it necessitates a designated and skilled person as well as available technology. Therefore the use of primary data sources are somewhat limited, and the use of secondary data is more prevalent. The use of predominantly secondary data could indicate that the sport related KITs as identified by die intelligence user, is not directing the data source allocation and usage as is the case within the business CI domain.

In both domains, *technology* plays an important role in obtaining and storing relevant data (Lyons, 2011; Nasri, 2011a; Wright *et al.*, 2012a). The use of video analysis is a necessity within PA, since the increasing number of digital resources and access thereof, have created unique opportunities to collect rich data and share information which is instrumental in enabling coaches to enhance performance (Lyons, 2005). Both the business CI and sport PA processes require the *validation of data* (Cooper *et al.*, 2007; Du Toit & Sewdass, 2014b; Fleisher, 2008; James *et al.*, 2007), which together with the gathering of information require specific *skills of the person gathering the data* (O'Donoghue, 2006; Strauss & Du Toit, 2010). Within sport PA the analyst or sport scientist need specific *skills* such as good observational skills to accurately and consistently identify KPI behaviours and events (Hughes & Franks, 2004). Furthermore, the analyst or sport scientist must be precise and accurate in keying in events and behaviours through dependable methods and systems (Cooper *et al.*, 2007; Wright *et al.*, 2012a). The use of *systems* for PA and CI data collection (Cooper *et al.*, 2007; O'Donoghue, 2008; Wright *et al.*, 2012b), together with the incorporation of *technology* has opened up the opportunities for thorough *data mining* within the two domains (Schoeman *et al.*, 2006; Teo & Choo, 2001). In this regard, Schoeman *et al.* (2006) explored the application of this CI business activity and tool of *data mining* within the competitive cricket analysis environment. This *data mining* process employed within the cricket domain is however still in its infancy stage, and top level coaches, managers and analysts indicated various inclinations towards the possible exploitation of such activities to enhance their competitiveness (Schoeman *et al.*, 2006).

The process of gathering data is not without *problems* within the CI landscape and include: infrequent data collection, dominance of web based, public domain sources accessed, lack of time, money and procedures (Gatsoris, 2012; Rapp *et al.*, 2011; Wright *et al.*, 2012b). PA *data collection problems* include inconsistent analyst observations, coding operational definition ambiguity and the on-going search for stability in performance indicators (Cooper *et al.*, 2007; James *et al.*, 2007; Lames & McGarry, 2007). Within the CI domain, information is characterised as being tactical or strategic, according to the longevity of use, availability and time orientation under the *informational characteristics* code (Rapp *et al.*, 2011).

5.2 Data conversion

The second stage of the CI process is data conversion during which true intelligence is created. Seven out of the ten codes show similarities between CI and PA articles (Figure 3). Within the CI domain, *information/data analysis* converts gathered data into actionable intelligence, which is used for strategic decision-making (Dishman & Calof, 2008b). The *analysis* process in sport is

described as the time taken to perform and interpret the how and what of information that was produced (Wright *et al.*, 2012a). In sport, measurements are modified to quantify match performances (Lemmer, 2008). For example, match variables that are related to successful and less successful teams or athletes are noted and *analysed* (O'Donoghue, 2007; Petersen *et al.*, 2008b). The *analysis* of KPIs are a priority and in some situations the coach will also perform match *analysis* (Wright *et al.*, 2012a). However, within elite and high performance coaching, performance *analysts* or sport scientists mainly perform the analysis (Bampouras *et al.*, 2012; Wright *et al.*, 2012a). Within the CI domain this activity is mainly performed by CI professionals or *analysts* who need specific *analyst skills* which include research skills, analytical abilities, an ability to apply qualitative and quantitative methods, select best methods as well as the ability to communicate results (Fleisher & Wright, 2010; Tej Adidam *et al.*, 2012). Further CI *analyst skills* for analysis include familiarity and the ability to utilise different tools and methods of analysis that are industry specific and complement the organisation (Fleisher, 2008; Salvetat & Laarraf, 2013). On the other hand, PA research does not elaborate on skills needed by the performance analyst other than that she/he must be able to observe and code matches correctly (Wright *et al.*, 2012a).

Within PA the main *information format* used for analysis is video footage or match recordings (Schoeman *et al.*, 2006; Wright *et al.*, 2012a), whereas the CI domain does not specifically mention the *data format* other than numbers and figures obtained during for example financial or general information analysis (Du Toit & Sewdass, 2014b). PA understandably focuses on the correct use of *statistical* methods for analysis (Moore *et al.*, 2012; O'Donoghue, 2008; O'Donoghue & Cullinane, 2011), especially in cricket where it is used by analysts and coaches for performance evaluation and enhancement (Amin & Sharma, 2014; Petersen *et al.*, 2008a; Petersen *et al.*, 2008b; Saikia *et al.*, 2012). However, it would seem that researchers are still trying to identify best practices for determining data reliability and *statistical methods* in PA (Lemmer, 2008; O'Donoghue, 2005; Saikia *et al.*, 2012; Sharma *et al.*, 2012). *Analytical techniques* most commonly employed within the CI domain include critical success factor analysis, SWOT analysis, benchmarking, Porter's five forces industry analysis and customer satisfaction surveys (Nasri, 2011a; Tej Adidam *et al.*, 2012; Wright & Calof, 2006).

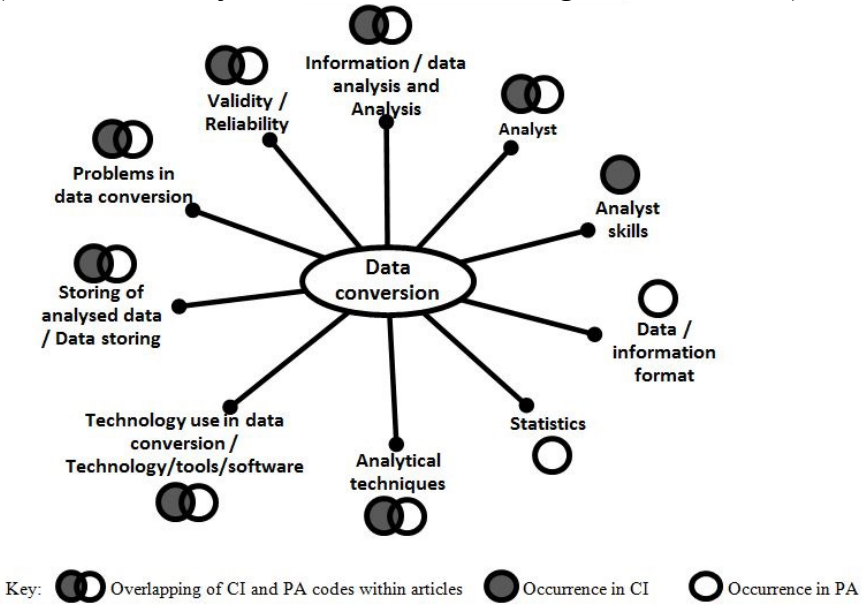


Figure 3. CI and PA data network on the data conversion stage

Information analysis in the form of summarised data, clustering, classifying, and association rule analysis is also reported, together with semantic-based algorithms, gap analysis program (GAP) analysis and competitor profiling (Dai *et al.*, 2011; Sewdass & Du Toit, 2014; Tej Adidam *et al.*, 2012; Wright *et al.*, 2012b). An examination of PA *analytical methods and techniques* reveals that performance evaluation through KPI analysis of winning and losing teams is a priority and researchers refer to *statistics* such as totals, averages and percentages (Amin & Sharma, 2014; Najdan *et al.*, 2014; Petersen *et al.*, 2008b). Furthermore, pattern recognition, performance profiling and the identification of opponents' strengths and weaknesses are used as *analytical techniques* to specify new tactics by the coach (Hughes, 2005; Lames & McGarry, 2007; O'Donoghue, 2009; O'Donoghue & Cullinane, 2011). As part of these *analytical techniques*, various statistics, video footage and ball-by-ball data are employed within cricket analysis (Schoeman *et al.*, 2006).

Technology plays an integral part in obtaining and analysing video footage during PA with numerous *software* packages and *tools* being employed (Lyons, 2011; O'Donoghue, 2006; Wright *et al.*, 2012a). Even though many organisations within the CI domain use *technology for data conversion* (Fleisher & Wright, 2010; Wright *et al.*, 2012b) it is clear that some organisations do not have appropriate *technology* and software *storing systems* to support their CI efforts (Garcia-Alsina *et al.*, 2013; Viviers *et al.*, 2002; Wright *et al.*, 2012b). The absence of, or inadequate *software* and *technology* for PA may also be a problem for lower level coaches, but for most elite level coaches the utilization of relevant *technology and software* is not a problem (Schoeman *et al.*, 2006; Wright *et al.*, 2012a). In this regard, more coaches and their support staff are using digital repositories or *data storing* systems such as the Cloud (Lyons, 2005). However, inadequate or unavailable software and technology is only one of the data conversion *problems* that some organisations face during the analysis stage. Other *problems* include inadequate analysis skills by analysts, improper tools, unreliable data inputs and unclear communicated KITs (Fleisher & Wright, 2010). The *validity and reliability* of data, the use of the correct analytical technique, as well as the importance of *storing* collected and analysed data were mentioned as being important factors to consider during data analysis in both domains (Cooper *et al.*, 2007; Fleisher, 2008; Lyons, 2011). Both domains indicate human and operator errors as the main problem during data analysis and within the PA domain, the importance of ensuring *reliability* and validity of data collected and the analysis process is highlighted (Cooper *et al.*, 2007; James *et al.*, 2007; Robinson & O'Donoghue, 2007).

5.3 Information communication

The third stage refers to the communication of the analysed data. All six codes show similarities between CI and PA articles (Figure 4).

Dishman and Calof (2008b) emphasize the importance of proper communication for *information sharing* in order to provide intelligence results for managerial decision-making. The onus is on the analyst to interpret and *share information* as well as intelligence in a timely, graphic and illustrative manner so that continuous, focused and accurate intelligence that answers the KITs of users (managers) can be provided (De Pelsmacker *et al.*, 2005). The manager or user of intelligence is also the *person receiving* the information (De Pelsmacker *et al.*, 2005). Within the PA domain, *information or intelligence sharing* is referred to as *feedback* and is aimed at providing coaches with information that adds to their own observed analysis and allows them to improve individual and team performance (Bampouras *et al.*, 2012; McGarry, 2009a). *Feedback* must be immediate and needs to assist coaches and athletes to indicate areas of improvement and allow them to evaluate specifics of performances (Bampouras *et al.*, 2012; O'Donoghue, 2006). The *person receiving feedback* in a sport set-up may differ, but in most cases feedback is

transferred from the analyst or sport scientist to the coach and then from the coach to the players (Bampouras *et al.*, 2012). The *relationship* between the analyst and coach is also important to facilitate communication (Hughes, 2005).

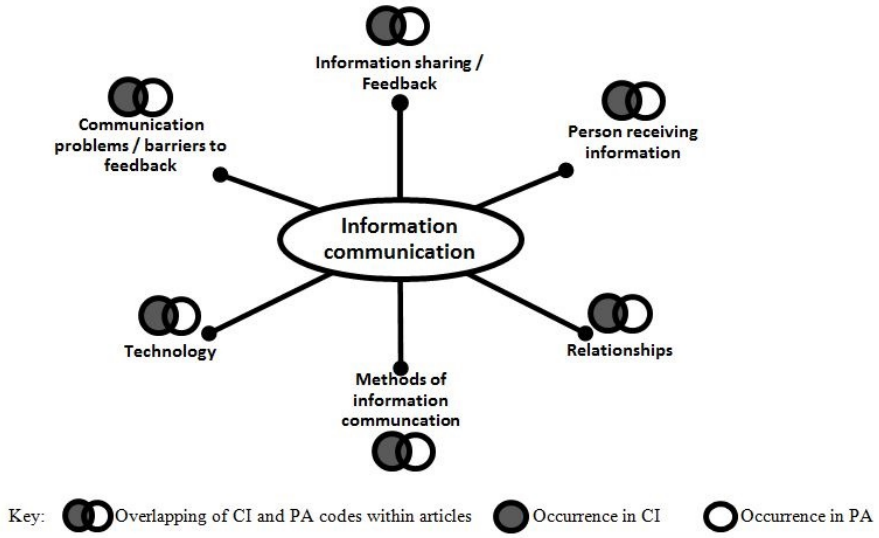


Figure 4. CI and PA data network on the communication stage

In this regard, the coach is seen as the gate keeper and decides which *feedback* is shared with athletes as *persons receiving* information (Bampouras *et al.*, 2012; Wright *et al.*, 2012a). Within the CI domain the analyst or the CI professional and intelligence user or managers are the main role players and their trust *relationship* is of great importance (Fleisher, 2008; Fleisher & Wright, 2010).

Video or DVD formats is the primary *method of information communication* or *feedback* within PA. Athletes view edited clips of their own or the opponents' match performances but feedback can also include match reports and match statistics (O'Donoghue, 2006; Wright *et al.*, 2012a). *Technology* plays an integral part in the *feedback* process with the use of various *software* packages and cloud computing, which augments the success of timeliness feedback (Lyons, 2011; Wright *et al.*, 2012a). Within the business CI domain *technology* also forms the *method of information sharing and communication* with the corporate intranet playing an important role (Fleisher, 2008; Marin & Poulter, 2003). Furthermore, different *methods of information communication* are used as platforms for intelligence sharing through emails, monthly reports, face-to-face meetings and presentations (Wright & Calof, 2006). In this regard Fleisher (2008) advance the use of knowledge management systems to store and disseminate validated intelligence, which should be easily accessible to different levels of intelligence users such as lower, middle and top management. Both domains indicate specific *problems or barriers* in the communication stage. Numerous business organisations show inadequate formal procedures for sharing intelligence, receive inaccurate information or experience a time delay in information communication (Fleisher, 2008; Garcia-Alsina *et al.*, 2013; Strauss & Du Toit, 2010). In PA, the time taken to complete the analysis and to communicate information, loss in practice time and the unavailability of appropriate technology are among the *primary barriers to feedback* provision (Wright *et al.*, 2012a).

Similarities between all six communication codes suggest that the CI and PA communication stages corresponds. However, within both domains there seem to be no prescriptive structure for communication methods which may be attributed to the fact that each organisation or team

develops their own methods that are structured according to their individual environment and needs.

5.4 Countering

The process during which CI users utilise analysed data is referred to as countering. There are four similarities and three prominent differences within the countering stage between the CI and PA domains (Figure 5). Within the CI countering stage, accurate and timely intelligence has to be provided to managers, since it supports their strategic planning and *decision-making* (Fatti & Du Toit, 2013). Likewise, within the sport domain, PA assists coaches' *decision-making* in complex situations as well as during teaching, coaching and mentoring opportunities and settings (Lyle 2002, cited by Wright *et al.*, 2012a). However, within the PA domain, there is more uncertainty about the strategy formulation process aimed at countering the opposition since no formal or systematic approach has been suggested (Groom *et al.*, 2011; Wright *et al.*, 2012a).
In the CI model, *decision-making* and *strategies* are aimed at achieving a competitive advantage (Wright & Calof, 2006). The competitive advantage is attained through the creation of knowledge during the CI countering stage, and is mainly aimed at creating *knowledge of the competitor* and the business environment (Begg & Du Toit, 2007; Du Toit, 2003; Priporas *et al.*, 2005). Coaches often try to identify competitor's performance patterns to gain *opposition knowledge* regarding their tactics and strategies (Saikia *et al.*, 2012). Coaches will then use this knowledge to develop tactics that will oppose *opponents'* strengths and exploit their weaknesses (O'Donoghue, 2009). Coaches utilise analysed data (match statistics) to make decisions, plan and implement *strategies* (Petersen *et al.*, 2008b). According to Moore *et al.* (2012), coaches make various tactical and *strategic* decisions to gain a competitive advantage. A sport competitive advantage can also be gained by *performance prediction* through the analysis of matches, KPI, individual performances and team *strategy* execution (Petersen *et al.*, 2008a).

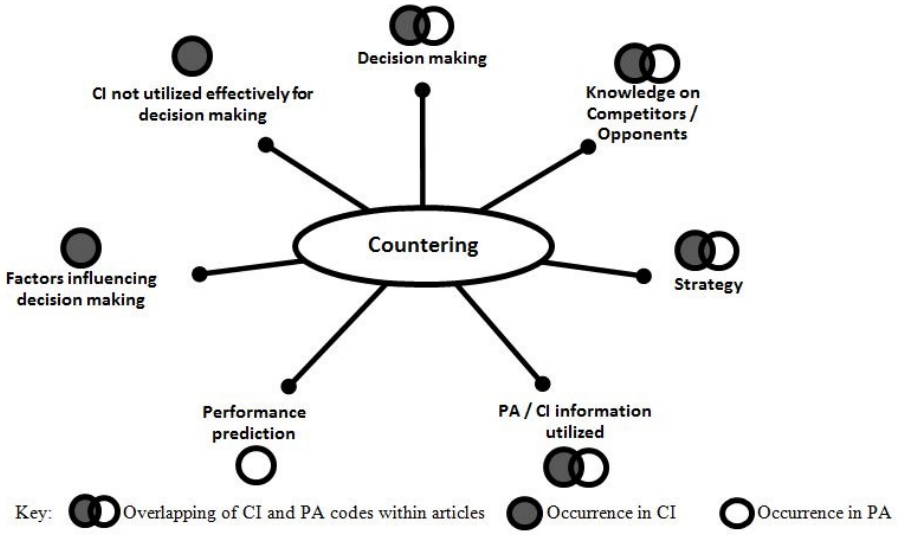


Figure 5. CI and PA data network on the countering stage

The majority of elite coaches *utilise PA information* to change and shape their strategies for future competitions (Wright *et al.*, 2012a). In the CI domain the *information utilised* is *knowledge of competitors* and the environment which enable decision makers to take proactive action (Teo & Choo, 2001). This information also allows decision makers to prepare for factors such as uncertain market situations and business environmental variations which may *influence* their *decision-making* (Michaeli & Simon, 2008). Another *factor* that may influence the CI countering stage, is inadequate training to understand and incorporate the intelligence in practice

(Gatsoris, 2012; Michaeli & Simon, 2008). Numerous studies also show that *CI is not utilised effectively for decision-making* and that organisations often struggle in this regard (Du Toit & Sewdass, 2014a).

A comparative analysis between the CI and PA domains with regard to the 4Cs process model stages, substantiate numerous similarities and few differences. The next section will provide an overview of similarities and differences between the CI and PA domains' processes.

5.5 Competitive intelligence and performance analysis processes

Coding rendered 26 different codes in total that are related to CI and PA processes, with thirteen overlapping codes from both domains (Figure 6). The overlapping codes suggest that there are similarities between the different domains, even though several overlapping codes revealed content differences. Eight CI-specific codes did not overlap with codes of the PA domain, whereas five PA specific codes displayed no overlapping with codes in the CI domain. Therefore, even though similarities were evident, there are also definite and understandable differences between the two domains with regard to stages as well as the components of each stage. Within each domain, definitions for the processes that are involved also differ. For example, the *CI definition* of a process refers to a definite analysis of data concerning the competitors and the environment (Gatsoris, 2012; Teo & Choo, 2001). On the other hand, the *PA definition* refers to the investigation of relevant aspects of player and/or team performance in competitive sport, which is not necessarily concerned with aspects that are only related to the opponent or competitive environment (Bampouras *et al.*, 2012; O'Donoghue, 2005). Literature also mentions different *types of CI* such as strategic intelligence (Marin & Poulter, 2003), business or market intelligence (Tej Adidam *et al.*, 2012), while PA is also categorised into different types such as biomechanical or *notational analysis* (Wright *et al.*, 2012a). Within the business domain the main aim of *CI processes* (*CI purpose*) is to govern strategic decision-making (Du Toit & Sewdass, 2014b), whereas *PA* is mainly aimed (*PA purpose*) at performance evaluation and secondly at developing strategies (Wright *et al.*, 2012a). According to Fatti and Du Toit (2013), the primary *CI benefit* to any organisation is the ability to continuously monitor a company's competition within the industry. *PA benefits* mainly include an enhanced ability of the coach to identify, diagnose and assist in the correction of technical and tactical problems of his/her own players or team (Lyle 2002 cited by Wright *et al.*, 2012a).

Analysed documents from both domains continuously refer to information that is related to the origin, *history and development* of the CI and PA fields of study (Dishman & Calof, 2008b; Neville *et al.*, 2008). In business organisations, top level managers are the main *CI users* of information, whereas the coach is the main *user of PA* information (Du Toit & Sewdass, 2014b; Wright *et al.*, 2012a). With regard to the type of information, coaches need information on *environmental factors* influencing cricket competitiveness, especially within high-paying franchise-based competitions (Petersen *et al.*, 2008a). Similarly, business organisations need to consider *environmental factors* as they constantly have to operate in rapid changing economic environments and climates (Priporas *et al.*, 2005). For organisations to utilise the benefits of CI within changing environments, a sound *CI culture* in which managers and executives support and drive CI activities is needed (Fleisher & Wright, 2010). In many organisations a good *CI culture* is evident (Dishman & Calof, 2008b), however research findings also highlight numerous organisations where a sound *CI culture* is absent or inadequate (Du Toit & Sewdass, 2014c; Wright *et al.*, 2012b).

Within the PA domain, responses vary with regards to a *PA culture* where information gathering and usage by coaches and players are very often facilitated, however also in some instances

neglected (Wright *et al.*, 2012a). While a positive *CI culture* is needed for successful intelligence creation, an inadequate CI culture is one of the many process *barriers to CI implementation*, along with the absence of formalised CI units, human resources and financial aid within organisations (Wright & Calof, 2006). *PA process barriers* include inconsistent use of PA as a process by coaches, inconsistent definitions of performance indicators applied, too many factors to consider and measure as well as inadequate applications in PA (Hughes, 2005).

Even though certain barriers may hamper the CI process, when implemented correctly, the process will benefit a business organisation (*CI value*) with regard to revenue growth and gross margins that can be sustained (Begg & Du Toit, 2007). Despite a substantial amount of research within the PA terrain, more research is needed to determine and verify the impact and value of PA (*PA value*) in the sport domain (Wright *et al.*, 2012a).

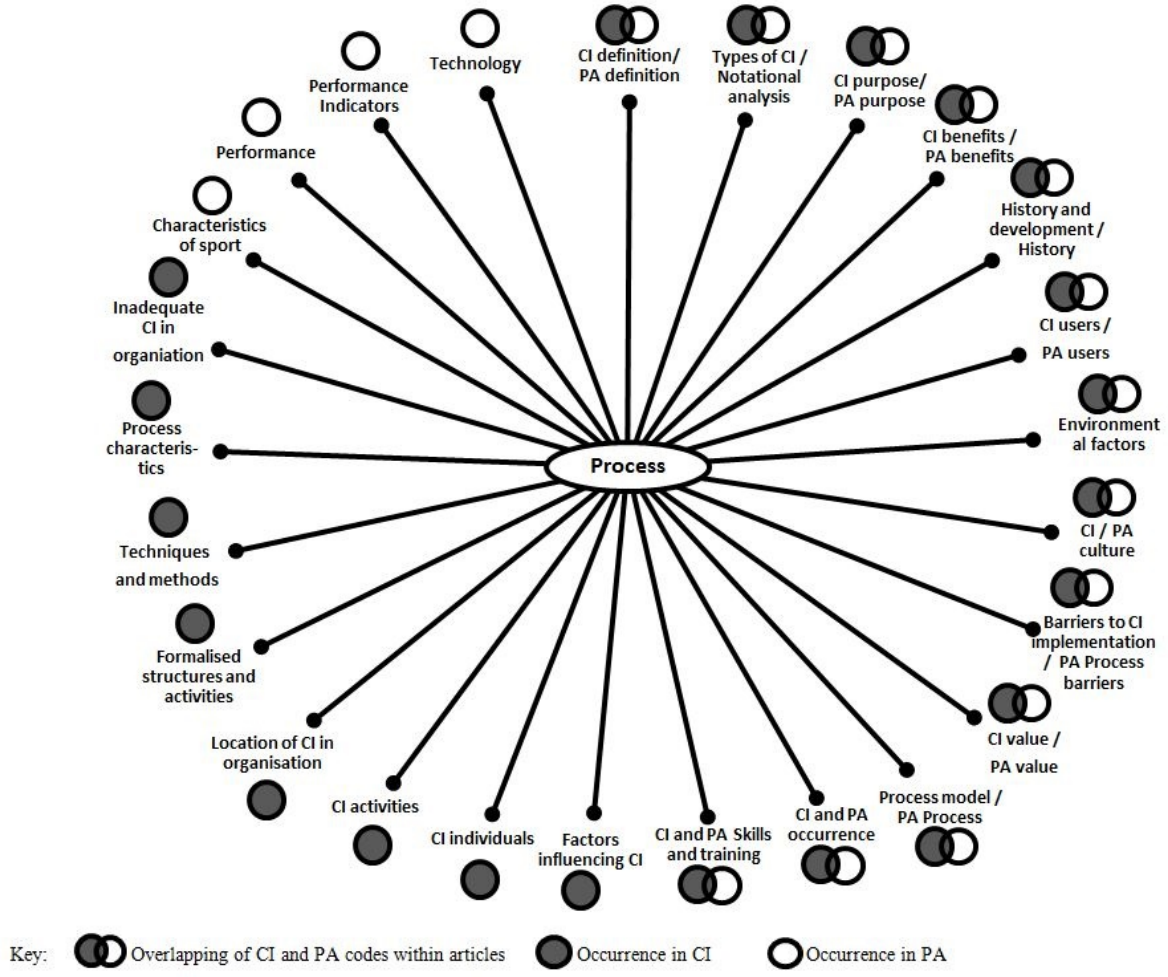


Figure 6: The combined CI and PA data network on a process

Although structurally different *CI process models* exist, the content and related aspects of these models are very similar (Garcia-Alsina *et al.*, 2013; Saayman *et al.*, 2008). PA-related research mentions *models* that are used in the PA process, but only describes segments of the coaching and competitive intelligence creation process, whereas little is known about the systematic manner by which information and feedback are provided (Bampouras *et al.*, 2012; Lames & McGarry, 2007; Wright *et al.*, 2012a). CI processes have been implemented in numerous countries such as Morocco, France and Turkey within a variety of industries like agriculture, tourism, transport and construction, to name but a few (*CI occurrence*) (Du Toit & Sewdass, 2014b). Similarly, PA takes place across various sporting disciplines and in various countries

(*PA occurrence*) (Hughes, 2005). Specific technical and cognitive *CI skills and training* are necessary for a CI unit to function successfully and likewise, in the sport domain coaches and support staff need to receive *PA training* to be equipped to perform PA accurately and effectively (Wright *et al.*, 2012a).

The fact that eight codes were only identified within the CI domain, indicates the immensity of the CI process with its many different facets. *Factors influencing CI* in business include the size and type of industry, position of the CI professional and the existing CI culture within an organisation (Garcia-Alsina *et al.*, 2013; Saayman *et al.*, 2008). *CI individuals* such as professionals, managers and decision makers should be process experts in order to drive specific *CI activities* such as routine inquests into projects and the determination of information accuracy (Fleisher & Wright, 2010; Nasri, 2011a). The *location of CI units* or professionals within organisations is diverse, varying between centralized units to de-centralised units and full time or ad hoc personnel (De Pelsmacker *et al.*, 2005; Fatti & Du Toit, 2013). However, it is imperative that CI units have *formalised structures and activities* within organisations to ensure the success of the process (Wright *et al.*, 2012b). CI professionals and units need to employ a wide range of *techniques and methods* within each stage of the CI process (Fleisher, 2008). *Process characteristics* such as financial support provided is another important aspect that could ensure success (Du Toit & Sewdass, 2014b; Tej Adidam *et al.*, 2012; Wright *et al.*, 2012b). Finally, despite managers' view that CI processes are important for organisations, there are organisations where *inadequate CI* is evident (Viviers *et al.*, 2002; Wright & Calof, 2006).

Codes that were only identified for the PA domain include the *characteristics of sport* such as the structure of the sport, individual or team sports and the objectives of the sport (Lames & McGarry, 2007). Sport structures and characteristics refer to different match objectives such as goals or point scoring opportunities, ball or racket sports, and contact allowed or disallowed, which are on field factors that can influence decision-making (Lorains *et al.*, 2013). Sport performance and the ability to control and predict *performance* is another important aspect within sport (Hughes, 2005). However, researchers and coaches must still establish the main outcome measures (i.e. KPIs) that are associated with successful cricket performance (Moore *et al.*, 2012). Another code that was predominantly evident in the PA domain is *technology*. *Technology* is widely used by coaches to provide data and information that are related to sport performance (Baca, 2006). Although reference to technology is made within CI, it is mentioned seldom within descriptions of the whole CI process.

6. Conclusions

Findings of the systematic literature review suggest that the majority of activities within different stages of the business CI process are similar to sport PA activities that coaches follow as part of the coaching process. These similarities are specific to the collection and analysis of data, communication of information, strategic decision-making under the countering stage as well to the CI process as a whole. Strong similarities between business CI activities that are aimed at obtaining intelligence and to counter opposition strategies and certain sport PA activities indicate that the CI process can be applied to a sport coaching context to ensure a formal and structured process. Research in the PA domain that incorporate novel approaches to gain a competitive edge, is scarce and findings of this review add to the knowledge pool that is related to a suitable and structured process that can facilitate the PA process.

Despite the applicability of the CI process to the PA domain, specific and clear differences between the two domains were also observed. In this regard, PA-related research does not

provide information on the identification of KINs or KITs that is categorised under the CI data collection stage. Although the term KPI is used in PA-related research, KPIs are not identical to KITs. Therefore, further research on the KINs and KITs of coaches and their data collection activities need to be conducted. More research on the collection of data and information (the first stage of the 4Cs process model) within a sport context will provide clarity with regards to the processes that are followed and activities that are applied by coaches. This information will also enable coaches, and especially novice coaches to enhance their athletes' performances. Furthermore, the development of a basic conceptual CI framework that will establish guidelines for sport coaches to determine and execute activities that are aimed at gaining a competitive advantage is a necessity. The majority of business CI research is performed using questionnaires and measurement instruments to identify, calculate and direct the CI activities. Currently, no formalised measurement instrument is available within the sport coaching and PA domain to measure or investigate CI activities of coaches. Therefore, empirical research into the development of CI survey for coaches would enhance future research of CI in a competitive sport domain.

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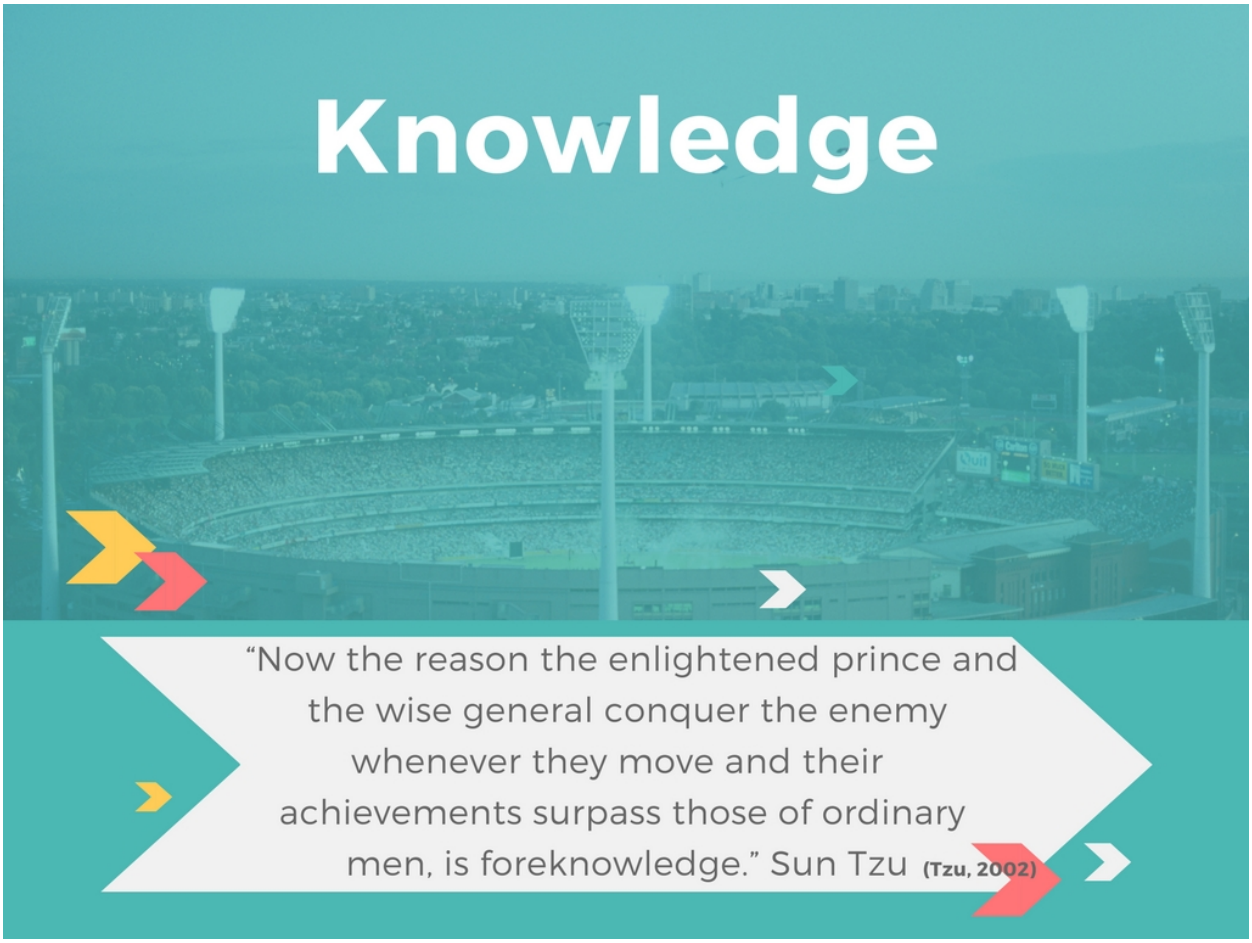
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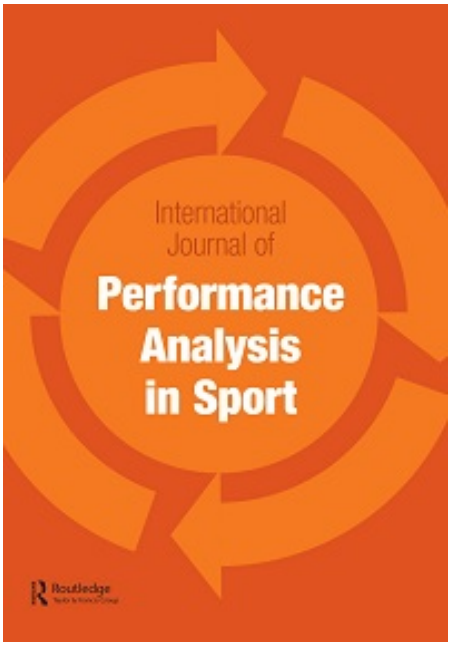
CHAPTER 4



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ARTICLE 2:

DIRECTING THE COMPETITIVE INTELLIGENCE PROCESS IN SPORT: KEY INTELLIGENCE NEEDS AND PERFORMANCE INDICATORS IDENTIFIED BY HIGH-LEVEL CRICKET COACHES



This article was submitted to the *International Journal of Performance Analysis in Sport* and is currently under review.

Directing the competitive intelligence process in sport: key intelligence needs and performance indicators identified by high-level cricket coaches

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Abstract

Very little is known about key intelligence topics (KITs) that coaches identify to direct data collection and analysis for the development of a competitive cricket strategy. It is against this background that the aim of this study was to identify the KITs of cricket coaches, using the 4Cs competitive intelligence (CI) process model of Weiss (2002) as a framework and incorporating existing knowledge regarding cricket specific key performance indicators (KPIs). Semi-structured interviews were conducted with high-level cricket coaches of South Africa. Content analysis was performed whereby a codebook was developed, and theory and data driven codes were created with ATLAS.TITM computer assisted qualitative data analysis software. The codes were derived through the identification and classification of key informational needs (KINs), which were categorized according to the business CI functional KITs categories. Results indicated that cricket coaches' informational needs could be translated into all three of the business type KITs, namely strategic, early warning, and key player KITs. However, coaches identified inadequate exclusive strategic decision and early warning type KITs, and over-emphasized key player KITs. In conclusion, the application of the business CI process model of Weiss (2002) highlighted shortcomings in coaches' KITs identification and knowledge creation process.

Keywords: key intelligence topics, key performance indicators, cricket coaches, competitive intelligence

1. Introduction

Competitive intelligence (CI) is often defined as "a systematic and ethical programme for gathering, analysing and managing external information that can affect a company's plans, decisions and operations" (Strategic and Competitive Intelligence Professionals (SCIP), 2012). Businesses world-wide challenge one another for dominion by gaining knowledge of their own operations but especially that of their adversaries (Weiss, 2002). Businesses employ CI processes to collect and analyse data to ultimately enhance decision-making, competitiveness, and the formulation of suitable counter-strategies (Bose, 2008; Wright *et al.*, 2012b). One of the stages that all CI process models follow, is data collection (Franco *et al.*, 2011; Gatsoris, 2012).

Business managers, as intelligence users, direct the data collection and analysis process by identifying and communicating their key informational needs (KINs) to CI specialists, who conduct the data search and analysis based on key intelligence topics (KITs) derived from the scope of KINs (Herring, 1999; Nasri, 2011b). Therefore, the identification of KITs is the initial activity of the CI process model data collection stage (Weiss, 2002). The main objective of KITs is to provide focus to conduct effective intelligence operations which are generally assigned to one of three functional categories: 1) strategic decisions and actions; 2) early-warning topics; and 3) descriptions of key players (Herring, 1999). Strategic type KITs refer to the complete range or scope of information aimed at the formulation of strategic plans and new competitor strategies, while early warning KITs typically focus on aspects and activities that prevent management from being caught unaware (Herring, 1999). Among the three KIT categories key players KITs are the least actionable since it reflects a manager's need to better understand the opposition. In this regard, key player KIT activities allow managers to obtain a competitor profile and a common understanding of the competitor so that individual managers can develop their own ideas on how to react to competitors (Herring, 1999). However, KITs are not mutually exclusive and a strategic type KIT may also require a competitor profile and some form of early warning intelligence to alert the user to changes in competitor activities or environmental aspects (Herring, 1999). The combination of all three KIT categories is the key to producing knowledge and should result in four distinct types of knowledge during the last stage of the 4Cs CI process model (countering) (Weiss, 2002). These types of knowledge include competitor knowledge on individual competitors; comparative knowledge by comparing different competitors; market knowledge which encompasses information on the wider market place and business environment, and self-knowledge which include information on one's own organisation (Weiss, 2002).

All mentioned types of knowledge are necessary to build a full and comprehensive picture of the total business environment and contribute to the formation of effective and actionable intelligence to outwit and outperform competitors (Weiss, 2002). Organisations should understand their own position within the market place and that of the competitors for appropriate decision-making (Weiss, 2002). With the four types of knowledge as the end goal of the 4Cs CI process model in mind (Figure 1), CI practitioners should clearly identify and define managers' KINs and translate them into KITs which will direct the data collection and analysis stages (Weiss, 2002). This study used the business CI model and KITs theoretical underpinning to investigate this CI phenomenon within the sport coaching and performance analysis (PA) domain. In the sport domain, data collection and analysis processes form part of PA, which is mainly directed by the coach (Bampouras *et al.*, 2012). In this regard sport coaches, just as business managers are involved in data collection activities in order to analyse the opposition as well as their own team (Cooper *et al.*, 2007). Very little is known about the functional categories or topics of information that coaches identify to direct data search, collection and analysis, and that are ultimately used to develop a strategy to gain a competitive advantage (Wright *et al.*, 2012a).

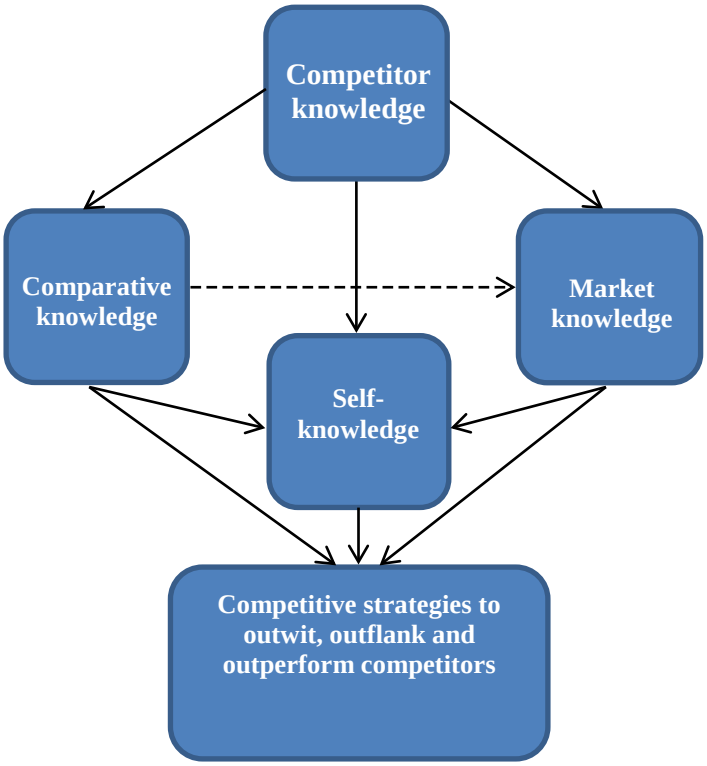


Figure 1: Types of knowledge and how they lead to strategy (Weiss, 2002)

In the sport PA context, collected performance specific data are governed by key performance indicators (KPI), which is utilized in the coaching context to identify critical elements of sport performance (Cooper *et al.*, 2007; Petersen *et al.*, 2008b). KPIs are valid measures of an athlete's or a team's performance level and usually have metric properties and a modus of interpretation (O'Donoghue, 2007). Therefore, in some instances KPIs are seen as data, and in other instances as information, since the data are processed as percentages or ratios (Ackoff, 1989; O'Donoghue, 2007). Coaches use this information to enhance their own team's or players' strengths, to exploit their opponents' weaknesses and to counter situations where opponents' strengths can overpower their own team's abilities (O'Donoghue, 2009). Coaches also consider information on the venue, conditions and which decision to make when winning the toss before competition participation (Petersen *et al.*, 2008b). Specifically related to cricket, the type of competition (day or night match) also plays a prominent role in decision-making and strategy design (Najdan *et al.*, 2014; Schoeman *et al.*, 2006). In this regard, cricket coaches very often refer to and use KPIs as an information source on various aspects which increase their knowledge regarding their own team, competitors and the environment, ultimately influencing their strategy design and the match outcome (Petersen *et al.*, 2008b).

Within the shortest form of the cricket game, namely T20 cricket, specific bowling KPIs include: taking more wickets, especially during the power play at the end of the match, and bowling balls from which batsmen cannot score runs (dot balls) (Moore *et al.*, 2012). Bowlers' economy rate, bowling averages and bowling strike rate are also used as KPIs in T20 cricket (Amin & Sharma, 2014). The KPIs for batsmen include a higher run rate, strike rate, scoring runs during power plays, scoring through boundaries and establishing partnerships between batters (Amin & Sharma, 2014; Moore *et al.*, 2012). However, the main outcome and performance measures in the T20 cricket format have not yet been fully identified (Moore *et al.*, 2012). The major batting KPIs within the fifty over cricket match format which differentiates successful from less successful teams, include: taking more wickets, maintaining a higher run rate, partnerships of

fifty runs or more, total runs and number of sixes scored (Petersen *et al.*, 2008b). For bowlers in the fifty over match format, bowling maiden overs and taking wickets serve as the primary KPIs (Petersen *et al.*, 2008b). KPIs that are related to other aspects include winning the toss and electing to bat first, as well as the advantage of playing on home ground (Petersen *et al.*, 2008a).

Although cricket KPIs have been identified and implemented within the sport coaching domain, limited research has investigated how coaches use this aspect (Moore *et al.*, 2012). Likewise, research has not yet focussed on the assortments, portfolios, processes, models or activities that cricket coaches implement and follow to gather and analyse information on KPIs in a controlled and systematic manner (Cushion *et al.*, 2006; Groom *et al.*, 2011). The inadequate collection and analysis of KPIs will hinder the implementation of individual player and team strategies (Petersen *et al.*, 2008b). For this reason there is a need to clarify the assortment of KPIs and the informational needs and goals which coaches identify to focus and direct data collection activities (Groom *et al.*, 2011). KPIs provide coaches with information, but are not used exclusively for decision-making or strategy design, and are often used for performance appraisal, development of coaching sessions or identifying strengths and weaknesses of own and opposition players. As it is used to lead to strategy formation, it seems similar to CI KITs, however with a small distinction, which has to be clarified (Cooper *et al.*, 2007). Therefore the aim of this study was to identify the KITs of cricket coaches, using the 4Cs CI process model of Weiss (2002) as a framework and incorporating existing knowledge regarding cricket specific key performance indicators (KPIs).

2. Method

2.1 Design

This exploratory study is qualitative in nature and used semi-structured interviews in order to enhance the understanding and explain KITs identified by high level cricket coaches (Henning *et al.*, 2004). Semi-structured interviews were used since this method allows for a wide scope of inquiry, depth of data collection, flexibility of methodology, and allows researchers to organise information according to specific areas of interest and to the particular theme of KITs in this study (De Vos *et al.*, 2005).

2.2 Participants

Purposeful, convenience sampling was utilised as it was considered appropriate since the researcher intended to discover, understand and gain insight into the specific phenomenon of KITs as identified by cricket coaches (Merriam, 1998). Expert and assistant cricket coaches were targeted since they are responsible for team strategy and individual player development, and usually use a variety of information for this purpose (Cooper *et al.*, 2007). Expert cricket coaches were included in the study based on the following inclusion criteria: the coach had to have at least five years of coaching experience, must have coached at university, provincial or national level, and should have obtained a coaching certificate from the national governing body (Côté *et al.*, 1993; Nash & Sproule, 2009). The level of coaching gained preference above age or gender, with the minimum coaching level set as university level.

A total of fourteen cricket coaches who matched the inclusion criteria, participated in semi-structured interviews. Twelve coaches were head coaches of their respective teams and two were assistant coaches. Three coaches had between six and nine years coaching experience; nine coaches between ten to nineteen years; and two coaches more than twenty years of experience. Five coaches obtained the Cricket South Africa (CSA) level 2 qualification, four the level 3, and five coaches the highest possible level, namely a level 4 qualification. A total of six out of the

fourteen coaches coached at franchise/professional level, with one coaching at national level, four at provincial, two at premier league and one at university level. The majority of coaches coached male teams, with two coaches who coached both genders and one coach a female team.

2.3 Procedures

Ethical approval for the study was obtained from the Ethics Committee of the institution, where the research was conducted (NWU-00185-15-S1). Before the start of the study permission to conduct the research was obtained from coaches' direct line managers and the coaching manager of CSA. Written informed consent was obtained from each participating coach, after which suitable dates, times and venues for face-to-face, telephonic or Skype interviews were arranged. In cases where a coach agreed to participate in the study, a request was made to also interview support staff such as assistant coaches or analysts; either with the particular person or individually. In this manner, a snowball sampling method was implemented. Two group interviews were conducted with four participants and two participants respectively, while the rest of the interviews were performed one-on-one. The interviewer and researcher transcribed the voice recordings verbatim. Typed transcriptions of interviews were emailed to participants for validation purposes (Creswell, 2003). None of the participants objected to the authenticity and accuracy of transcriptions. Before commencement of interviews, participants completed a demographic information questionnaire that was used to collect information on coaches' age, gender, ethnicity, coaching experience, qualifications, successes and teams coached.

2.4 Interview schedule

A literature review on the available CI processes and models, as well as frequently used CI surveys were scrutinized to develop a preliminary interview schedule for the cricket coaches (Gehlbach & Brinkworth, 2011). The interview schedule contained six questions relating to the four stages of the CI process, namely data collection, conversion, communication and countering, as well as questions related to CI awareness, culture, planning, identification and focus (i.e. KITs) (Weiss, 2002). With the aim of finalizing the interview schedule, the researcher approached intra-university peers (from the same university as the researcher but from different campuses) to evaluate the schedule and provide feedback via interviews. Interviews were voice recorded, transcribed verbatim, and emailed to intra-university peers who validated the authenticity and reliability of the transcribed document (Creswell, 2003). Thereafter the researcher performed a qualitative content analysis by coding the interviews using ATLAS.TI™, computer-assisted qualitative data analysis software. The constant comparative method was followed to code the data and interviews were performed until data saturation was achieved (Boeije, 2002; Merriam, 1998). The feedback and codes created from the intra-university peers' interviews, facilitated changes made and contributed to the settlement of the interview schedule.

2.5 Data analysis

Researchers analysed the content of each interview according to the method of DeCuir-Gunby *et al.* (2011) to create a codebook as a critical first step and reference for analysing interviews. A codebook is defined as "a set of codes, definitions and examples used as a guide to help analyse interview data" (DeCuir-Gunby *et al.*, 2011:138). Theory driven codes were generated through a systematic literature review (SLR) performed by researchers and then entered into the ATLAS.TI™ system (DeCuir-Gunby *et al.*, 2011). The created codes were related to the four stages of the CI process model, as well as specific aspects within each stage and the process as a whole (Weiss, 2002). Data driven codes were also developed by reducing the raw data into smaller units of meaning as a second manner to create codes (DeCuir-Gunby *et al.*, 2011). The second step of the codebook development process involved the collaborative revision of codes by a colleague researcher within the context of the data and led to the creation of additional data

driven codes (DeCuir-Gunby *et al.*, 2011). Meticulous care was taken in creating specific codes, and researchers ensured that code definitions were precise, encompassing the constructs and that example quotes illustrated each code appropriately (DeCuir-Gunby *et al.*, 2011).

In the next step the reliability of the coding procedures, as well of the coder were calculated by making use of Cohen's Kappa (DeCuir-Gunby *et al.*, 2011). The intra-rater reliability was calculated to be $\kappa = 0.78$ and inter-rater reliability to be $\kappa = 0.79$. Research suggests that reliability values between the 0.8 and 0.9 range are deemed to be rich in analytical value (Anderson *et al.*, 2001). The fair agreement indicates the consistency in the creation and application of codes during the analysis and therefore validates the qualitative method used (Campbell *et al.*, 2013; DeCuir-Gunby *et al.*, 2011). The qualitative analysis was performed through a constant comparative analysis whereby researchers simultaneously analysed the content in applying the code book and codes to the data, together with data collection through interviews (Boeije, 2002; Henning *et al.*, 2004). Data saturation was reached and researchers determined that no additional data were found (Guest *et al.*, 2006). For the purpose of this study, researchers only included and discussed those codes which were related to the KITs and KPIs as part of the overall interview schedule and data analysis. For clarification purposes, this study divided the KPIs according to two categories within cricket, namely batting and bowling (Petersen *et al.*, 2008b). The coach quotes and codes related to KITs and KPIs were categorised according to the KITs three functional categories for further explanation.

3. Results

3.1 Coded data

The coded data on KINs of the coaches' and assistance coaches as support staff were categorized and presented in Table 1. Codes and quotations identified by coaches related to KPIs are categorised into batting and bowling as presented in Table 2 and 3.

Table 1: KINs identified by cricket coaches and assistant coaches

Coach quotations	**KIN categories**
And then you will also try and gather information on, for example, the brand of cricket they (opposition team) play and then implement a game plan to that and try and execute it with your skills (P8a*) ...when you talk about brand of cricket, it is either a team that is very attacking, or very conservative in the method of going to collect their runs (P5a)	Brand of cricket
We then also have to look at the experience of their team as well. Sometimes there are more experienced players, and there are certain players that you try and get out. You know which are the key players and obviously we have a certain game plan for that as well, so that goes into specifics...and then we will go and look at each player (P17a)	Countering experienced and key player
I think one is to have an idea what their team will look like, so you will have a strong idea of your game plan, you need to know who you are playing against...(P11a) Knowing, this is their line-up, this is how we are planning of getting those players out, this is where their strengths and problems are and these are our plans (P2a) You can anticipate from the last game, this is the possibility of their team (P16a)	Opposing team to influence own game plan, anticipate opposition player inclusion
You want to know - this player's release shot is this, so you want to build pressure and then you know he is going to release with that shot... (P13a)	Opposing players' pressure outlet
That is why I think it is vitally important to have a thorough knowledge of your own players before you go to the competitors because you then know, ok this is plan A and we go accordingly (P8b) You have to constantly be aware of the situation of what is happening within your team and know exactly where they are in terms of performance (P3a) As far as opposition is concerned I would go through each one of my particular weapons that I have at my disposal and we might even strategize to the extent that our team selection will depend on where we play and the wicket we play on and sometimes the opposition (P10a)	Own team information and competence, own team weapons
There are a couple of things; the first thing would be conditions...you will tell your players: these are the sort of conditions you are going to get; this is how we need to combat those conditions, in terms of batting and bowling. Then obviously in terms of our bowling, in those conditions down at the coast, you have to be a lot more patient, a lot more dot balls, where on the Highveld you can be more attacking, you can run in and bowl quick and bouncers (P17b) The key things for me are: the first one – let's say it is a home game or like we are playing away (P9a) There are also variables like the ground you are playing at and the pitch that you are playing on, which plays a big part (P3b)	Environmental influences, venue, pitch condition

* The number refers to the participant while the alphabet letter refers to the comment number by the participant.

Table 1 (continue): KINs identified by cricket coaches and assistant coaches

Coach quotations	**KIN categories**
What I want on opposition is about their character. Where can I find the soft areas, because I don't think high level sport is only about technique, it is more about the character and we talk about mental strength and all of those things. (P8c)	Character, mental aspects
I also check if the team that we are playing against has won games before, like are they under pressure, is the coach under pressure, is there drama, you know like in their side The biggest thing for me in T20 cricket is where players do get under pressure and what do they normally do when they get under pressure (P9b)	Overall functioning, handling pressure
You get to know their (opposition players) fears, theirs strengths and weaknesses, their opportunities and threats, so I think it is important that when they (own players) give that info on those players just to get the edge. They may know something I don't know, because the player can come to me and say coach, I was with this guy in Australia, he prepares like this, and he looks to do this and that, so I have more info on that certain player then I can share it with my team. You don't get this info anywhere, it is close and personal (P9c) I will look at their strengths and weaknesses (P14a)	Fears, SWOT analysis of individual players
You focus on how certain players bowl at the death (P14b)	Death bowling
Because we thought that if we get the chance that we would bat first, looking at their blowing combinations (P1a)	Bowling combinations
So there will be various variables that you need to consider as a coach in terms of your planning, in terms of how you are going to execute your plan to win games. So you made an example about the competitors that you are playing against, so that information will be key. Most of the teams, if you have played against them, you would have seen them once or twice or a couple of times, so you do have some sort of information about them. And then you look at how they score their runs, for example if it is a batsmen, is he a guy that scores a lot of boundaries or is he a guy that scores a lot of ones and twos. That type of information will play a big part in your planning as a coach and for you to make sure that you are making the right decisions with your team. There are also variables like the ground you are playing at and the pitch that you are playing on, which plays a big part because you get things like averages so, in a season you look at what is the average score for a particular pitch. Then you will set your own target on the number of runs you want to score and for example you will use that data as a baseline to do your planning. So that is very important (P3c)	Competitors (runs scored, boundaries, score in one or two runs), competition venue specifics (average score for venue)

Coaches indicated the need for information on the specific *brand* of cricket that the opposition team plays, i.e. are they *attacking or conservative in their method of obtaining runs* (P8a, P5a). Additionally, coaches indicated that they focus on information on *experienced and key players* (P17a). The *oppositions' team line-up* and *knowing the opposing players' strengths* were also highlighted as important information (P11a, P2a and P16a). The fact that the opposition team line-up is unknown to coaches until very close to the commencement of the match, forces coaches to make predictions of opposition team inclusion (P16a). However, coaches would normally change their own team strategy and game plan immediately after they received

information on the opposing *teams' line-up* (P11a, P2a and P16a). Information on players' *reaction towards pressure* and the *release shot* they typically use (P13a), *knowledge and situation of own players* (P8b, P3a and P10a), especially focused on their *own weapons* or *strengths* (P10a), is also important to coaches. Information on certain environmental aspects such as *weather conditions*, *venue* and *pitch condition*s influences cricket matches and should also be considered (P17b, P9a and P3b). Opposition players' *character, soft areas and mental condition* (P8c), the *overall team functioning*, *pressure on the coach* and how individual *players handle pressure* (PP9b) are KIN categories that coaches identified. Likewise, coaches need information on opposition players' *fears, strengths, weaknesses, opportunities and threats* (P9c and P14a). Coaches also focus on how certain players *bowl at the death* of the match (P14b) and opposition *bowling combinations* (P1a). A single quote by P3c indicates that coaches' KINs can be categorised into *competitor information*, mentioning measurable aspects such as runs scored, as well as mentioning the *ground and pitch* the team would be playing at and referring to average scores for a pitch. This last quote contained specific measurable variables such as the runs scored, which is classified in the sport domain as a KPI. The coach quotations and categories related to KPIs, as identified by the cricket coaches and support staff is presented in Table 2 and 3. The KPIs are likewise categorised into different batting and bowling specifics.

Table 2: KPIs for batting as identified by cricket coaches and support staff

Coach quotations	**Batting KPIs**
We go onto ESPN Crick info, and each player has stats in terms of how many runs they have scored, what their last 4 or 5 innings are and statistics on dismissals (P17c)	Statistics on last few performances
And then you look at how they score their runs, for example if it is a batsmen, is he a guy that scores a lot of boundaries or is he a guy that scores a lot of ones and twos (P2b)	How runs scored in boundaries, one's or two's
I actually got a full printout of players' averages, strike rate to look at (P1b)	Average runs, strike rate
Basically the biggest thing that I look for, is how they get out, on average are they bowled, or are they caught on the boundary, or are they run out or what? The other biggest things, I look for are the fours and sixes. Where they go, on the leg side or are they going on the off side or are they lapping it or are they reversing it like player A. Those types of things — then the spinners again, are they sweeping the spinners or are they coming down to open up, like go on the leg side (P9d) ...which areas the batter scores his runs... (P13b)	Modes of dismissal, fours and sixes hit, area runs are scored: leg- or offside scoring, types of shots, improvisations
...50 run partnerships... (P16b)	50 run partnerships
Some coaches use it (videos) to look at technique and where the batsmen get out (P2c)	Technique flaws, types of dismissals

KPIs for batsmen include the statistics on the *number of runs* they scored especially during their *last few innings* (P17c) and the form in which *runs were scored* - as *boundaries*, *one's or two's* (P2b, P9d). *Average runs* scored and *strike rate* are calculated and used for analysis (P1b) as well as the main *areas* or *side of the field where batsmen prefer scoring* (P13b, P9d). The *modes of dismissals* are investigated (P9d), while the *type of shots* that batters prefer (P9d), as well as

improvisations during batting (P9d) are all aspects that coaches focus on. Coaches also value information on *partnerships* between batsmen, especially when partnerships are more than *50 runs* (P16b). Information from video footage is also used to identify technical flaws in batsmen's *techniques* which could be exploited to get the batsmen out (P2c).

Table 3: KPIs for bowling as identified by cricket coaches and support staff

Coach quotations	**Bowling KPIs**
With all the stats, I look at who has been taking wickets, ranked from highest to lowest (P2d)	Wickets taken, and highest ranked bowlers
They might have what is called a pitch map, where it will show the bowlers where they bowled so they will have that percentage of where their balls are bowled and landed, so out of their two or three games that we watched, 60% are short balls, full balls or whatever. (P2e)	Area ball landed as percentage
..how many dot balls did he bowl, how many boundaries did the batsmen hit of him, where did they score their boundaries (P3d)	Dot balls, runs conceded, areas runs conceded
I am very aware of for example, runs per over conceded by the bowler, the score, the areas we are bowling and field placing he is setting (P10c)	Runs per over conceded, fielders set
I want them to bowl as many maidens (bowling overs) (P10d)	Maiden overs bowled
...if he is a medium pacer we want him to bowl economically for long spells... (P10c)	Economic bowling rate, bowling spell goals

Coaches look at *statistics* of opposition bowlers to determine which bowlers *took the most wickets* as they were ranked on a public available statistical website (P2d). Coaches also investigated a *pitch map* to determine where the highest *percentage* of balls landed on the pitch (P2e), the number of *dot balls bowled* (P3d), the *number of boundaries* scored of a certain bowler (P3d) as well as the primary *areas* where batsmen scored a*gainst a particular bowler* (P2e). Coaches also identified their need to gain information on *runs per over conceded* (P10b), and *field placing* set (P10b). The importance of *bowling maiden overs* (P10c) and *bowling economically* for long spells (P10d) were also accentuated.

4. Discussion

The scope and nature of an organisations' KINs are portrayed by KITs (Herring, 1999). In this regard, this study identified and categorised the KINs of high level cricket coaches into the functional KIT categories of strategic, early warning and key player KITs (Table 4). Additionally, the type of knowledge created from the collection and analysis of data as driven by the identified KIT categories are indicated and discussed.

With strategy formation in mind, coaches indicated a variety of KIN categories such as the *brand of cricket* that the opposition is playing, *experienced and key* opposition team *players*, *players' outlet shot to release pressure, included opposition players* as well as *environmental factors* such as the venue, location, pitch and weather. These KINs can be categorised as strategic type KITs

since coaches indicated the need for this information in order to devise a strategy. In this regard, coaches pointed out that the inclusion of certain key players in the opposition team line-up does sometimes govern their decisions on their own team line-up. The brand of cricket opposition teams play as well as certain environmental aspects such as the type of pitch that was prepared and the way in which it may influence play on the match day, also compels coaches to rethink their own match strategy.

Table 4: Cricket coaches' KIN and KIT categories and type of knowledge

Cricket coaches identified KIN categories	**Business CI KITs type**	**Type of knowledge classification**
• Brand of opposition cricket, attacking or conservative # • Countering opposition experienced and key players # • Opposition team member inclusion # • Opposing players' pressure outlet # • Environmental influences – weather, venue, pitch and conditions @ • Own team information on competence and strengths*	Strategic decision type (# Key player) (@ Early warning)	Competitor, environmental (market) and self-knowledge
• Character and mental aspects of opposition players • Overall team functioning • Individuals and team handling pressure • Opposition players' fears, strengths, weaknesses, opportunities, threats. • Death bowling • Bowling combinations • Competitors' performance (batting and bowling KPIs)	Key player	Competitor
• Opposition players included in team • Environmental influences (weather, pitch and conditions)	Early warning	Competitor and environmental

* Not categorised as a strategic type KIT, however included since it is used to develop a strategy
# Additionally classified as a Key player type KIT
@ Additionally classified as an early warning type KIT

Information of the *own team's competence and strengths** cannot exclusively be classified as a strategic type KIT, since the focus of information is inward towards own team and player. However, this information is still very relevant to the coaches' strategy design. No KIN was exclusively assigned to only a strategic type KIT. Similar to the business CI domain, where managers need some form of education in order to identify and verbalise their strategic type KITs (Herring, 1999), coaches need to be educated to define their informational needs.

The first activity of KITs identification within the CI data collection process stage is essential and consequently coaches should learn to discern and identify functional strategic topics that will drive the collection and analysis of relevant information for strategy design (Fleisher & Wright, 2010). Coaches only referred to a limited number of strategic decision type KITs, which

accentuates the need to also include KITs identification theme as niche area in coaches' education programmes. However, since KITs are not mutually exclusive, the KINs within this category can also include competitor profiles or early warning signal KITs. In this regard the KINs indicated with "#" also belong to key player type and the KIN indicated with "@" to the early warning KITs.

The strategic type KITs, namely the *brand of cricket*, *experienced* and *key players*, opposing *players included* in match team and *players' pressure outlet shot* can also be categorised into the key player KITs functional category, since the focus is on attaining information on the opposition. Additional KINs categorised within the key player category, are *character* and *mental aspects*, *overall team functioning*, *pressure* on individuals and team, the opposition *strengths*, *weaknesses*, *opportunities*, *threats*, *fears*, and *handling pressure*. Likewise *death bowling*, *bowling combinations* and specific information on *competitors* such as runs scored and information on the environment (i.e. previous scores achieved at the venue), all contribute to an analysis and profile development of competitors. In this regard, coaches identified numerous KPIs, as customary sport coaching and performance analysis measures and information regarding competitors' batting and bowling performance. The KPIs on batting and bowling, such as runs scored, runs conceded, dot balls bowled and strike rate were also identified from the interview data. Likewise, wickets taken by bowlers, the area targeted, maiden overs bowled and bowling economy were also deemed to be important KPI for coaches. For batsmen, coaches look at statistics on the last few performances, average runs scored, modes of dismissal, partnerships, technical flaws, improvisations, the area and how runs were scored. These KPIs were all assigned to the functional category of key player KITs, since it provides a fuller description of key competitors. Coaches indicated a need for competitor information and knowledge to monitor and predict competitor activities and performance for analysis, decision-making and own strategy formation as in the business CI domain.

The third functional category of early warning topics was not commonly found within cricket coaches' KINs. In the business CI process, the early warning KITs category centres around the elimination of surprises or threats by analysing changes in the environment (Weiss, 2002). However, coaches' needs and knowledge on cricket competition *environmental aspects* such as the *venue, pitch and weather conditions*, were assigned to the early warning KITs. Sudden changes in weather conditions as well as the way in which the pitch is prepared, need to be considered well in advance as well as close to the start of the match as these factors may influence the strategic decisions coaches make regarding for example own team line-up. Coaches should access easy available statistical KPIs on venue history and previous match results (Petersen *et al.*, 2008a), to try and eliminate such environmental surprises. Additionally, the lack of information concerning the *opposition team line-up*, is another informational need within the early warning KITs category. Coaches repeatedly indicated that their decision-making, game plan development and own team selection often depend on the availability of information regarding opposition team members. This information is usually not available to the coach until very close to the start of the match. The need to avoid unexpected and unanticipated opposition team player selections is very apparent. Therefore, research should focus more on measurable constructs and include specific KPIs that could aid coaches to accurately predict opposition team selection.

Even though all three KITs categories could be assigned to the coaches' KINs, it is evident, that coaches predominantly identified key player KITs and mainly focused on competitor information through the use of sport KPIs to gain a greater understanding of their opposition. KPIs are measurable pieces of information which in this study were assigned to the key player KITs

category. Coaches who were included in this study use KPIs as loose-standing, individual data points or informally linked components. Using KPIs in this manner does not allow coaches to effectively use KPIs to develop intelligence for their strategy design (Michaeli & Simon, 2008). KPIs that are grouped together in strategic assortments according to specific informational goals will optimize the CI process and intelligence creation within sport, similar to the business domain (Michaeli & Simon, 2008). However, since KPIs are viewed as a key player KIT, it is also the least actionable KIT as it only allows coaches to gain a better understanding of the competitor (Herring, 1999). Even though coaches use KPIs in PA as information to enhance their own teams' or players' strengths, to exploit their opponents' weaknesses and to evade or counter situations where opponents' strengths can overpower their own teams' abilities by itself, it cannot be used to direct a data collection and analysis process with the aim to provide actionable intelligence. At best, KPIs can provide knowledge on competitors or own players or the environment, as is the current practice within PA. Conversely, it is up to the coach to react on this knowledge.

Within the 4Cs CI process model, the last stage, namely countering aims to provide four types of knowledge, of which competitor knowledge is one (Weiss, 2002). Therefore, if the correct and all-encompassing KITs are identified during the first step of the CI process model, then all four types of knowledge would be created within the last stage (Weiss, 2002). The evaluation and identification of cricket coaches' KITs and KPIs are an indication of the type of knowledge that could possibly be created during the countering stage of the CI process (Table 4). In this regard, competitor knowledge is linked to key player KITs, since the coach gains a better understanding of competitors in this way. The KPIs of the sport domain are included in the key player KITs category, since coaches placed emphasis on competitor measurable informational properties. The business CI market (environment) knowledge is described as information on the wider market place, referring to customers and technology as examples (Weiss, 2002), and it could possibly be translated into the sport context as the overall competitive or match environment (relating to environmental knowledge). The environmental aspects coaches identified as important for strategic decision-making are the venue, location, weather conditions and the type of pitch prepared. Previous historical data on these aspects could play an influential part in providing "early warnings" of changes in the specific competition environment. Therefore, coaches are likely to produce knowledge on the environment from these KITs. However, the interpretation of the supposed sport environmental knowledge within this context is limited and through research, coaches should be encouraged to explore information on the competitive environment, over a longer period than just one season or the period in which the upcoming match will take place. In this regard, research should explore the influence of coaches' KINs on aspects such as sport PA technology advancements, competition rule changes or injuries to players that may change the competitive environment and influence coaches' own strategy.

Within the competitive environment, coaches' focus on information such as strengths, weakness and competencies of own players, were not categorised as a strategic type KIT *per se*. However, these are within the strategic type KITs scope since it is clear that coaches need specific and encompassing knowledge on their own players and team to make strategic decisions. This could be related to self-knowledge within the countering stage the 4Cs CI model. Self-knowledge could be attained through the use of KPIs, as is the case within current sport PA programmes (Bampouras *et al.*, 2012). Lastly, according to the types of knowledge categorisation of Weiss (2002, Figure 1), there is a distinct lack of informational needs for the creation of comparative knowledge through the current KITs and CI activities. None of the coaches' KINs could be translated into the creation of comparative knowledge, which indicates that the CI knowledge creation process is inadequate. Although collectively, coaches' KINs were classified into all

three functional categories of KITs, individually coaches seldom referred to a wide range of KITs and only made use of limited and selected KPIs to gain information on own players, the opposition or the environment. Keeping in mind that the CI process is directed by quality and various KITs (Garcia-Alsina *et al.*, 2013), coaches should enlarge their array of KITs as well as KPIs which would better direct their data search to create all four types of knowledge, which will lead to actionable intelligence. The coaches' strong emphasis on competitor knowledge, which was emphasised by the numerous loose standing KPIs and categorised as key player KITs and some reference to environmental knowledge as well as self-knowledge, indicate that coaches base their decisions on limited knowledge from an incomprehensive analysis. It is only by fully understanding one's own position (self-knowledge) and that of the opposition (competitor knowledge) within the competitive environment, together with the environmental influences (environmental knowledge) and comparative competitor analysis (comparative knowledge), that one would be able to devise strategies that would outwit and outperform competitors (Weiss, 2002).

Effective decision-making through intelligence operations depends on how well the initial identified informational needs of an intelligence user can be met, and cricket coaches need guidance in identifying KITs. If coaches are educated to identify additional and more encompassing KITs with current sport KPIs also incorporated, their data collection and analysis process would improve. A more comprehensive data collection process could lead to the creation of all four types of knowledge as well as the development of better strategic decisions and plans. Since no information on the sport domain is available to provide guidelines for coaches to develop strategies by making use of competitor information (Wright *et al.*, 2012a), the 4Cs CI process model may serve as a suitable framework to direct CI sport-related data collection processes.

5. Conclusions

The study succeeded in identifying the KITs of high level cricket coaches by making use of the theoretical underpinnings of the 4Cs CI process model of Weiss (2002) as a framework and incorporating existing knowledge regarding cricket specific KPIs. Consequently, the mentioned business CI process model may provide coaches and sport managers with a systematic procedure to identify and use KITs in the coaching domain to drive a successful data collection and analysis process by incorporating research on current cricket KPIs. Findings of this study suggest that research needs to explore the development of strategic decision and early warning type KITs on competitors and environment to gain a sport competitive advantage. In this regard, coaches need to be properly educated in the CI process, especially as it relates to identifying KITs, as the first step of the data collection stage of the 4Cs CI process model. This study identified similarities between sport KPIs and business key player KITs within the CI process. An over-emphasis of key player KITs which create encompassing competitor knowledge, but no comparative knowledge, indicates the need for coaches to be taught how to explore comparative knowledge creation through various KITs. However, further research is also needed to investigate high-level coaches' CI data collection activities in order to describe and evaluate these activities that accompany and follow the initial KITs identification step. Research findings will shed light on the properties of cricket coaches during the first stage of the 4Cs CI process model (data collection). This study paves the way for current and future coaches to construct and implement a systematic procedure to create applicable knowledge for decision-making and to direct the CI process in sport.

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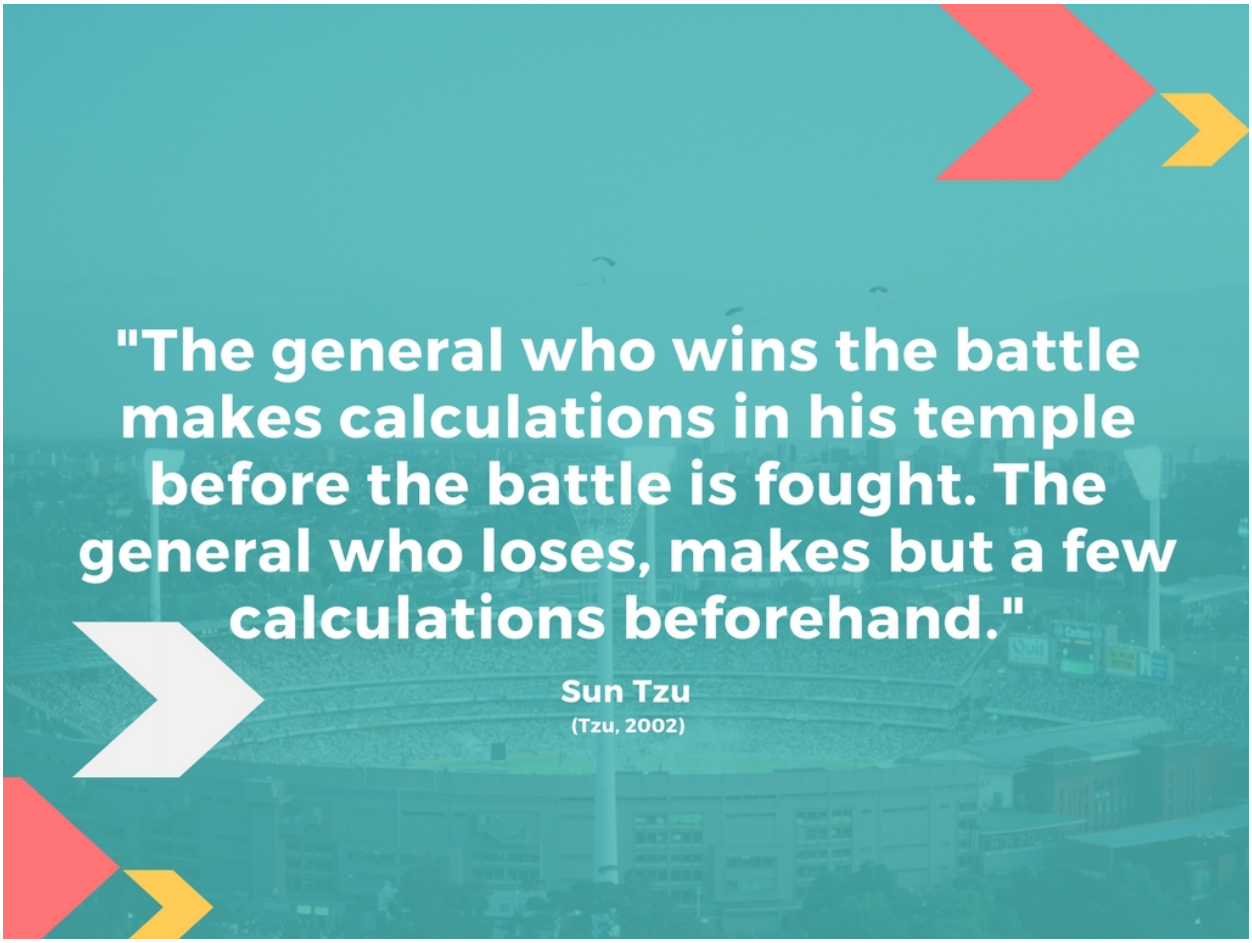
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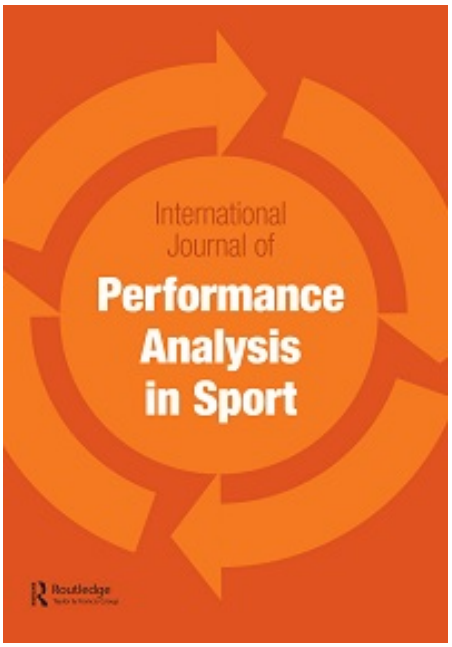
CHAPTER 5



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ARTICLE 3:

THE COMPETITIVE INTELLIGENCE PROCESS IN SPORT: DATA COLLECTION PROPERTIES OF HIGH-LEVEL CRICKET COACHES



This article was submitted to the *International Journal of Performance Analysis in Sport* and is currently under review.

The competitive intelligence process in sport: data collection properties of high-level cricket coaches

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Abstract

The aim of this study was to identify the data collection properties of cricket coaches, using the first stage of the 4Cs Competitive Intelligence (CI) process model of Weiss (2002) as framework. Semi-structured interviews were performed with high-level cricket coaches in South Africa. Content analysis was performed by developing a codebook through the creation of theory and data driven codes with ATLAS.TITM computer assisted qualitative data analysis software. Codes were thematized into the what, where, who and how of data collection as well as challenges cricket coaches face. Overall, coaches indicated that they make use of various sources of information on competitors, own team and the environment. Data collection is usually performed by numerous persons within the team set-up and a variety of information formats are utilized. The main findings of the study indicated that easy available sources are not effectively utilized, data collection processes are not performed in a structured manner and coaches need skill development regarding data collection and analysis. Furthermore, the lack of technology as well as the absence of a person who can collect data and a shortage of skills by the person who is responsible for data collection, are the main challenges coaches face.

Keywords: data collection, cricket coaches, competitive intelligence, data sources

1. Introduction

One of the greatest challenges for sport coaches is to create a high-performing entity to outsmart the opposition and win matches (Van Hoeke *et al.*, 2013b). Coaches, just as business managers, realize the need for data and information on competitors and the environment to devise strategies and counter opposition game plans (Wright *et al.*, 2012a). In this regard, coaches and managers collect data based on their specific informational needs (Weiss, 2002). Within the business domain these needs are categorised into key intelligence topics (KITs) which guide the data collection and analysis process (Herring, 1999). In the business realm the term used to explain "a systematic and ethical program for gathering, analysing and managing external information that can affect an organization's plans, decisions and operations", is competitive intelligence (CI) (Weiss, 2002:41). Various CI process models are utilized to describe the general steps that organizations follow to achieve a competitive advantage (Cloutier, 2013; Dishman & Calof, 2008b). The 4Cs CI process model of Weiss (2002) consists of the following stages, namely: the collection, conversion, communication and countering of data and information (Figure 1).

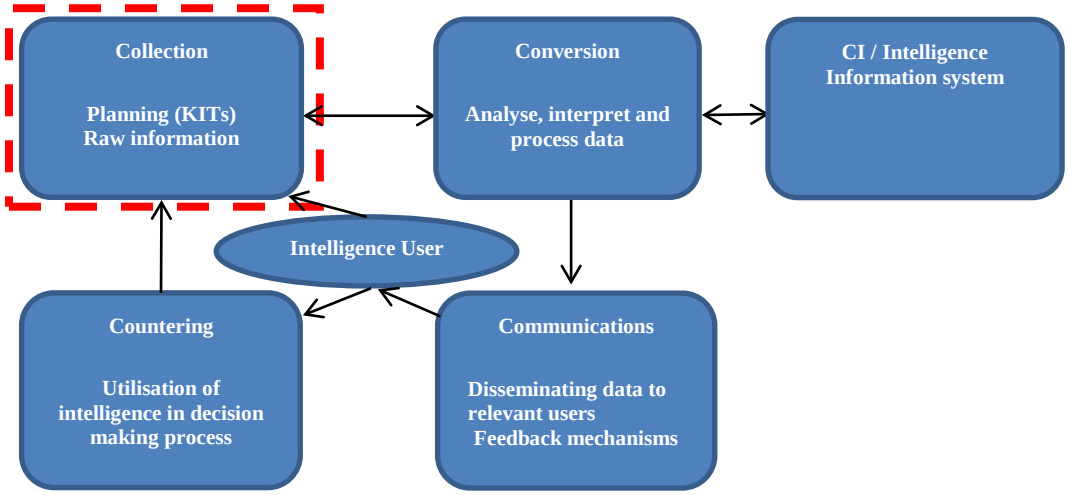


Figure 1: 4Cs CI process model (Weiss, 2002) with a focus on the data collection stage

Each of the stages is divided into sub-stages, and in this regard the first stage, namely data collection, consists of the following key elements: key intelligence topic (KIT) identification, the utilization of primary and secondary sources, a determination of the scope of information gathered, the identification of a person or persons that is/are going to collect data, determination of skills needed, the methods and technology that are going to be used as well as an assessment of the challenges that an organisation face (Dai *et al.*, 2011; Dishman & Calof, 2008b; Fleisher & Wright, 2010; Marin & Poulter, 2003; Tej Adidam *et al.*, 2012; Wright *et al.*, 2012b). In a previous article we identified the KITs that cricket coaches focus on to collect information. Therefore, in this article we direct our attention to the further properties of the data collection stage as part of the CI process model, and use the model as a theoretical framework from which high level cricket coaches' data collection behaviour can be explored, interpreted and explained.

Within the sport coaching domain, coaches collect data inter alia through performance analysis (PA) (Bampouras *et al.*, 2012). PA refers to the process of recording and analysing athletes' performances during practices and competitions with the main focus to obtain objective data that inform and support the coaching process (Lees, 2003a). Within the cricket domain, coaches continuously collect and analyse performance-specific data on own players' and competitors' strengths as well as weaknesses (O'Donoghue, 2006; O'Donoghue & Cullinane, 2011). Sport match data are collected from various sources including internet websites and databases, while live coded matches obtained from live footage are also widely utilized as primary data sources by coaches and analysts (Moore *et al.*, 2012). On the other hand vast amounts of data from internet websites are used for competitor statistical analysis in order to gain knowledge of the best possible team selection to counter opposition strategies (Hendrickson, 2012). Statistical data from websites are also regularly used in sport and cricket performance research due to its availability and accessibility (Hughes, 2005; Najdan *et al.*, 2014). Coded videos and statistical data allow coaches to exploit opponents' weaknesses whilst also eluding situations where opponents' strengths could overcome their own teams' abilities (O'Donoghue, 2009). In this regard, coaches require information on the strengths and weaknesses of both their own team, as well as that of the opposition (Wright *et al.*, 2012a). Additionally, coaches also make use of previously gathered information on the following for strategic decision-making: statistical information on the venue, information on teams who most frequently won the toss and the decisions they made on winning or losing the toss, as well as the type of competition (day or

night match) (Hughes, 2005; Najdan *et al.*, 2014; Petersen *et al.*, 2008a; Schoeman *et al.*, 2006). Consequently, data mining as part of the CI data collection process to gain a competitive advantage has been explored within cricket settings (Schoeman *et al.*, 2006). The research by Schoeman *et al.* (2006) underpins the novel application of a data collection method from the business CI process, that could be employed within the cricket coaching domain.

Numerous persons within a team set-up collaborate to obtain sport performance and statistical data. These may include the coach, sport scientist, or a performance analyst (Wright *et al.*, 2012a). The performance analyst usually films, analyses and reports back on specific key performance indicators (KPIs) on behalf of the coach (Wright *et al.*, 2012a). In this regard, the findings of our previous study on coaches' KITs identification, indicated that coaches need training to identify a variety and encompassing KITs from all three functional categories, since an over emphasis on the use of KPIs – defined as key player KITs – were evident. These KITs function to direct the collector, and if incomplete, risk jeopardizing a comprehensive data collection and overall CI process (Herring, 1999). Ideally the coach should direct the analyst or scientist who collects data with clear KITs (Bampouras *et al.*, 2012). Additionally, the data collector should be a skilled observer, who accurately notes specific match variables and outcomes (O'Donoghue, 2006). The increase in the availability of PA systems has enabled analysts to code matches with ease and to generate large amounts of publicly available statistical and match data (Lemmer, 2008; Moore *et al.*, 2012; Najdan *et al.*, 2014). The rapid advancement in information, audio, visual, broadcast and telecommunications technology undoubtedly also influenced its usage in the PA domain (O'Donoghue, 2006).

In sport PA numerous challenges obscure the information collection process, which include the inconsistent use of analysis systems and analysts who do not have enough experience to accurately analyse data (Najdan *et al.*, 2014). Especially cricket analysis is a tedious job, as ball-by-ball information during a match needs to be collected (Bhattacharjee & Saikia, 2014). Therefore, the cricket analyst needs to be a dedicated person, whose input and value necessitate the funds which are made available for him/her from the team's budget (Bampouras *et al.*, 2012). Despite numerous financial and personnel challenges and the influence of technology, coaches still need to collect data in a systematic manner to gain a competitive advantage. Since very little information on coaches' data collection activities are available, and no formalized process exists that can guide coaches in this manner (Wright *et al.*, 2012a), the aim of this study was to identify the data collection properties of cricket coaches, using the first stage of the 4Cs CI process model of Weiss (2002) as framework.

2. Method

2.1 Design

This exploratory study is qualitative in nature and used semi-structured interviews in order to enhance the understanding and explain data collection activities of high-level cricket coaches. (Henning *et al.*, 2004). Semi-structured interviews were used since this method allows for a wide scope of inquiry, depth of data collection and flexibility of methodology (De Vos *et al.*, 2005). The method also allows researchers to organise information according to the properties of the specific phenomenon of coaches' CI activities from a theoretical background for the enhanced understanding and explanation of the phenomenon (Henning *et al.*, 2004).

2.2 Participants

Purposeful, convenience sampling was utilized as it was considered appropriate since the researcher intended to discover, understand and gain insight of the specific phenomenon of KITs

as identified by cricket coaches (Merriam, 1998). Expert and assistant cricket coaches were targeted since they are responsible for team strategy and individual player development, and usually use numerous data sources for this purpose (Cooper *et al.*, 2007). Expert cricket coaches were included in the study based on the following inclusion criteria: the coach had to have at least five years of coaching experience, must have coached at university, provincial or national level, and should have obtained a coaching certificate from the national governing body (Côté *et al.*, 1993; Nash & Sproule, 2009). The level of coaching gained preference above age or gender, with the minimum coaching level set as university level.

A total of fourteen cricket coaches who matched the inclusion criteria participated in semi-structured interviews. Twelve coaches were head coaches of their respective teams and two were assistant coaches. Three coaches had between six and nine years coaching experience; nine coaches between ten to nineteen years; and two coaches more than twenty years of experience. Five coaches obtained the Cricket South Africa (CSA) level 2 qualification, four the level 3, and five coaches the highest possible level, namely a level 4 qualification. The majority of coaches (6) coached at franchise/professional level, with one coaching at national level, four at provincial, two at premier league and one at university level. The majority of coaches coached male teams, with two coaches who coached both genders and one coach a female team.

2.3 Procedures

Ethical approval for the study was obtained from the Ethics Committee of the institution, where the research was conducted (NWU-00185-15-S1). Before the start of the study permission to conduct the research was obtained from coaches' direct line managers and the coaching manager of Cricket South Africa (CSA). Written informed consent was obtained from each participating coach, after which suitable dates, times and venues for face-to-face, telephonic or Skype interviews were arranged. In cases where a coach agreed to participate in the study, a request was made to also interview the assistant coach; either with the particular coach or individually. In this manner, a snowball sampling method was implemented. Two group interviews were conducted with four and two participants together respectively, while the rest of the interviews were performed one-on-one. The interviewer and researcher transcribed the voice recordings verbatim. Typed transcriptions of interviews were emailed to participants for validation purposes (Creswell, 2003). None of the participants objected to the authenticity and accuracy of transcriptions. Before commencement of interviews, participants completed a demographic information questionnaire that was used to collect information on coaches' age, gender, ethnicity, coaching experience, qualifications, successes and teams coached.

2.4 Interview schedule

A literature review on the available CI processes and models, as well as frequently used CI surveys were scrutinized to develop a preliminary interview schedule for the cricket coaches (Gehlbach & Brinkworth, 2011). The interview schedule contained six questions relating to the four stages of the CI process, namely data collection, conversion, communication and countering, as well as questions related to CI awareness, culture, planning, identification and focus (i.e. KITs) (Weiss, 2002). With the aim of finalizing the interview schedule, the researcher approached intra-university peers (from the same university as the researcher but from different campuses) to evaluate the schedule and provide feedback via interviews. Interviews were voice recorded, transcribed verbatim, and emailed to intra-university peers who validated the authenticity and reliability of the transcribed document (Creswell, 2003). Thereafter the researcher performed a qualitative content analysis by coding the interviews using ATLAS.TI™, computer-assisted qualitative data analysis software. The constant comparative method was followed to code the data and interviews were performed until data saturation was achieved

(Boeije, 2002; Merriam, 1998). The feedback and codes created from the intra-university peers' interviews facilitated changes made and contributed to the settlement of the interview schedule.

2.5 Data analysis

Researchers analysed the content of each interview according to the method of DeCuir-Gunby *et al.* (2011) to create a codebook as a critical first step and reference for analysing interviews. A codebook is defined as "a set of codes, definitions and examples used as a guide to help analyse interview data" (DeCuir-Gunby *et al.*, 2011:138). Theory-driven codes were generated through a systematic literature review (SLR) performed by researchers and then entered into the ATLAS.TI™ system (DeCuir-Gunby *et al.*, 2011). The created codes were related to the four stages of the CI process model as well as to specific aspects within each stage and the process as a whole (Weiss, 2002). Data driven codes were also developed by reducing the raw data into smaller units of meaning as a second manner to create codes (DeCuir-Gunby *et al.*, 2011). The second step of the codebook development process involved the collaborative revision of codes by a colleague researcher within the context of the data and led to the creation of additional data driven codes (DeCuir-Gunby *et al.*, 2011). Definite care was taken in creating specific codes, and researchers ensured that definitions were precise, encompassing the constructs and that example quotes illustrated each code appropriately (DeCuir-Gunby *et al.*, 2011).

In the next step the reliability of the coding procedures, as well of the coder, was calculated by making use of Cohen's Kappa (DeCuir-Gunby *et al.*, 2011). The intra-rater reliability was calculated to be $\kappa = 0.78$ and inter-rater reliability to be $\kappa = 0.79$. Research suggests that reliability values between the 0.8 and 0.9 range are deemed to be rich in analytical value (Anderson *et al.*, 2001). The fair agreement indicates the consistency in the creation and application of codes by during the analysis and therefore validates the qualitative method used (Campbell *et al.*, 2013; DeCuir-Gunby *et al.*, 2011). The qualitative analysis was performed through a constant comparative analysis whereby researchers simultaneously analysed the content in applying the code book and codes to the data, together with data collection through interviews (Boeije, 2002; Henning *et al.*, 2004). Data saturation was reached and researchers meticulously determined that no additional data were found (Guest *et al.*, 2006). For the purpose of this study, researchers only included and discussed those codes which were related to the data collection codes and categories as part of the overall interview schedule and data analysis. A data network was developed in ATLAS.TI™ from the codes, categories and stage themes which portray the links between the properties of the cricket coaches' data collection process.

3. Results

3.1 Coded data

The codes created within the larger study's CI data collection theme were described as stage themes according to the questions of *what* information coaches collected, from *where* cricket coaches collected their data, *who* collected the data and *how* data collection was performed. The summary of the stage themes and categories are outlined in Table 1.

Table 1: Outline of identified stage themes and categories from interviews.

No	Stage theme	Categories
1	What?*	1. Competitors 2. Own team 3. Environment
2	Where?	1. Data collection sources
3	Who?	1. Person collecting data 2. Skills of the person 3. Perceived knowledge
4	How?	1. Technology use for data collection 2. Coding of matches
5	Challenges	1. Data collection challenges

* Particulars of this aspect are explained in more detail in a separate article

The themes and categories are disassembled within Tables 2 to 9 and discussed individually by referring to the quotations of the coaches and created codes. The first theme of *what* information coaches are looking for, was addressed in detail within a separate article regarding cricket coaches' KITs. A few quotations on all three categories under the *what* stage theme are clustered together within Table 2 for discussion purposes, since the need for this information sets the data collection process in motion and therefore necessitates mentioning.

Table 2: *What* information stage theme: Competitor, own team and environmental aspects based on cricket coaches' quotations

Coach quotation	Information category
Again there are so many variables in the game, we do actually analyse opposition, both mentally, physically and obviously statistically. We try to look at everything (P10a*) We try to keep it down to two things, from a batting perspective two things - he scores on the short ball, he is worth a lot...from a bowling perspective we are analysing their bowlers we might say ok, he's got a good slower ball... (P2a)	Competitor analyses
We have some videos everywhere as well where if maybe our players have some technical flaws, we try and iron them out through video footage, to see where they are going wrong and maybe they are just falling over (P9a) So we always looked for positives and always our good shots, the boundary shots, where the guys hit sixes or fours, us bowling, getting wickets (P2b)	Own team
So you have to look at the different conditions in different venues that you play around the country because we obviously play all over the country (P17a) ...if you are going to a pitch you will know this is a slow wicket (P2c)	Environmental

* The number refers to the participant while the alphabet letter refers to the comment number by the participant.

Numerous important information variables regarding competitors were mentioned by coaches, from mental and physical to statistical information on strengths and weaknesses of opposition players (P10a and P2a). Likewise, coaches need information on their own team, either for own technical evaluation and performance adjustment (P9a), or strengths and weaknesses of

individual players (P9 a and P2b). The last category of information need coaches identified is regarding environmental aspects such as the specific venue and conditions the team will play in (P17a), as well as the pitch that was prepared (P2c). The coaches' information needs on these three categories are not limited to these few examples. The three categories were separately discussed in more detail in an unpublished article as part of the study. The fact is that coaches need specific information which necessitates them to use specific sources. The sources used by cricket coaches to collect data are given in Table 3 and describe the stage theme from *where* coaches collect data.

Table 3: *Where* information stage theme: Sources for data collection based on cricket coaches' quotations

Coach quotation	**Data source codes**
I will see the guy playing, I see A, B, C and I will write down a couple of points, it is actually a book that I have kept over the last 4 years... (P17b)	Own notes, book format
We go onto ESPN Crick info, and each player has stats... (P17c)	ESPN website
Yes, I go around with a memory stick, so after each game I say, this is (the video footage) that I want (P16a)	Video from analyst
I remember with the national side again we had the advantage of hawk-eye*. (P11a)	High level technology / video
For us it is a little bit different, we only have video footage and then statistical data which is logged on to a software program, and then obviously Crick-info as a kind of third resource (P11b)	Video footage, statistical data, software program, internet website / statistical data
So for instance in the national team there is an analyst who has a strong background staff in India who analyse a lot of games and provide a lot of information to provide a point of difference or cutting edge advantage (P11c)	Analyst
They would just give us the game, which is just recorded and not coded (P10b)	Raw video material
And so we used to do the coding of players, now the governing body employ people to come and do it for us. So each game is analysed but not by us. Or actually video recorded (P10c)	Analysed video footage
You see their scorecards and if I pick up any trend there (P2d)	Scorecards / trends
And I think the information, a lot of the players have a lot of information as well, because they are playing provincial cricket against these guys (P2e)	Players' experience
Another thing that I do sometimes use is where I have come up with an excel spread sheet... (P2f)	Own excel spread sheet
There are video analysts that prepare documents (P5a)	Analyst prepared documents
So when I get here to the ground I will find out from the grounds man (P8a)	Grounds man
There is a database that you could call on, so together with the video analyst and the coach (P8b)	Database/video analyst
I will sit with a higher level coach and talk to him, asking his view on this bowler or how will he approach that batter (P13a)	Senior coach

Coach quotation	Data source codes
You get the information on your computer into the change room and the coach has his own personal computer on which he stores the information (P14a)	Personal computer/database
Those small things you tend to pick up even through the media and the papers or through the TV when the coach is commenting about his plans or whatever he faces, we tend to listen. We buy some newspapers and just get to what is basically happening there (P9b)	Media/TV
Yes there is a lot of information going around, like if you look on Facebook, look on Twitter, maybe I will search a young player, he is about to make his debut tomorrow - he is going to put it on Twitter "I am so glad I am making my debut for "A team tomorrow" for example, then I see that and then I know that this guy is going to play... (P9c)	Social media

* Hawk-eye is sophisticated vision processing technology in sport which track balls to mm accuracy but also players and cars.

Results in Table 3 show that coaches utilise a variety of data sources to collect information on competitors and the environment. In some cases, coaches use their own written notes and in book format (P17b and P17c), while others revert to using available databases (P8b), personal computers with simple databases or personalized excel worksheet-related databases (P2f, P14a). Sophisticated technology, which is predominantly only available at national level competitions, when utilized, provides a great advantage to the coach (P11a), while additional sources also include score sheets (P2d) and statistical data which is freely available on internet websites (P17c and P11b). Video footage, either in raw (P10b) or in analysed format (P10c, P16a) is an additional source which is also used. Expert analysts provide a lot of information to high level coaches (P11c and P16a) and often compile documents with information for coaches' perusal (P5a). Coaches also tap into the knowledge and experience of their own players for information on competitors (P2e), talk to the grounds man who prepared the pitch where they will be playing to gain insight into the environmental aspects (P8a) or ask the advice of a senior and more experienced coach regarding opposition players (P13a). Lastly, social media (Twitter and Facebook) and broadcasting media (TV and printed media such as newspapers) are also accessed to gain insight into selection of the opposition team (P9b, P9c). Even though coaches are mainly involved in accessing and utilising various data sources, this task is not exclusively assigned to them and therefore the stage theme of *who* collects data was investigated and portrayed in Tables 4 to 6 under the categories of person collecting data, skills of the person and perceived knowledge.

Table 4: *Who* information stage theme: Data collector based on cricket coaches' quotations

Coach quotation	**Collector codes**
... we took video analysts with us to this specific competition... (P2g)	Analyst
A lot of the players have a lot of information as well, because they are playing provincial cricket against these guys, so they actually have more information than what they know, so you just got to tap into it (P2h)	Own players
I do most of that job. Obviously our level is semi-pro cricket, me as head coach, I am full time employed and then we have an assistant coach and a trainer, that are part-time employed. So for them going to look up stats would be going a bit far, so I do everything myself in terms of that (P17d)	Coach
So I devote a lot of time personally with the assistant coach whom I have now tasked to help me out with that in terms of looking at stats of specific grounds we are playing on so we can plan around what is required (P16b)	Assistant coach
It is a mixture of me, the assistant coach and the video analyst (P9d)	A combination of the coach, assistant coach and analyst

A variety of personnel is involved in gathering cricket information which include the head coach (P17d), assistant coach (P16b), analyst (P2g) and players (P2h). Sometimes the whole coaching team (coach, assistant coach and analyst) will combine to gather the relevant information (P9d). The variety of personnel involved in gathering information results in different skill levels of persons involved. Table 5 describes the category of the skills of the person collecting data as represented by coach quotes and codes.

Table 5: *Who* information stage theme: Skills of data collector based on cricket coaches' quotations

Coach quotation	**Data collector skills codes**
...obviously the two people (video analysts) who did it is very professional, they know what they are doing... (P2i)	Highly skilled
...during our week matches, we have 14 players and I have three players on the side of the field, but we normally have one player sitting and doing nothing. So I try and get him to work on the computer and he logs every ball...it is quite easy because he just needs to click one, two, three, four (P2j)	Low skills, trained by coach
... [The assistant coach] is also a level 3 coach, so he knows what he is doing and out of experience we will know what we want to and not want to see. We tag specifically... (P13b)	Skilled and experienced
The thing is, it is a guy that has a cricket background and knowledge, and so he knows what to look for and which type of information to give to the coaches... (P14b)	Cricket background and knowledge
...who has been all over the world and like we didn't understand the teams that we are going to play against, like those IPL teams, the teams from Australia, the teams from England... (P9e)	Extensive traveling experience

An analysis of the different skill levels of people who are involved with data collection shows that some are highly skilled and professional persons (P2i) with extensive traveling and analysis experience (P9e) where others have low skill levels and were trained in-house to perform the

data collection activity (P2j). In-between these opposites were skilled and experienced assistant coaches (P13b) and personnel with cricket background and knowledge (P14b), who were also involved with data collection. Linked to the various skill level and persons collecting data, an additional category of perceived knowledge was identified within the stage theme of *who* collects data. Coaches expressed their professed knowledge regarding numerous important aspects which is depicted in Table 6.

Table 6: *Who* information stage theme: Own perceived knowledge based on cricket coaches' quotations

Coach quotation	**Own perceived knowledge codes**
If you are going into environmental things - there are certain things that you as a coach know... (P4a) ...so knowing the pitches that we play on (P2k) In one-day cricket, we know here at this ground, batting second at night is the way forward. To bowl second is really tough (P11d)	Environment, pitch, venue, day / night game
Look for instance it is almost worldly known that a guy like player K struggles against left arm spin... (P11e) So basically we are playing the same teams 6 or 7 times a year, so it is repetitive (P10d) I think the collective sort of knowledge of the players on the opposition is enough over the years of playing against the opposition to kind of develop a strategy (P11f)	Competitor knowledge, repetitive matches, players knowledge
...it is vitally important to have a thorough knowledge of your own players... you have to understand where your team is at (P8c) ...so we get caught up in the technological side of things but the understanding and the little nuances that plays itself out, the sensing of a player that is a little low on confidence, I am not going to get the best out of him (P8d)	Own player knowledge, experience

Coaches relied a lot on their own perceived knowledge for information gathering and using it to make strategic decisions (P11f). Coaches perceived their knowledge on especially the environmental aspects (P4a), cricket pitches being played on (P2k) and venue specifics that influence matches (P11d). Likewise, coaches have perceived knowledge on specific opposition players (P11e), mainly due to repetitive competitions against the same teams (P10d) and therefore also rely on the knowledge of their players for decision-making (P11f). Coaches also have a thorough knowledge of their own team (P8c) through an understanding of little nuances of the game (P8d) which comes through experience. Coaches cannot attain all the information they need from own experience or players' knowledge and have to apply certain techniques to collect additional information. The fourth stage theme of *how* coaches collect data address this aspect in Tables 7 and 8. This theme is divided into the categories of technology use for data collection and coding of matches.

Table 7: *How* information stage theme: Data collection technology use based on cricket coaches' quotations

Coach quotation	**Data collection technology codes**
Mainly videos and then they will show the visual, and they might have what is called a pitch map, where for the bowlers, it will show where the guys bowled so they will have that percentage of where their balls are bowled and landed, so out of their two or three games that we watched, 60% are short balls, full balls or whatever (P2l)	Video footage and pitch map, statistics
But all competitive games are video recorded, should we need it we can go through virtually every ball that has been bowled the previous seasons to back up the statistics (P10e)	Statistics and video recordings
They would just give us the game, which is just recorded and not coded, which again is not always perfect because one comes from the one end and the other from the other end, and you might want the footage from the other end, etc. so we only get the one particular angle (P10f)	Uncoded video footage
For us it is a little bit different, we only have video footage and then statistical data which is logged on to Performax – it is a very specific number of parameters and then obviously Crick-info as a kind of third resource (P11g)	Internet data base, video footage
But we were fortunate to have access to Hawk-eye there, which gives you a very strong visual display of these guys' dismissals (P11h)	High quality technology

Coaches use a wide range of technology to gather information on their own team as well as opposition teams. The following are examples of technologies that are used: video recordings (P2l, P10e, and P11g), statistics available from internet sites (P10e and P11g) and software programs which give statistics in a visual format (pitch map) (P2l). Coaches also indicated that a lot of information is available, but that data in the form of, for example, uncoded video footage is not always ideal for use by coaches (P10f). Coaches prefer high quality technology that highlights specific areas of performances such as batsmen dismissals for information utilization (P11h). To gain a better understanding on an issue as batsmen's dismissals, coding of matches is a necessary form of information collection and plays an influential role in the PA domain. In this regard, a category of coding of matches was identified within the stage theme of *how* data are collected and presented in Table 8.

Table 8: *How* information stage theme: Coding of matches based on cricket coaches' quotations

Coach quotation	**Match coding codes**
I will not tag the whole time – my assistant coach will do that. He will record and note that via 5 or 10 second video clips (P13c)	Short video clips
...in the past before Cricket South Africa centrally contracted video analysts; we used to log the games ourselves (P11i)	Centrally contracted video analyst, coaches perform activity
I can get it from them (analysts) (while the match is on), but because they have to tag and log and pay attention to the game it gets difficult (P16c)	Analyst

Coach quotation	Match coding codes
One or two can help with the drinks, but we normally have one player sitting and doing nothing. So I try and get him to work on the computer so he logs every ball (P2m)	Players

Coaches indicated that coding (assignment of performance specific values to videos) of match information was important when collecting data. Information is gathered through video recordings and the coding of matches (P13c and P11i). Coaches feel that you need to appoint a designated person who pays specific attention to the task (P16c). Various persons within a cricket team set-up are utilized to perform this, including coaches and assistant coaches (P11i and P13c), analysts (P16c) and players (P2m). Coding of sport matches is seen as one of the primary methods of data collection in PA. This method and others are not without problems and a stage theme of *challenges* was identified. Table 9 addresses this stage theme with data collection challenges as category.

Table 9: *Challenges* of information stage theme: Data collection challenges based on cricket coaches' quotations

Coach quotation	Collection challenges codes
As a coach, you have a group of 18 players to coach and only 11 can play, so all of them want your attention, and it becomes a busy life and then you as a coach still needs to go and search for information - that becomes a difficult task (P14c)	Numerous coaching tasks
...especially when you have to travel. You have to remember, we play half of our games away from home and if I get to, say this provincial cricket venue, I have nothing, no permanent video feed because they don't have it. And now I have to lay down 100m of video cable and fly it down, it makes everything just so much more difficult (P13d)	Traveling / Insufficient technology and set-up / resources
Yes, the only difference is the lower level that you play, the less resources you have, the less information available (P13e) ...we played there last year – we went there blind in terms of, not having any thing (information) on their team (P8e)	Inadequate resources and information, less information
I did it (coding every ball) for a year or two, which was to be honest a bit boring in a way (P10g)	Tedious process
You know, maybe a guy can come up with something that we maybe haven't looked at, because we don't have a video analyst (P17e)	Insufficient trained personnel
What I would probably do is, hire somebody if there was a budget (P17f)	Insufficient funds
...because on the level that we are at, matches are not televised, so you need to gain that type of information (P4b) At our level, to be honest, I don't think it is enough quality information for us to devise an entire strategy (P11j)	Deficient quality footage
...during our league season, we don't have the videos and the visuals... (P2n)	No video recording
...you come against a new player and you have no clue because you have very little reference material... (P13f)	New players – little information

Coaches perform a variety of tasks as part of their coaching responsibilities which are time consuming and may cause them to shift data collection to the background (P14c). Lower level coaches sometimes play on grounds that do not have the technology such as pre-installed video cameras, which makes data recording difficult (P13d). This, together with inadequate resources (P13e), insufficient trained personnel such as a video analyst (P17e) and insufficient funds (P17f) augment coaches' information collection challenges. Different and new situations when travelling to another country and playing a team for the first time (P8e) as well as new and unknown opposition players (P13f) also pose a challenge to coaches, since no previously gathered data are available. Coaches also view the data gathering process to be a tedious activity and therefore neglect it (P10g), while in some instances the unavailability of video recordings (P2n and P4b) and inadequate high quality footage lead to a loss of data (P11j).

The wide variety of identified codes, categories and stage themes are presented in a data network (Figure 2). This network indicates the intricate and entwined properties of cricket coaches' data collection process. KITs, as identified in a previous article, direct the data collection on competitors, own team and the environment which necessitates coaches to use specific sources of information. The data sources are linked to the person who accesses it, skills of people collecting data, technology use, coding of matches and challenges faced in the process. The stage theme of coaches' perceived knowledge is linked to the sources, person collecting, coding of matches, technology and challenges since it could influence all these stage themes.
Smaller links are also evident with the network.

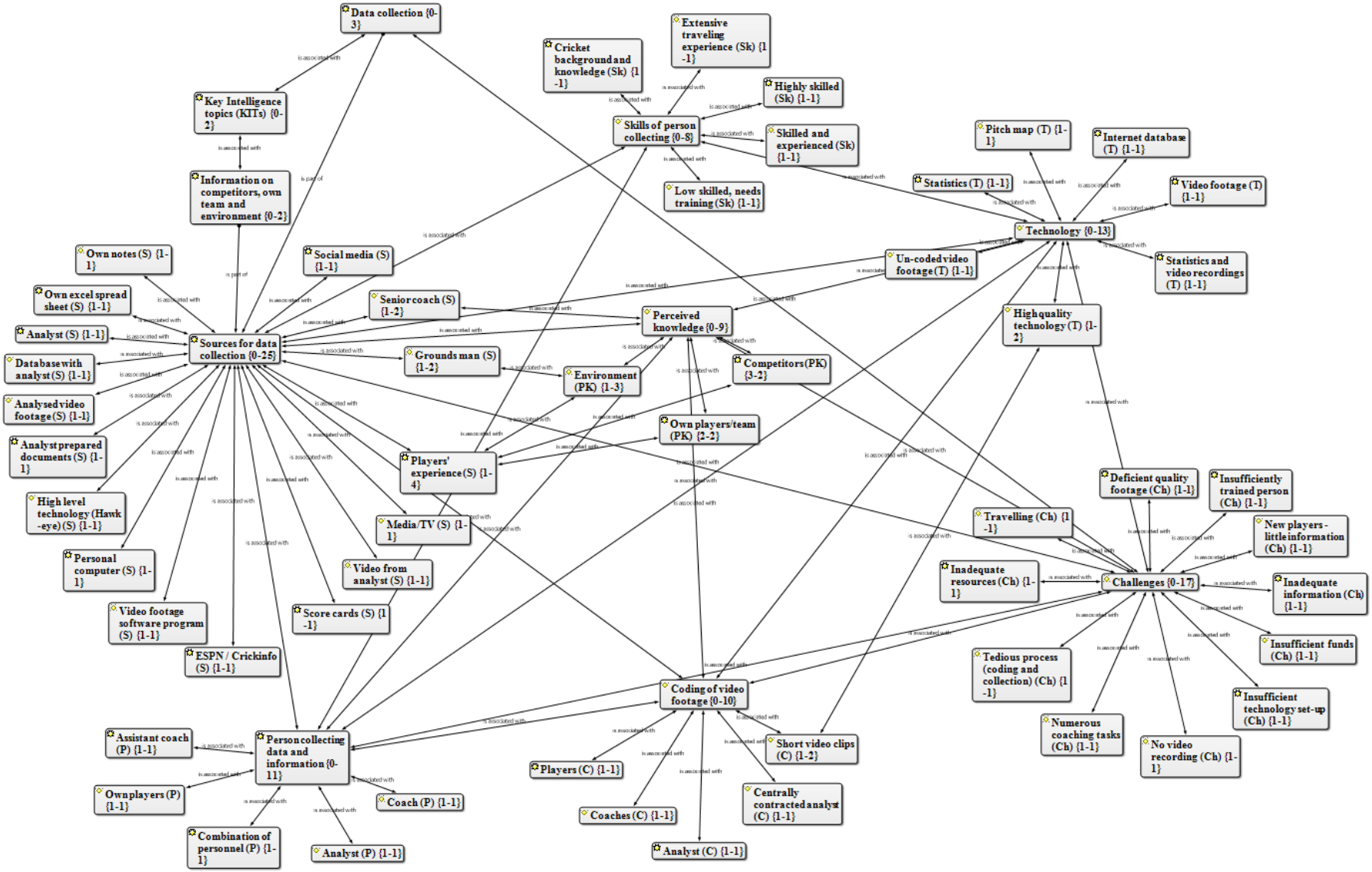


Figure 2: Data network on data collection properties of high-level cricket coaches in South Africa

4. Discussion

The data network visually portrays the empirical evidence from coaches' and assistant coaches' interviews and indicates that coaches also use properties and activities that are similar to the data collection activities of the business 4Cs CI process model of Weiss (2002). Therefore, this process model can be used as a theoretical framework from which high level cricket coaches' data collection behaviour can be explored, interpreted and explained. In this regard, coaches use various sources for data collection. These sources include their own players, senior coaches, groundsmen, internet websites, social media, video clips, broadcast and printed media, own databases or publically run cricket databases. Individual coaches seem to favour a specific data source and predominantly rely on that particular data source on a continuous basis. Furthermore, coaches do not seem to have a formalised structure and process to govern the utilization of different sources. Some coaches prefer to use their own written notes or Excel spread sheet, while others frequently use input from own players and feedback from the groundsman or assistant coaches. Knowledge and information from own employees are mostly accessed in the business domain and likewise coaches in the cricket domain also use their players' knowledge on a continuous basis (De Pelsmacker *et al.*, 2005). Therefore, coaches, just as business managers, should develop the skills of their players and assistant staff members to collect, store, analyse and utilize information to gain a true competitive advantage. In this regard, researchers in the business domain such as Dishman and Calof (2008a) suggest that publically accessible websites, which within the cricket domain contain results and statistics on the majority of players and matches, should rather be used as the primary data source.

Very few coaches have a data collection system in place to collect data from publically available sources or from own data recordings. Coaches, who have systems such as these in place, either make use of very basic, out-dated paper-based databases or Excel spreadsheets. In this regard, two coaches were innovative by establishing their own technology-based data collection systems, but were obliged to do so because of inadequate funds. Higher level coaches have the luxury of a centralized analyst who provides them with video material, should they need it. However, it was not entirely apparent if these coaches continuously made use of this service. Furthermore, despite the fact that coaches collect data from numerous sources, coaches do not apply set methods in determining and tapping data sources, nor do they as individuals frequently search for suitable, available and quality data sources and compile databases from a variety of sources. Coaches evidently need assistance on how to collect, sift and store information systematically that will enable them to gain a competitive edge.

Within high-level sport, the majority of data are obtained by coding live matches as information that is deemed most valuable and readily available (Moore *et al.*, 2012). This was also evident from cricket coaches' feedback which showed that coded recordings are still a primary source of information that they prefer. However, very few coaches frequently made use of this data source due to scarcity of resources. Two professional cricket coaches that do have match recordings available indicated a disregard for information if it was not of a superior quality and already in an analysed format before they received it. The use of high quality information is a critical aspect of the CI process and coaches should strive to gain live coded match data since information from such sources is very valuable (Teo & Choo, 2001; Wright & Calof, 2006). Unfortunately, in the South African context, high quality data in the form of coded match videos are only available to national level coaches and only during some competitions for lower level coaches and teams.

Coaches consider the data collection process to be time consuming, and indicated that they do not want to spend too much time on this aspect of the CI process due to numerous other coaching

tasks that they need to perform. However, elite level coaches need to spend time on data collection and need to review PA information, which is evidence of a more systematic approach to enhance their coaching process (Wright *et al.*, 2012a). The best solution to ensure that the data collection stage of the CI process receives the necessary attention, is to appoint professional analysts with extensive knowledge and skills to provide high quality coded video information to coaches, together with reports, which contain, amongst others, an analysis of opposition players' strengths, weaknesses, opportunities and threats (SWOT analysis) (Strauss & Du Toit, 2010; Wright *et al.*, 2012a). Not only should coaches receive information on opposition players, but also on their own players and the environment. However, numerous challenges such as inadequate finances restrict this option for most coaches. Some coaches overcame this barrier to effective data collection by training their own reserve players to collect data through the use of a simple custom-made spread sheet, while others bought an ordinary video camera and laptop from limited funds and made use of an assistant coach to collect data. Initiatives such as these indicate that cricket coaches are aware of the value and benefits of setting up data collection systems and data bases. Within the business domain, an awareness of the value and benefits of the CI process enhances the pursuit of intelligence and effective decision-making (Fleisher & Wright, 2010; Garcia-Alsina *et al.*, 2013). Data collection initiatives by coaches also indicate that it is possible to train an unskilled person with a good cricket background, to perform the mundane task of data collection. However, this is not the most effective form of data collection.

Therefore, similar to their business manager counterparts, coaches need to focus on the development of their own analytical skills as well as those of their players or assistant coaches to collectively accomplish the task of data collection and CI creation (Strauss & Du Toit, 2010; Teo & Choo, 2001). As is the case with business managers, coaches are responsible to convey and determine the culture of CI and the activities performed to achieve a competitive advantage (Wright & Calof, 2006). Within the business CI domain, specific skills and knowledge are needed to successfully execute the CI process (Strauss & Du Toit, 2010). Likewise, coaches require excellent sport-specific knowledge, which according to the coaches include perceived knowledge of the environment, opponents and own players. Coaches also pointed out that coaching experience allows them to be more successful in the coaching process. According to O'Donoghue (2008) this attribute is indicative of expert coaches. However, Franks and Miller (1986) showed that coaches were able to recall only thirty to fifty per cent of key performance events. Consequently, coaches also need to depend on other methods of sport PA to overcome the limitations of human observations alone (Wright *et al.*, 2012a). In this regard, participant coaches seemed to rely predominantly on their perceived knowledge and memory to recall and analyse important information. This is consistent with previous research which revealed that coaches operate from perceptions or a gut feeling - which could foster inconsistent and incomplete data analysis (Wright *et al.*, 2012a). The implementation of a CI process could enable coaches to gain a competitive advantage through the systematic collection, analysis and use of data (Fatti & Du Toit, 2013). Coaches' decisions will then be based on logical and visually available data of, for example, opponent players' weaknesses and strengths.

Although coaches acknowledged that opposition players' strengths and weaknesses were important informational needs that influenced practice sessions used to prepare for upcoming competitions, it was not entirely evident that coaches pursued data collection to complete a comprehensive analysis. For example, none of the coaches implemented something such as a SWOT analysis, which is seen as a primary analysis technique in the business CI process (Bose, 2008). Also, despite the identification of KITs by high level cricket coaches, coaches only use part of the available information. This trend of impartial data use is also evident within the

business CI domain (Wright *et al.*, 2012b). For this reason, coaches should continuously endeavour to systematically direct identified KITs towards suitable sources for data collection.

The data network which displays the property links between various stage themes and codes indicate the need for an integrated process of data collection for cricket coaches that involves numerous persons within the team set-up. The availability of a skilled person for data collection through high quality technology and a variety of sources would enable coaches to overcome numerous data collection process challenges. However, the availability of numerous sources alone without the presence of a skilled person does not guarantee an effective data collection process. On the other hand, the presence of a skilled person alone with inadequate funds for high quality technology, would hamper effective data collection. Coaches' perceived knowledge is linked to sources, technology, coding of matches, person collecting and challenges, since coaches would not utilize technology or sources, if they are of the opinion that they have enough knowledge and information on competitors, their own team and environment.

5. Conclusions

In this study high-level cricket coaches exhibited specific qualities and activities that are related to CI creation. However, these qualities and activities currently exist as alone-standing elements which need to be strung together in a systematic and purposeful manner. Coaches often use available sources such as their own players to gather partial information, but available data and statistics on accessible websites are not sufficiently scouted and utilized for easy data collection and analysis. Within the business domain, business managers are prone to overuse public sources for data collection, whereas coaches currently do not utilize available information effectively. Therefore, coaches should be trained on how to access and exploit easy accessible web-based databases for continuous data collection and storage. In this regard, coaches' analytical and research skills should be addressed and coaches should be deferred from expecting only the highest quality coded videos from professional analysts as the primary data source. Within the current cricket competition structures, high quality and already analysed videos are only available to high level cricket coaches, or at a lower level, only during a few competitions. Even though coaches could structure their coaching set-up in such a way that high quality coded videos are made available, they should not neglect available statistical information for utilization during the CI data collection process. Coaches could also focus their attention on CI activities that can be performed with limited technology and resources. Therefore, coaches' education should focus on the application of a systematic and formal data collection process to foster the organised creation of cricket coaching intelligence. This is possible by using the properties indicated in the data network as educational tool. In this regard the business 4Cs CI process model of Weiss (2002) provides a theoretical underpinning for cricket coaches' data collection properties and activities.

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CHAPTER 6



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ARTICLE 4

THE DEVELOPMENT OF A COMPETITIVE INTELLIGENCE FRAMEWORK FOR CRICKET COACHES



This article was submitted to *Sport Management Review* and is currently under review.

The development of a competitive intelligence framework for cricket coaches

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Abstract

Competitive intelligence (CI) provides the framework of knowledge to organise and coordinate activities to collect and analyse environmental and competitor information. Currently no CI framework exists regarding elite coaches' practices on competitor analysis and strategy design. Therefore, the aim of this study was to develop a conceptual CI framework for cricket coaches using the business CI 4Cs process model of Weiss (2002) as theoretical framework. The exploratory study utilized a dominant qualitative research method, followed by a quantitative exploration. Semi-structured interviews were completed with high-level cricket coaches whereafter a constant comparative qualitative method of data analysis was employed using ATLAS.TI™ software. The theory and data driven interview codes and categories were quantitized into numerical values and a quantitative cluster analysis produced five conceptually concatenated themes of strategy design, review, information transmission, CI process dynamics and information parameters, each with specific sub-categories. Subsequently, a conceptual CI framework for cricket coaches was established as a schematic representation of the concatenated tree diagram. A structured CI approach applicable to cricket is the first step to advance the CI domain in sport coaching and enhance coaches' intelligence creation activities to enhance competitiveness.

Keywords: competitive intelligence, framework, cricket coaches

1.1 Introduction

Competitive intelligence (CI) is an ethical and systematic manner to collect, analyse and manage external information that can affect own organisation plans, decisions and operations (Strategic and Competitive Intelligence Professionals (SCIP), 2012). CI is a process of knowing the opposition's strategy and staying one step ahead of them (Teo & Choo, 2001), which is achieved by collecting and analysing information about competitors and the environment, and applying newly attained knowledge to own strategy design (Teo & Choo, 2001). The strong strategic dimension of CI is the ultimate goal and aids the strategist to understand the environmental and competitor forces that ultimately influence ones' own strategy (Nasri, 2011a). According to Streamcrest (2003), CI provides a framework of knowledge to organise and coordinate activities to collect and analyse environmental and competitor information. In this regard, the 4Cs model of Weiss (2002) can be used as theoretical framework to investigate the collection and analysis activities cricket coaches follow when developing their teams' strategy. Very little research exists on elite coaches' practices regarding competitor analysis and strategy design which justifies an investigation of this nature (Wright *et al.*, 2012a). Empirical evidence from this inquiry aims to develop a CI framework for cricket coaches, which will guide coaching practices to gain a competitive advantage.

CI is used by businesses world-wide as a process to enhance decision-making, competitiveness and to formulate opposition counter strategies (Bose, 2008; Wright *et al.*, 2012b). The 4Cs CI process model of Weiss (2002) with its four stages of data collection, conversion, communication and countering, as well as an intelligence system and user involved, provides the theoretical foundation for this study (Figure 1).

Within the first stage of data collection, aspects such as key intelligence topics (KITs) identification, primary and secondary sources used, persons and skills needed in collecting data, and technology used in collection and storage of data are addressed (Dai *et al.*, 2011; Fleisher & Wright, 2010).

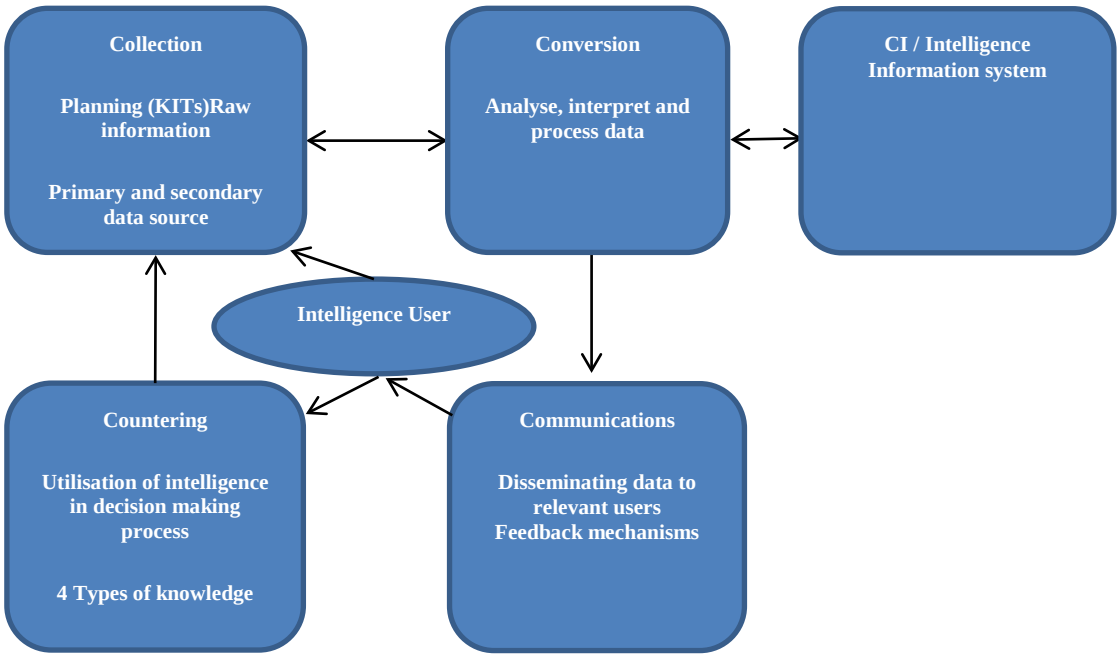


Figure 1: 4Cs CI process model (Weiss, 2002)

The second stage, namely data conversion, involves features such as the employment of advanced analytical techniques to analyse competitor information, the analyst and skills needed to analyse data as well as the type of technology used and information stored (Fleisher & Wright, 2010; Gatsoris, 2012). In the third stage, namely communication, the analyst or CI professional shares information timeously and in a usable format by using different methods of communication as well as technology (De Pelsmacker *et al.*, 2005; Marin & Poulter, 2003). In this regard the relationship between the intelligence user as receiver of information and the analyst is important (Fleisher, 2008). Countering as the fourth stage includes the formation of four types of knowledge: competitor, self-, environmental and comparative knowledge (Weiss, 2002). The four types of knowledge culminates into decision-making and strategy development, which enables decision makers to take proactive action (Wright & Calof, 2006). The decision

makers or intelligence users within an organisation could be senior management, executives, departmental managers or CEOs and they direct the CI projects by communicating their KITs (Du Toit & Sewdass, 2014b; Wright *et al.*, 2002). Additional to the four stages are features such as formalized structures and activities within CI units, financial support and a CI culture to ensure the success of the process (Wright *et al.*, 2012b). Mentioned aspects of the CI process were incorporated into the 4Cs theoretical framework and used to investigate similar activities performed by cricket coaches.

Within the sport domain analysis refers to a process by which match information that was produced is interpreted (Wright *et al.*, 2012a). In this regard, studies focus on the analysis of key performance indicators (KPIs), as specific and measurable pieces of performance information in cricket (Petersen *et al.*, 2008b). Analysts use KPIs in cricket as performance measures to discern successful from less successful teams (O'Donoghue, 2007; Petersen *et al.*, 2008a). This article is part of a larger study and therefore, in a previous article the KPIs identified by cricket coaches were classified as key player type KIT within the CI domain, since it provides a better understanding of opposition key players to the coach (Van den Berg *et al.*, 2017b). The use of sport domain KPIs to analyse opposition is similar to the KITs within the CI. In this regard, analysts or coaches collect, inter alia, KPIs from different sources of information such as coded video footage or match and statistical data which are available on public websites (Moore *et al.*, 2012; O'Donoghue, 2009). Analysts, who perform data conversion tasks are highly skilled, professional and usually involved at the highest levels of sport (Bampouras *et al.*, 2012). Data conversion by analysts often include the creation of coded video clips, where technology and suitable databases of high quality video footage play an important role (Lyons, 2011). Therefore, technology and the availability of technology are critical to gain competitor information (Lyons, 2011). However, coaches need to be trained in order to collect data from coded videos, although

coaches with minimal analysis training are also compelled to perform certain data collection activities since technology and skilled analysts are not always accessible (Wright *et al.*, 2012a). Technology is not only used for data conversion, but also during communication which is the next stage of the CI process (Dai *et al.*, 2011).

Information is communicated mainly from the sport analyst to the coach who acts as the gatekeeper, sifting through information before providing feedback to his own players or the team (Bampouras *et al.*, 2012). The analyst is also responsible for providing timely and visual representations of results by incorporating different methods and formats such as videos, match reports and statistics (Wright *et al.*, 2012a). Coaches use the received information for competitor analysis, player improvement and strategy design (Wright *et al.*, 2012a).

Little research exists regarding coaches' competitor analysis, decision-making and strategy design, mainly due to the competitive advantage that is gained through these activities (Wright *et al.*, 2012a). Coaches continuously make decisions during training, coaching and competitive situations and need knowledge on competitors and the environment to enhance decisions on strategy design (Lyle, 2002 cited by O'Donoghue, 2009; Wright *et al.*, 2012a). Sport strategy design often depends on opponents' strengths and weaknesses, performance prediction and competitor pattern recognition (O'Donoghue, 2009; Saikia *et al.*, 2012).

The use of sport analytical and statistical applications within USA-based sport franchises have increasingly changed coaches' competitor analysis and decisions on player inclusions (Hendrickson, 2012). The use of statistical analysis applications is also increasing in the sport of cricket, even though it is still in its infancy stage (Najdan *et al.*, 2014). Researchers have, therefore, called for specific and structured activities, and processes that can guide coaches'

decision-making and enhance their competiveness through a systematic approach of competitor data collection, conversion and countering (Cushion *et al.*, 2006; Groom *et al.*, 2011). It is against this background that the aim of this study was to provide a conceptual CI framework specifically developed for cricket coaches based on the 4Cs CI business process model as a theoretical foundation.

2.1. Method

2.1.1 Design

The use of the 4Cs CI process model of Weiss (2002) as theoretical framework to investigate CI activities of cricket coaches places this study in the functionalist paradigm for the analysis of social theory (Burrel & Morgan, 1979). This paradigm assumes that scientific theories can be assessed objectively through empirical evidence and that analogies from one domain can be used for the explanation or clarification within another domain (Burrel & Morgan, 1979). This pragmatic perspective aims to provide practical solutions (Burrel & Morgan, 1979). Therefore, this study made use of a CI framework to explain and discuss cricket coaches' CI activities. This exploratory study utilized a predominantly qualitative research method, followed by a quantitative exploration, ultimately followed the partially mixed sequential dominant status design (Leech & Onwuegbuzie, 2009). Data collection was performed through semi-structured interviews with qualitative and quantitative data analyses performed in sequence. The Research Ethics Committee of the institution where the research was conducted approved the study (NWU-00185-15-S1). The cricket governing body, namely Cricket South Africa (CSA), as well as university coaches' direct line managers gave permission for the researcher to contact the coaches.

2.2.2 Study sample.

Purposeful as well as convenient sampling were utilized to include cricket coaches and their support staff such as assistant coaches, performance analysts or sport scientists from university, provincial and professional level teams. The sampling methods were utilized since the researcher aimed to discover and gain insight into coaches' CI related activities (Merriam, 1998). Coaches had to fulfil the following criteria to be included in the study: a coaching experience of at least five years; must have coached at university, provincial or professional level; or have obtained a high level coaching certification from the national governing body. Male and female participants were approached for inclusion with the level of coaching gaining preference, with the minimum level of coaching set as university level. The criteria aimed to include higher level coaches since they are more experienced and use refined coaching practices that better portray CI activities (Cooper *et al.*, 2007). Support staff such as analysts or sport scientists was included in the study if they fulfilled the following criteria: must have obtained a tertiary qualification in the human movement science field or certification in strength and conditioning or applicable sport analysis field and have a minimum of three years' experience in team coaching and sport analysis.

2.2.3 Procedures.

After written and informed consent was obtained, the researcher contacted participants to arrange a date, time and venue for either a face-to-face, telephonic or a Skype interview, depending on what suited the participant. Coaches who agreed to participate and who had support staff such as an assistant coach or analyst were asked if the support staff could also be interviewed. Two professional coaches agreed that their support staff could also be interviewed. The coaches could decide whether they wanted their support staff member to be interviewed simultaneously or separately, in which case one coach opted for a combined interview and the other for a separate interview. Four provincial level coaches who work alongside each other opted for a face-to-face

group interview at their provincial offices. Other interviews were one-on-one, face-to-face interviews, performed at the office of the coach or analyst which was situated at the team grounds, or in a private room within the stadium where some of the coaches' teams were playing away matches at the time of the interview. One interview was performed via Skype and three via the telephone due to distance constraints. The researcher emailed the interview schedule at least two days before the scheduled interview date to participants so that they could familiarise themselves with the proposed questions. At the start of the interview, the interviewer briefly explained the interview objectives to participants and explained that participation was voluntary, anonymous and that the interview would be recorded and used for research purposes. The researcher transcribed the voice-recorded interviews verbatim and emailed the typed version to participants for validation. None of the participants objected to the authenticity and accuracy of transcriptions (Creswell, 1998). Participants also completed a demographic information questionnaire, which was used to collect information on coaches' age, gender, ethnicity, coaching experience, qualifications, successes and teams coached.

2.2.4 Interview schedule.

The interview schedule contained six questions related to the four stages of the 4Cs CI process model (data collection, conversion, communication and countering) as well as two questions associated with CI planning, culture and focus (KITs) (Weiss, 2002). The researcher approached university peers to evaluate the schedule and provide feedback during interviews. In this regard, two colleagues participated in a simultaneous face-to-face interview, one a Skype and another a telephonic interview. After the university peers validated the authenticity and reliability of the verbatim transcribed interview document (Creswell, 2003), a constant comparative method (CCM) was followed as content analysis using the ATLAS.TI™ computer-assisted qualitative data analysis system (Boeije, 2002). Codes were created, indicating similarities or changes which

needed to be made to the schedule. Data saturation was reached when no new codes or categories could be added and the interview schedule was finalized (Creswell, 1998).

2.2.5 Data analysis.

The mixed method approach with a partially mixed sequential dominant status design was used (Leech & Onwuegbuzie, 2009). The first step entailed the analyses of qualitative interview data, where-after data was quantitized and quantitative data exploration performed (Newman *et al.*, 2015; Saldanha & O'Brien, 2013). Data quantitizing consisted of the numerical conversion of qualitative data and involved that a statistician assigned a score of "1" or "0" to each participant and each category (Newman *et al.*, 2015; Sandelowski *et al.*, 2009). Quantitizing was used to determine a phenomenon's intensity, frequency, direction and presence to assess variability and dimensions of a code or category and was used to report results in a precise manner (Newman *et al.*, 2015; Saldanha & O'Brien, 2013).

2.2.5.1 Qualitative analysis.

The qualitative content analysis of the cricket coaches' interviews utilized ATLAS.TI™. Four themes from the CI model and the CI process as whole were identified deductively, providing a foundation for the coding process. Thereafter inductive coding was used by applying the constant comparative method (CCM) (Boeije, 2002). The CCM directed the interview data collection and content analysis process which were performed simultaneously, and is defined as a systematic analysis of similarities and differences across cases or in this instance, interviews (Newman *et al.*, 2015). The CCM allowed the researcher to create data-driven codes by making connections between theory or data driven codes as well as to further test and develop categories (Leech & Onwuegbuzie, 2008a). In addition to the coding process and the application of the CCM, the researcher also conducted content analysis according to the guidelines of DeCuir-

Gunby *et al.* (2011), to create a codebook for interview analysis. A codebook contains a set of codes, definitions and examples to direct interview data analysis (DeCuir-Gunby *et al.*, 2011). Codes are seen as meaning units of information which are specific ideas or views that can function as separate entities (Côté *et al.*, 1993). Data driven codes were created and revised by the researcher together with a colleague as part of the second step in the codebook development process (DeCuir-Gunby *et al.*, 2011). During discussions, the appropriateness, definitions and examples of codes were scrutinised, contributing to the formation of specific codes with precise definitions and examples illustrating the construct fittingly (DeCuir-Gunby *et al.*, 2011). The last step of codebook development involved determining inter- and intra-rater reliability by calculating Cohen's Kappa - a change-corrected measure (Anderson *et al.*, 2001). The primary researcher coded two interviews on separate occasions more than a week apart and obtained a strong inter-rated reliability (Cohen's Kappa = 0.8). The inter-rater reliability for this study was determine to be $\kappa = 0.78$ when a research colleague coded two interviews independently. Although moderate inter-rater reliability was achieved, reliability figures between 0.8 and 0.9 are considered to be indicative of data that is rich in analytical value and allowed researchers to proceed with the content analysis (Campbell *et al.*, 2013). Data saturation was unequivocally reached with 17 participants when no new codes or categories could be added after 4338 meaning units were created within 71 code categories (Guest *et al.*, 2006; Merriam, 2009). According to Creswell (1998), phenomenology studies such as this one could have as little as six participants. Jette *et al.* (2003) also suggested that expertise in a chosen topic could reduce the number of participants and that is why data saturation could be reached with 17 participants.

2.2.5.2 Quantitative analysis.

A tree clustering, single-linkage, 1-Pearson Correlation Coefficient cluster analysis was performed with all indices of the quantitized coded interview data in order to detect clusters of measures that are related to each other (Wilkinson *et al.*, 2009). Linkage distance for detection of different clusters was set at 4 from which five themes emerged. Themes where suitably titled according to the cluster incidence similarities and overarching meanings which were conceptually concatenated into categories.

3.1 Results and discussion

A total of twelve male head coaches, two assistant male coaches and three analysts of which one was a female, satisfied the inclusion criteria and participated in semi-structured interviews. Three coaches had between six and nine years coaching experience; nine coaches between ten to nineteen years; and two coaches more than twenty years' experience. Five coaches obtained the CSA level 2 qualification, four the level 3, and five coaches the highest level 4 qualification. A total of three participants were involved at university level, one being a coach and two being analysts. Two coaches functioned at premier level (the level under the professional level), four at provincial level and six at professional level. One coach and one analyst operated at national level. The majority of participants coached male teams; with two coaches who coached both genders. One participant coached a female team. Two of the analysts had between three to four years' experience with one over ten years' experience. The dendrogram rendered by the single-linkage, 1-Pearson Correlation Coefficient cluster analysis of all indices is presented in Figure 2, whereas a conceptually concatenated schematic representation of the dendrogram in the form of a conceptual framework is presented in Figure 3. The linkage distance for detection of different clusters which was set at 4, rendered five themes.

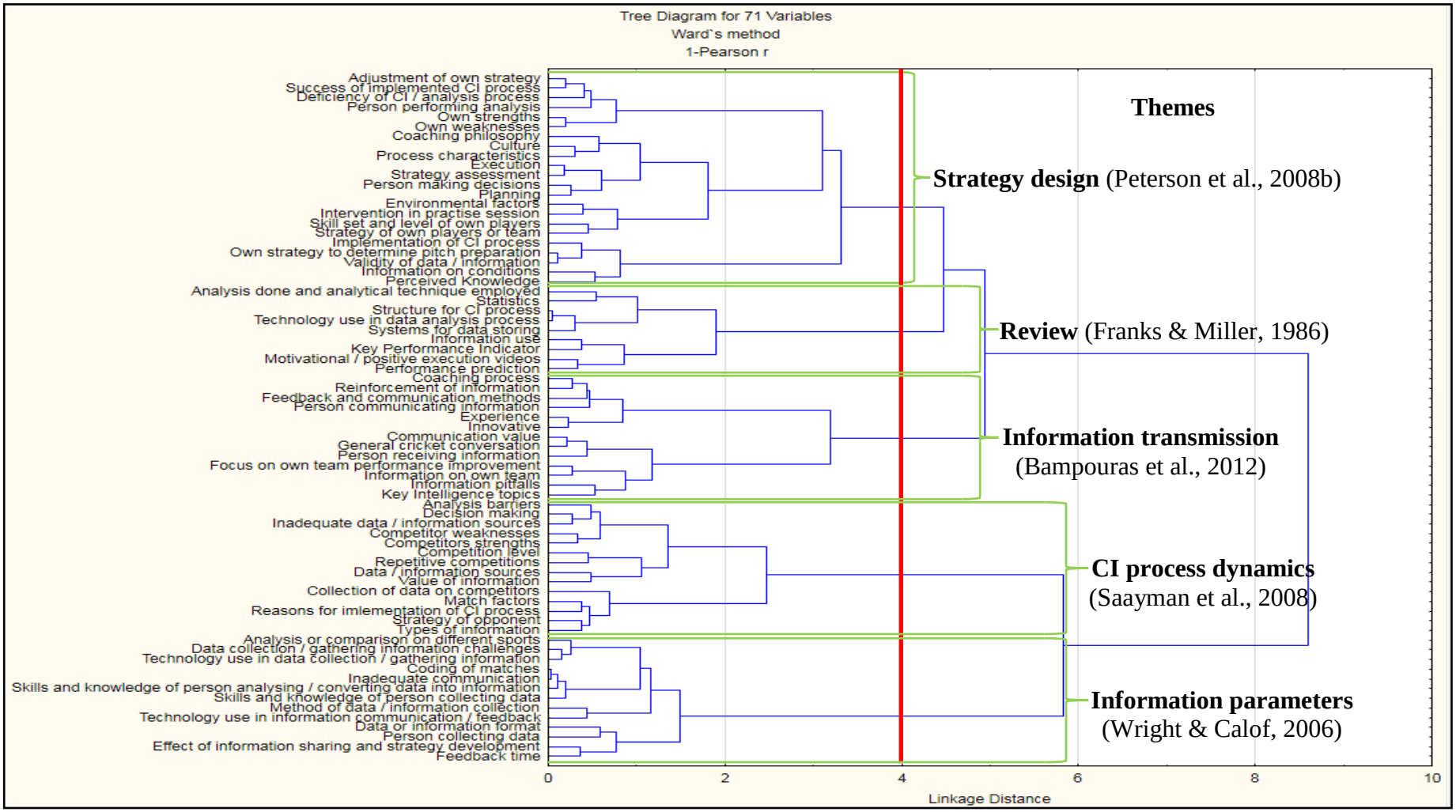


Figure 2: A tree clustering, single-linkage, 1-Pearson Correlation Coefficient cluster analyses dendogram of all quantitized coded interview data indices with conceptually concatenated theme

The five themes were explored for labelling in light of individual and collective meaning, significance and relatedness to CI with the aim to develop new concepts (Cohen *et al.*, 2011:351). The five themes were subjectively labelled to denote the overarching subject through the factual evidence analysis of the codes linked to the specific categories within the theme cluster. Clustered codes were investigated and individually evaluated to move beyond a separable description to the conceptualization of encompassing categories linked to the cluster theme (Cohen *et al.*, 2011:344). The conceptually concatenation of codes and categories through the dendrogram as structure, described the CI phenomena within a cricket coaching context and depict the overarching five CI themes for cricket coaches. The concatenated codes provided categories, each denoted within the five phases within the conceptual CI framework for cricket coaches (Figure 3).

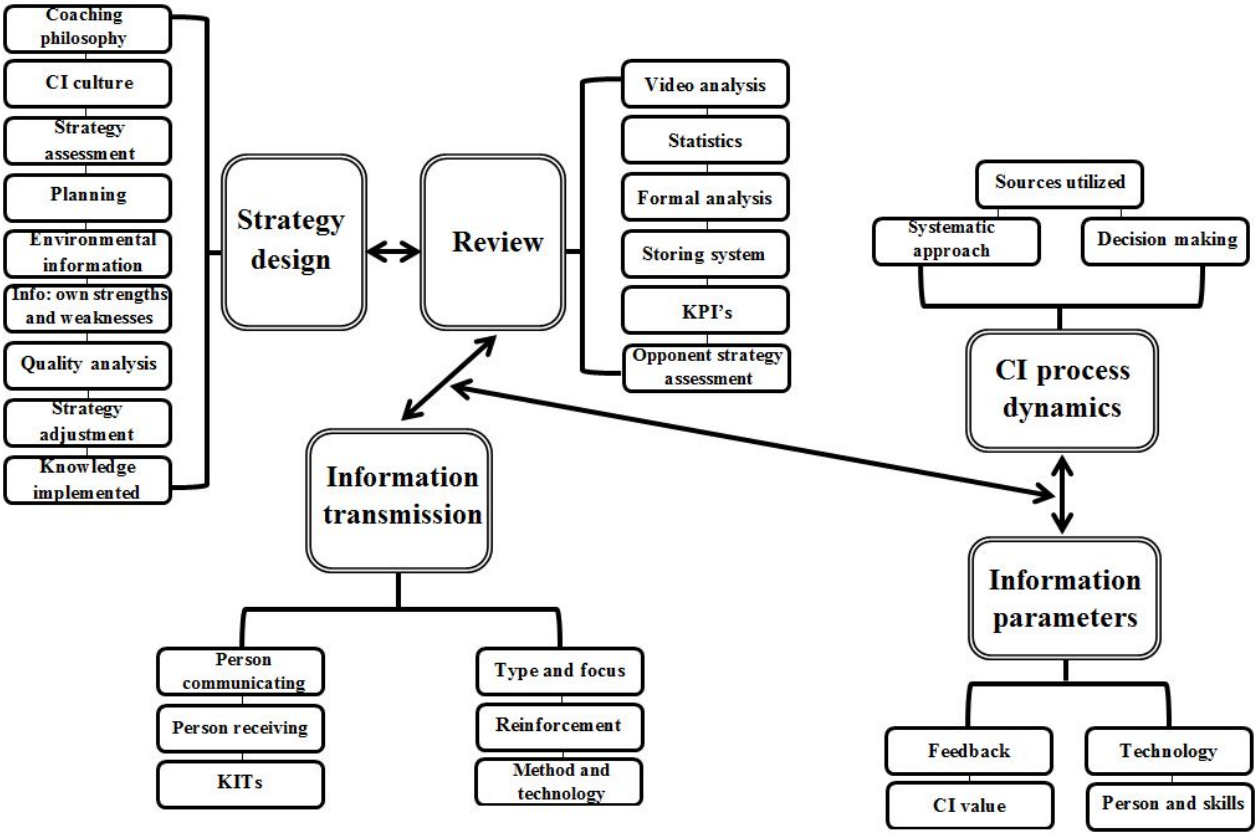


Figure 3: Conceptual competitive intelligence framework for cricket coaches

Themes were titled according to overarching code cluster meanings, which were conceptually concatenated into categories. The five themes that emerged empirically from the different categories were a*) Strategy design, b) Review, c) Information transmission, d) CI process dynamics and e) Information parameters.* The first theme of *Strategy design* relate to aspects and factors that contribute to the intended strategy developed by the coach and include the following categories: i) coaching philosophy, ii) CI culture, iii) strategy assessment, iv) planning, v) environmental information, vi) information on own strengths and weaknesses, vii) quality analysis, viii) strategy adjustment and ix) knowledge implemented. The second theme, namely *Review* describes how the coach appraise information to confirm his strategy design and denotes categories of i) video analysis, ii) statistics, iii) formal analysis, iv) storing system, v) key performance indicators (KPIs) and vi) opponents' strategy assessment. The theme of *Information transmission* refers to the "how" and "what" of information coaches communicate regarding their designed strategy and include categories such as i) person communicating, ii) person receiving information, iii) KITs, iv) type and focus, v) reinforcement and vi) method and technology used. Specific *CI process dynamics* as the fourth theme are characterised by forces, which could stimulate the growth, development or change within the coaches' CI process and refer to factors, which the coach has to manage effectively for successful CI implementation.

These include i) systematic approach, ii) decision-making and iii) sources utilized. The last theme, namely *Information parameters* refers to limitations that coaches experience or perceive which negatively influence the successful implementation of a systematic CI process. Categories within the last-mentioned theme are i) feedback, ii) technology, iii) CI value and iv) person and skills. In the next section each of these themes and subcategories with reference to coaches' quotes will be presented and discussed.

a) Strategy design

In cricket as in any other sport, strategy plays a very important part and great care should be taken when designing a competitive strategy (Petersen *et al.*, 2008b). Within business CI, strategy development is seen as the last stage of the 4Cs CI process (Nasri, 2011b), while cricket coaches' feedback indicate that strategy design is the focus at the start of the coaching process, with nine interrelated categories or elements that directly influence it.

i) Coaching philosophy. *Coaching philosophy* is the foundation of coaching practice and strategy or game plan development (Bennie & O'Connor, 2010). The following quotes by coaches illustrate this finding:

> *I see my cricket players as entertainers, so as an entertainer they should play a brand of cricket, which people want to come and watch* (P14). *We try to empower players to actually do their own analysis. One of the biggest things for me is that, yes results are important, but growing the individual is even more important* (P2).

The coaches' philosophy direct the manner in which they coach and the type of cricket that they encourage players to play. The coaches' philosophy could also among other things, be driven by the belief that gaining competitor information which culminates into the CI culture and is being transferred to the team, is important. Within the business domain, a proactive attitude (philosophy) to address all issues that the organisation may face, should be incorporated into a CI culture (Wright *et al.*, 2012b).

ii) CI culture. The sustainable commitment of business executives and analysts to the principles and practices of CI enhance a CI culture within organisations (Fatti & Du Toit, 2013). Likewise, coaches with a strong belief in the value of PA are inclined to implement it more within their team (Wright *et al.*, 2012a):

We create a culture where the player has to make a plan. If you don't make a plan, you cannot play (P13). *We try to empower players to actually do their own analysis (P2).*

However, literature suggests that players could oppose coaches, who try to instil a CI culture into coaching practice as some players are sceptical of the systematic analysis process (Wright *et al.*, 2012a). Coaches, who struggle to impart their coaching philosophy and CI culture to players may only partially apply CI activities, which within the business domain is a definite barrier to strategy assessment as part of successful CI creation (Wright *et al.*, 2012b).

iii) Strategy assessment. Strategy assessment, planning and strategy adjustment, are three closely related elements. Coaches indicated that the assessment of their strategy execution through analysis of information, is vitally important to facilitate their training and strategy planning and to direct strategy adjustment:

Even if we've done well, I think it is important that the players learn from those performances and if we lost, I believe that you learn a lot. If you lost, then you look deeper into the things that you have done right and the things that you have done wrong (P9).

As within the business domain, coaches' strategy assessment and analysis of failure or success plays an integral part in planning new strategies.

iv) Planning. Coaches, assistant coaches, captains and players are often all involved in the planning of a strategy and look at different variables:

We sort of have a discussion on each player in our meeting and we also use the stats, and then we come to a conclusion in terms of where we are going to bowl to them or what our plans are. We as a collective, the assistant coach and I and the players and the captain, we discuss it as a team. I think it is very important that guys have to buy into the plan (P17). *So there will be various variables that you need to consider as a coach in terms of your planning* (P3).

Numerous role players discuss the opposition and own performance by referring to additional data such as statistics during the planning and preparation. Collective planning, discussions and data can enhance the planning process, however a general lack of effective planning methods and management skills result in poor strategic implementation (Fleisher & Wright, 2010). The business CI provides decision makers with a sound discipline to plan and in this regard, coaches should regard a detailed planning process as a necessity. During coaches' planning, variables such as environmental factors are evaluated for strategy design.

v) Environmental factors. Environmental factors such as the pitch, outfield and weather conditions influence continuous planning, decision-making and strategy adjustment:

> *With cricket I think the biggest factor is the pitch. You have to adapt your game according to the pitch and field you get on the day* (P1). *That is where the conditions and the environment comes in and that is where you have just got to plan a little bit in advance and maybe speak to a few people who you know around there and get the information* (P2).

Organisations need to continuously analyse environmental factors to enable them to react faster to the dynamic and volatile changes that may occur (Rapp *et al.*, 2011). Similarly, coaches constantly collect and monitor information on venues, pitches, weather conditions and the overall competition environment. This information allows them to develop environmental knowledge in order to enhance their strategy design. This continuous focus on information collection and analysis with regard to environmental factors, together with information on own teams' strengths and weakness will allow for effective strategy formation.

vi) Information on own team's strengths and weaknesses. Coaches also consider their own players' strengths and weaknesses and therefore acclaim high quality information and planning for training and preparation purposes:

I would go through each one of my particular weapons that I have at my disposal and we strategize to the extent of team selection (P10). *I do however feel that before you can go that route (of competitor analysis), you need to have gathered all the information on your players. Because I think gathering all the information on competitors often count for naught if your players do not have the right skill set and maturity level* (P8). *We have some videos everywhere.....if maybe our players have some technical flaws, we try and iron them out through video footage, to see where they are going wrong* (P9).

In planning the tactics and strategy for a competition, coaches and players gain self-knowledge on their own strengths and weaknesses, not only to improve the weaknesses, but also to know how to incorporate a strategy whereby their strengths can be utilized in a match to make up for their weaknesses. A proper analysis of own team and players' strengths and weaknesses, as well as on environmental factors should be implemented by making use of high quality technology.

vii) Quality analysis. Coaches indicated that quality analysis and intelligence at the highest competition level provided success in strategy design:

I remember with the national side again we had the advantage of hawk-eye, we were up against Pakistan and player M, and saw that of his last 30 dismissals only 2 were on the stumps. So he only got out LBW or bowled twice out of 30 dismissals, the rest were on 4th or 5th stump actually, which is different to the rest of the batters in the world basically. So there was a good way to strategize so we got him out caught behind twice in that game (P11).

Quality analysis promote better CI practice and it should be an organisations' goal to develop and utilize structures and peoples' skills to attain the best possible analysis output (Fleisher & Wright, 2010). High quality analysis leads to enhanced strategy formation and adjustment.

viii) Strategy adjustment. Failures in businesses are attributed to strategic blunders caused by inadequate CI implementation (Fatti & Du Toit, 2013). Continuous strategy adjustment is therefore a key component within a coach's strategy design. In this regard, a participant coach indicated that he would change his strategy according to new information:

> *So we will use data, we had a generic plan at the start of the match, but when we see that things are going in a certain way, we use the particular data that we have at a particular time to be able to change our plan, so that we are able to counter what is happening* (P3).

Successful strategy adjustment is not only the result of quality analysis, but also of the implementation of coaches' knowledge and experience.

ix) Knowledge implemented. Coaches, just as business managers, gain knowledge on the environment, own and opposition team through experience, which if implemented enhance their strategic decisions and guide the formal analysis (Dave & Mathur, 2014; Greenwood *et al.*, 2014). Coaches are very dependent on their perceived knowledge:

> *Yes, you do really know, if you are going to a pitch you will know this is a slow wicket, you know what the good scores are and you are not going to say ok, we are going to get 400 here, 200 might be enough* (P2). *I think the collective sort of knowledge of players is enough over the years of playing against the opposition to kind of develop a strategy* (P11).

Coaches base their perceived levels of knowledge on repetitive competitions as depicted by the following:

> *So basically you are playing the same teams six or seven times a year, so it is almost repetitive* (P10).

The goal of CI is to create knowledge (Du Toit, 2003). A previous article showed that coaches' informational needs and analysis led to the formation of competitor-, self- and environmental knowledge (Van den Berg *et al.*, 2017b). However, in cases where coaches are

of the opinion that they have enough knowledge regarding competitors, environment and self or own team because of repetitive competitions, they most likely will not continuously utilize numerous sources for information collection or perform a quality analysis. Coaches will then base decisions on their perceived knowledge and a gut feeling, without considering systematically collected and analysed information (Wright *et al.*, 2012a). Experience, either in business or sport coaching is usually seen as a positive commodity which should enhance the persons' managerial ability (Fleisher & Wright, 2010). However, coaches should guard against the negative influence of over perceived tacit knowledge on elements of strategy design. In this regard, business CI literature indicate that coaches should apply CI activities for knowledge creation, since it provides insight on and understanding of "tacit knowledge" (Du Toit, 2003). All nine elements within strategy design are interconnected and influence one another in numerous ways. Although coaches utilize all these elements during strategy design, they also incorporate a review process.

b) Review

The following elements are used during the second stage of the cricket CI framework (the review process): *video analysis*, *statistics*, *formal analysis*, *storing systems*, *KPIs* and *opponent strategy assessment*. Each of these elements are discussed by referring to coaches' quotes.

i) Video analysis. Coaches referred to the use of video analysis of own team and opponents to identify strengths and weaknesses:

> *It is quite important for us as coaches because every game that we play we get the info of the competitors and we are quite lucky since every game that we play in South Africa is recorded. So all the information that we need on certain players, are coming through, maybe of a player that you have not seen much of. You can always go to Cricket South*

Africa just to get the video footage of a certain player and then see his weaknesses, or then his strengths (P9).

Coaches can recall only thirty to fifty per cent of key performance events and therefore need video analysis as a means to enhance their player performances and matches analysis (Franks & Miller, 1986). Video footage plays an integral part in sport PA and in coaches' review process to assess strengths and weaknesses of own and opposition team players. On the other hand, coaches should also use various forms of data to review their strategy of which statistics is one.

ii) Statistics. Compiled and internet published statistics are used by coaches and analysts:

We will get pre-match statistics of the ground from the internet and *we have got stats on each player* (P15). *We go onto ESPN Crick info, and each player has stats in terms of how many runs they have scored, what their last 4 or 5 innings are, and then we look at that and we would say, this guy is batting well, and then we look because it also shows you how they got out* (P17).

Statistics and video analysis play a major role to devise cricket competitive match strategies (Moore *et al.*, 2012). These two elements should be combined to produce a formal analysis.

iii) Formal analysis. Formal analysis methods were also indicated:

We (analysts) usually do a SWOT analysis so we look at his key aspects, his weaknesses, opportunities where we can get him out, and then we sit with the players and look at game plans and how we will approach bowling to the player (P15).

High level coaches spend up to three hours reviewing performance analysis data such as video clips, match reports and match statistics (Wright *et al.*, 2012a). A formal analysis such as a SWOT analysis on competitors, provide coaches with a comprehensive understanding of the

opposition to base own strategic decisions on. The analysis is considered to be the most important part of the intelligence process and various analytical techniques, tools and models are utilized within the business CI domain to achieve a comprehensive and formal analysis (Nasri, 2011a). Coaches should not only do formal analyses through the use of video material or statistical results, but should also invest in suitable storing systems to keep valuable intelligence safe.

iv) Storing system. Most coaches within the study did not set up or maintain their own storing system to safe coded video footage or statistics. At national and professional cricket level, the national governing body has centralised video analysts and databases that coaches can call upon for data:

> *CSA has centralized analysts which record and code all professional level matches and then they sore the video analysis – but at our level we do not have that* (P13).

For the professional level coaches it is more important how often they access these databases. Additionally, coaches should set-up their own storing systems to store information gained from the centralised analyst and to add more data of their own to it. In this manner, previously analysed and shared information together with newly collected data can be incorporated and easily accessed, shared and utilized for review purposes. Coaches very often also collect KPIs from and store cricket KPIs on storing systems.

v) Key performance indicators (KPIs). Elite coaches primarily review information by making use of KPIs and in cricket these are divided into two categories, namely batting and bowling:

> *For batsmen you would mostly look at dismissals and the first 20 balls he faces, while with bowlers you will look at type of deliveries, stock ball or slower balls and bouncers that he bowls* (P15). *We look at the runs they scored* (P17*), averages, strike rate, how many fours*

he hit in the season, how many sixes, wickets taken by bowlers (P1). *For bowlers you also look at the areas and line they bowl and batsmen you can calculate their impact factor* (P15).

KPIs as measurable pieces of information play an important role in PA and the coaches' review process. A previous article classified KPIs into key player KITs, as it provides knowledge on the opposition. However, loose standing or informally linked KPIs cannot be used to devise a strategy but can be incorporated into the coaches' review process of for example opponent strategy assessment.

vi) Opponent strategy assessment. Coaches also assess opponent strategy since the oppositions' style of play often necessitate an effective, opposing style to be formulated and adopted:

Where you analyse players in terms of how they go about scoring their runs, you can see a lot of singles early on and boundaries come later, or does the player go for boundaries early? So you sort of know how to set your fields accordingly (P4).

Business managers realize that if competitor actions and strategies are not monitored effectively, their strategic plans would fail (Du Toit, 2003). Likewise, coaches should focus on constant opponent strategy assessment. The elements of the review process are also connected to the strategy design stage and will therefore add to the development or enhancement of stage elements. Therefore, it is imperative that coaches fully immerse themselves in a comprehensive review process whereby video and statistical analysis with opponent focused KPIs are used to achieve a formal analysis. The analysis must include opponent strategy assessment and must be stored in a suitable database. Not only should this information be stored but created intelligence should be transmitted to suitable stakeholders.

c) Information transmission

Information transmission is a continuous collaboration process between performance analysts, coaches and athletes (Bampouras *et al.*, 2012). A discussion of the information transmission elements follows.

i) Person communicating. Coaches are primarily responsible for information communication, although in specific instances and at the highest level, the analyst would also communicate information to players:

> *And when I was at Worcestershire, during the game, when you were batting and you were dismissed and got off the field, the analyst would sit with you and show you, this is where you scored your runs, this is where you were struggling, this is where you got more dot balls*...(P1). *After that game, I'll (head coach) just add one or two things about what has happened and the analyst runs the team talk on opposition for the next game* (P2).

In many instances the coach acts as a gatekeeper and sifts the information that is communicated to players. However, coaches should guard against losing information and facilitate a constant flow of focused and timely intelligence through feedback from either himself, assistant coach or analyst. Information transmission is mainly directed at players as persons receiving information.

ii) Person receiving. The players, which include the captain, are the primary receivers of information:

> *The key people you communicate it with are your captain, and there has to be buy-in from him* (P8). *And a few days out we will have a team meeting and we sit the team down and say, what we are looking to do here* ....(P11). *So basically what you first do is you start telling your players, these are the sort of conditions you are going to get....* (P17).

This constant flow of information between the persons giving and receiving information would also ensure that KITs are addressed and communicated.

iii) Key intelligence topics (KITs). KITs are related to the business CI process and the term is not used within the sport domain. In a previous article, coaches identified KITs that could be categorised as key player type KITs, since KPIs, as customary sport performance measures were classified within this category. Since coaches need to obtain and process a variety of key informational aspects to devise a strategy, it is essential that coaches identify and communicate their KITs (Lemmer, 2013). The following quotes highlight the KITs that coaches identified:

> *What I want on opposition is about their character....where can I find the soft areas. And then you will also try and gather information on like the brand of cricket they play and then implement it like that and try and execute with your skills* (P8). *So you have to look at the different conditions in different venues that you play around the country because we obviously play all over the country and it influence your own strategy* (P17*)*

Different type of KITs were identified from coaches' feedback, however, in the cricket CI framework, coaches incorporate KITs into the information transmission stage, whereas the business 4Cs process model includes KITs during the first stage. KITs identification drives the business CI process, however, even though cricket coaches' KITs were identified, the use of this term and identification thereof as part of a CI process, is a new concept within coaching practices. Likewise, the identification of KITs at the onset of the current coaching process will not be evident within the sport domain as is the case within the business CI process. Coaches use KITs without the prior knowledge of the definition and appropriate context function thereof. The coaches' KIT communication is still essential and is linked to the review stage, which will influence its related elements. Likewise, the review stage is linked to the strategy design stage, and therefore elements from the information transmission stage would also indirectly influence

certain elements within the strategy design stage. In this regard KITs influence information on environmental factors, own strengths and weaknesses as well as quality analysis aimed at own strategy adjustment and opposition strategy assessment. KITs as part of the transmission stage are relayed through the review process to the strategy design stage. Coaches are continuously planning, assessing and adjusting their strategy (as elements in the strategy design stage) according to the underlying KITs. Not only should coaches communicate their KITs, but also focus on the type and focus of their information transmission.

iv) Type and focus. Coaches primarily use video footage as feedback with the focus of motivating players through the repetitive viewing of their good performances. Additionally, players also receive feedback on opponents' weaknesses as well as their own negative performances. This information is used to guide future training sessions aimed at improving weaknesses. Literature posits that opposition tactics, strengths and weakness are also communicated for analysis purposes (O'Donoghue, 2006), as was the case within this study:

> *We mainly use the visual because, we found that with players, to have the video on the competitors – show their weaknesses. And then we always finish a video session with our own batting and bowling. So we always finish with positive and always our own good shots, the boundary shots, were the guys hit sixes or fours. So we always left the room with a positive reinforcement that we know what we are doing* (P2). *So also then I will be looking at my own guys' videos, and see ok, maybe there is a technical problem he has, and then we can actually come back and have a look at it. Then I will take them to the nets and obviously work on that problem* (P17).

The different types and focus of information transmission also serve to reinforce important information.

v) Reinforcement. During information transmission, coaches use reinforcement since players seem to neglect the generated intelligence if they are not reminded of it:

> *Where we could just reinforce the message out to the bowler, and say listen, remember our plans, we don't want to bowl short at this guy, pitch the ball up and it worked for us* (P2). *You put somebody in charge that can always remind everybody on the field, because you play over a long period, so somebody must remind everyone* (P6).

One of the primary reasons for CI failure can be attributed to communication problems (Fleisher & Wright, 2010). Coaches' tendency to reinforce specific information is a positive factor, which could limit the negative influences of common miscommunication and information transmission failures. Coaches should look to incorporate various methods to reinforce information and technology for transmission.

vi) Method and technology. Elite coaches in this study adopt technology use for information transmission and use a variety of methods through cloud computing, the internet and social media:

> *Because for that competition week we have two types of video feedback sessions that we do, we will give a post-match feedback session and match preparation video session* (P7). *For the overseas tournament we had 7 Samsung tablets with all the information downloaded and gave it to the players on the hour bus trip from the grounds to the hotel and they could go through the stuff.* (P11).

Video feedback augments numerous informational aspects (Wright *et al.*, 2012a). Two coaches made use of video feedback sessions and tablets for information transmission. However, all coaches should use differentiated methods and use technology in innovative ways. Within the business CI domain, a systematic and formalized communication system is necessary for successful CI implementation and creation (Franco *et al.*, 2011). Likewise,

cricket coaches should invest in technology to transmit information in different ways and reinforce different types of information through the incorporation of their KITs. Persons who receive and give the information play a vital role in the information transmission process, and all six elements are interconnected and fed into the review process. However, two major themes could influence the information transmission feed into the review process namely information parameters and CI process dynamics.

d) CI process dynamics

A sound CI implementation process develops good intelligence which aids in the strategic functioning of organisations (Fleisher & Wright, 2010). Features such as the resources employed, sources utilized and organization characteristics influence CI strategic functioning (Saayman *et al.*, 2008). The cricket CI framework identified certain CI process dynamics which coaches need to manage and include elements such as sources utilized, systematic approach and decision-making.

i) Sources utilized. In this regard, coaches use various sources to draw information from:

> *The analyst will perform a video analysis of the match and put it on the database, and when a coach needs it the analyst could retrieve it and give it to him* (P17). *We go onto ESPN Crick info, and each player has stats* (P17*). Basically what we did is we tried to create a database, so obviously on day one we tried to get as many games and code them then and there as much as possible, and then day two, day three, day four, and what we would do is we would start putting databases together of each specific batsmen and bowler, so that we could then find trends or a pattern in their play* (P7). *You look at their scorecards and if I pick up any trend there* (P2). *Yes there is a lot of information going around, like if you look on Facebook, look on Twitter* (P9).

Collectively, coaches identified and utilized numerous sources of information. A wide array of sources for information collection are available to cricket coaches and can be used in coaches' education programmes, as part of the encompassing cricket coaches' CI framework. Training in the utilization of numerous data sources will enhance a systematic approach to CI creation as well as decision-making, which are the other two elements within the CI process dynamics theme.

ii) Systematic approach. CI is the cornerstone of effective and efficient strategy formulation and organisations should follow a systematic approach to foster the benefits created through it (Franco *et al.*, 2011). In this regard, one analyst referred to structures that were put in place to facilitate the CI process:

> *Because we have structures in place and do things in a specific manner, it works well — it is actually interesting how well it works* (P15).

The analyst referred to the centralised analysis system which is functioning well. However, only one other coach apart from the analyst referred to a systematic approach of data gathering and analysis:

> *We took video analysts with us to the week-long tournament. But they can't be with us full time, they are available for our main tournament only. So we were the only team that did that, a lot of the other teams started doing that in the second year. They then started using video analysis. They saw what we were doing and they tried to catch up. We tried to do two match video recordings of each opposition, and then have the visual, the feedback to the team. Obviously the two people who did it is very professional, they know what they are doing, so it was quite quick to get the feedback back to the players* (P2).

The periodic application of a systematic approach brought the coach and team success, so much so that other teams incorporated the same analytical activities during the competition of

the following year. However, if coaches want to sustain CI creation throughout the whole season, CI cannot only be applied during certain time periods as sustainable systems are needed for effective decision-making.

iii) Decision-making. The following quotes indicate that coaches base their decisions on different types of information:

> *I feel that if you receive the correct analysis and information, even during a match, that you will be able to make decisions faster* (P14). *That was more really the coach's job. He was the one to make the decisions. I feel he started to select his team or make decisions more through trial and error* (P1). *....you have to look at something specific like the weather....because when we go down to the coast it is probably going to be a slower pitch, so we want information to know how many of our spinners should go* (P2).

Coaches, just as business managers make numerous decisions which according to researchers should be based on very specific information and intelligence created through a process (Lorains *et al.*, 2013; Wright *et al.*, 2012a). Coaches' quotations indicate the importance of information on aspects such as weather conditions for decision-making purposes. Literature shows that numerous factors influence decision-making; however, it is more important that an organised and systematic process is needed to govern decision-making (Wright *et al.*, 2012b). A systematic process for CI creation will counter the trial and error method that is currently being used by coaches to make decisions. Decisions, which are the result of a systematic approach that utilized different sources, are linked to information parameters.

e) Information parameters

Business managers just as coaches, are faced with information parameters (Wright & Calof, 2006). Challenging elements for cricket coach CI implementation includes: feedback, technology and personnel and skills.

i) Feedback. Factors such as the time that it takes to complete an analysis and the timing of feedback provision are immensely important in sport (Bampouras *et al.*, 2012). In this regard the following feedback was obtained from coaches:

> *So then we get the footage at the end of the game and then depending on the gap between the games and if a player has done well or badly, how much of that we actually use. Sometimes we are playing a game on a Friday and we are traveling on a Saturday and playing on a Sunday, so there isn't really actually time to sit down and go through it and say this is what happened* (P10).

Coaches' feedback relies on technology and time available, which seem to be two factors that hamper the feedback process. Feedback on match performance needs to take place close to match completion to be effective (Wright *et al.*, 2012a). However, very little is known about the feedback processes that coaches follow and whether feedback is provided in a systematic manner (Wright *et al.*, 2012a). Literature suggests that the majority of coaches use video footage for feedback (Wright *et al.*, 2012a). Consequently, technology is needed by coaches to provide detailed and timely feedback to their players.

ii) Technology. Even though coaches adopt technology in their coaching practice, inadequate funds and limited technology resources can hamper the CI process implementation:

> *I think the resources are different at different levels, CSA has resources that are more superior to what we have, and so at lower levels it just gets less and less* (P12). *Gathering*

information about competitors ...you can't really because there are no videos on the other teams. The technology is just too expensive...and you have to have a full time person (P1).

Above-mentioned quotations indicate that inadequate funds for technology seriously limit collecting and analysing data effectively. Technology plays a crucial role within sport PA and the successful coaching process (Wright *et al.*, 2012a). The inclusion of technology in both the information parameters and the information transmission stage, indicate the importance and influence of technology for cricket CI. Nevertheless, coaches will only make an attempt to overcome limitations of technology unavailability and feedback if they value CI.

iii) CI value. Coaches who value the benefit of deriving information, strive to gain more intelligence which facilitate and stimulate the adoption of CI processes:

And we analysed opposition and we saw who their main bowlers were, so we targeted different players from a batting perspective, bowling, everything. So for me the information on competitors is vital (P2). *I think it is naturally important. If you want to prepare specifically, you need specific information* (P17). *For me personally, I'd like to be the most prepared in terms of the information that I get on my opposition and also the venue that we are playing on* (P16). *You must spend time analysing the opposition, but not the majority or too much time* (P11).

Previous studies indicated that 46% of coaches felt that PA and the services of an analyst were essential, while 36% of coaches felt that their organisations valued the role of match and technique analysis as important (Wright *et al.*, 2012a). With varying degrees of value attached to CI, it is evident that a coach who does not value CI, will not address the other information parameters such as feedback, technology or person and skills.

iv) Person and skills. The person collecting and analysing the information needs specific skills, and at elite level sports should employ a variety of analytical techniques:

> *The two people who did the analysis is very professional, they know what they are doing* (P2). *A person with a background in cricket is better because he can learn the in house system quicker* (P15). *I have an Honours degree in Sport Science and I do all their team and player analysis* (P7). *So for instance in the national team there is an analyst who has a strong background staff in another country who analyses a lot of games and provides a lot of information to provide a point of cutting edge advantage. We had an analyst as part of the set-up, but not to that degree. To go in depth as for the national side would be ideal* (P11).

The collaboration between an analyst and coach is instrumental for successful PA and coaching practices (Bampouras *et al.*, 2012). Cricket coaches at university and provincial level prefer the services of highly skilled and trained analysts, as is the case for professional and national level teams. However, the financial burden of appointing a skilled analyst prevents lower level coaches from doing so. To overcome this limitation, coaches should endeavour to develop and implement other methods that will allow them to incorporate easy accessible or own-generated information on a continuous basis. This links to the sources' utilized element within the CI dynamics stage, which indicates the overall link between the CI process dynamics and information parameters themes. The interaction between these two themes shows that elements from the information parameters theme could influence the elements within the CI process dynamics theme. When CI is not valued, with inadequate technology and unskilled persons unable to utilize different sources (as part of the CI process dynamics), it will influence the interconnected review and information transmission stages, and indirectly the strategy design stage negatively.

4.1 Conclusions

The aim of this study was to develop a conceptual CI framework for cricket coaches by using the business domain 4Cs CI process model of Weiss (2002) as a theoretical framework. Results from interview data suggest that some elements of the CI framework for cricket coaches (CIFC) are similar to the elements of the business 4Cs CI model of Weiss (2002). However, differences related to sport specific elements such as KPIs, coaching philosophy, video analysis and an emphasis on technology use within the CIFC are also evident. Furthermore, the 4Cs CI model consists of four definite sequential stages, each with its own sub-stages, specific elements and activities assigned to it, whereas the cricket CI framework (CIFC) consists of five different themes, which may not be entirely sequential but interrelated. The five themes of the CIFC were developed through the quantitative cluster analysis of the quantitized qualitative coded data, whereby individual codes were scrutinized according to its linkage and relatedness with other clustered codes. The clustered codes were conceptually concatenated to form categories, which were labelled according to the overall meaning of the clustered codes. The categories were linked through the cluster analysis to the overarching theme as the linkage distance was set at four.

The most prominent difference between the two CI models would seem to reside around the strategy development. Within the 4Cs process model, decision-making and strategy development reside within the fourth and last stage of countering, whereas results suggest that strategy design is the prominent starting point theme in CIFC. The review, information transmission, CI process dynamics and information parameters stages are interconnected to, and influence the strategy design, and therefore the process CIFC ends with strategy design just as the CI 4Cs model does. On the other hand, the CIFC displays more two-way interactions between different themes and elements, which causes continuous interdependence. Not only are the five themes of strategy

design, review, information transmission, CI process dynamics and information parameters interdependent, but the different elements within each theme are also interconnected. The linkage of stage elements indicates that these elements should be addressed for that specific theme to successfully add to the overall CI process in creating intelligence. This also implies that an inadequately addressed element within one theme potentially could not only negatively impact that theme's development, but also other interdependent themes. This is also true for the 4Cs CI model as some stages and elements of stages are also interdependent. Likewise, an element within the 4Cs CI model which is inadequately incorporated into the CI process will also result in failed attempts to create intelligence. Just as business managers should address the all-encompassing CI process with all its elements, coaches should focus on understanding and utilizing all elements and themes within the CIFC. This is needed since all themes and elements work together to develop a sound strategy, based on comprehensive information gathered from different sources, which was adequately analysed and transmitted while overcoming specific parameters.

The CIFC is therefore a comprehensive framework that addresses numerous and influential elements and themes that coaches could employ to gain a competitive advantage. Coaches' education programmes can make use of the newly developed CI framework across different levels of coaching, to assist coaches in developing and implementing an effective CI process.

5.1 Future research

While the establishment of a cricket CI framework will enhance the coaching practice through the systematic collection and analysis of information, researchers should also endeavour to develop tools to measure and evaluate best CI practices in a sport context. The development of a

CI survey for cricket coaches could fulfil such a need and open up a niche research area within the sport domain.

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CHAPTER 7



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ARTICLE 5

THE DEVELOPMENT OF A COMPETITIVE INTELLIGENCE SURVEY FOR CRICKET COACHES



This article was submitted to *Sport Management Review* and is currently under review.

The development of a competitive intelligence survey for cricket coaches

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Abstract

Sport coaches collect, analyse and communicate data and information on their own team, the opposition and relating environmental factors in order to gain a competitive advantage. This process is known as competitive intelligence (CI), however, little is known about how coaches follow this process. Therefore, the aim of this study was to create a CI survey for cricket coaches. Semi-structured interviews with high-level cricket coaches were performed, followed by a constant comparative qualitative method of data analysis with ATLAS.TI™ software. Theory and data driven interview codes and categories were quantitized into numerical values. A cluster analysis concatenated the codes into five conceptual themes, each with sub categories. Through the qualitative and quantitative exploration, a conceptual CI framework for cricket coaches was developed. A CI survey emerged from the CI framework themes of strategy design, review, information transmission, CI process dynamics and information parameters as subscales. Subject experts confirmed the content and face validity, as well as preliminary factorial validity of items, resulting in a new CI survey measurement instrument for cricket coaches.

Keywords: competitive intelligence, survey development, cricket coaches

1. Introduction

Cricket coaches obtain competitive intelligence (CI) through collection and analysis of information on their competitors and the environment for decision making (Teo & Choo, 2001). Knowledge gained through data collection and analysis enables coaches to adapt and devise a suitable counter-strategy, enhancing their competitiveness and chances of success (Nasri, 2011b). For competitor and environmental knowledge to achieve any strategic value, CI should be created through a structured and systematic process (Wright *et al.*, 2012b). In the business domain CI process models are available that govern the CI process. However, no such models exist for the sport domain. Researchers suggest that a domain-specific phenomenon can be transferred to another domain's research question to assist in determining the underlying principles and variables (Turocy, 2002). Therefore, the CI process model of Weiss (2002) was chosen to be applied as theoretical framework to investigate the occurrence of knowledge creation and strategy design by sport coaches. In this regard, a CI framework for cricket coaches was developed and discussed. (Van den Berg *et al.*, 2017a). This article forms part of a larger study and builds on the developed CI framework for cricket coaches.

Although the above-mentioned model may provide coaches and sport practitioners with guidelines to plan, design and apply a CI process, CI process-related activities that are executed during the coaching process need to be evaluated to determine the effectiveness of this process. Therefore, a need exists to develop a suitable CI measurement instrument or survey that cricket coaches can use to evaluate their CI process activities. Research provides specific guidelines and steps to guide researchers in the undertaking of developing a survey to measure an unexplored construct such as CI within the sport domain (Burton & Mazerolle, 2011; Gehlbach & Brinkworth, 2011). Therefore, this study followed the five step process of Gehlbach and Brinkworth (2011) to create a survey. The five steps include i) a literature

review, ii) the use of focus group interviews, iii) synthesis of findings into a comprehensive list, iv) the development of items, and v) expert reviews before executing a pilot study (Gehlbach & Brinkworth, 2011). This approach relies on diverse techniques and, among other things, consultation with experts in the field to assist in item development and validity determination at the onset of survey creation (Gehlbach & Brinkworth, 2011). In view of this background, the aim of this study was to follow the proposed steps to create a CI survey for cricket coaches.

2.1 Literature review

In the first step of survey development researchers explored relevant literature through a systematic literature review (SLR) of the business CI and sport related performance analysis (PA) domains (Van den Berg *et al.*, 2017c). The SLR allowed researchers to identify substantial similarities and specific differences between the business CI and sport PA domains as well as overarching constructs (Van den Berg *et al.*, 2017c) (Table 1). The SLR also allowed researchers to examine pre-existing CI scales within the business domain, which aided in defining constructs and their definitions for development of the sport-related CI survey (Burton & Mazerolle, 2011; Gehlbach & Brinkworth, 2011).

Table 1: CI and PA identified constructs

No	Construct	Definition
1	Data collection	The process of gathering key data on a variety of competitor and environmental aspects from numerous sources and in different formats by a specific person
2	Data conversion	The activity of giving data meaning: a process of formal analysis
3	Information communication	The process and method of conveying or transferring information between stakeholders
4	Information countering	The process of decision making and strategic thinking, planning and action, following the process of data collection and conversion aimed at obtaining a competitive advantage
5	CI process	The step-wise process incorporating data collection, conversion, communication and countering, as well as additional factors which influence a competitive advantage

A strong understanding of the CI literature and its applicability to sport coaching, the existing CI surveys and the research question (Burton & Mazerolle, 2011), led to the employment of a mixed method research design (Leech & Onwuegbuzie, 2009). Firstly, a dominant qualitative data analysis in the form of interviews was performed after which data were quantitized (Saldanha & O'Brien, 2013), and a quantitative exploration of data followed (Newman *et al.*, 2015).

2.2 Focus group and interview data

For the exploratory qualitative data analysis, researchers turned their attention to the population of interest - this is a deviation from most traditional survey construction processes (Gehlbach & Brinkworth, 2011). In this regard, researchers aimed to match conceptualized SLR CI constructs to the sport domain, examining the terminology and application through research (Gehlbach & Brinkworth, 2011). Researchers compiled open-ended questions for semi-structured interviews with cricket coaches (Henning *et al.*, 2004). Semi-structured interviews allowed researchers to obtain in-depth and a wide scope of data as well as to

organise specific constructs (De Vos *et al.*, 2005). Four questions related to the four stages of data collection, conversion, communication and countering from the 4Cs CI process model were generated, as well as two additional questions related to the CI culture and focus of key intelligence topics (KITs) that coaches deemed important (Weiss, 2002). These questions adhered to the constructs identified through the SLR (step 1) as suggested by Turocy (2002).

However, researchers suggest that questions should be judged by experts to review the interview schedule for clarity, make recommendations and bring about changes (Burton & Mazerolle, 2011). To adhere to these suggestions, experienced intra-university research peers in the field of sport science and management were approached to participate in interviews regarding the proposed interview schedule. Two face-to-face, a Skype™ and a telephonic interview were conducted whereafter the voice recorded interviews were transcribed verbatim and validated by research peers for correctness (Creswell, 2003). Documents were transferred to ATLAS.TI™, a computer assisted qualitative data analysis system. The constant comparative method (CCM) was followed during the creatio of codes and categories, making changes and additions to the schedule (Boeije, 2002). Data saturation was achieved when no more new codes or categories emerged during the CCM and the interview schedule was finalized (Creswell, 1998; Guest *et al.*, 2006). The confirmed interview schedule was used to conduct semi-structured interviews with the main study sample of cricket coaches and support staff.

2.2.1 Study sample

Cricket coaches with more than five years of coaching experience at university, provincial, professional and national level, and/or with the national governing body's coaching qualifications were approached for inclusion in the study. Ethical procedures for informed

consent and participation, as stipulated by Declaration of Helsinki regulations, were adhered to during the sampling and research process (World Medical Association, 2013). The use of purposeful sampling in this instance was deemed to be appropriate to gain insight into the specific occurrence of CI-related activities of cricket coaches (Merriam, 1988). Coaches who consented to participate were asked if they had support staff involved with the team (assistant coaches, performance analysts or sport scientists) with at least three years' experience, or a tertiary qualification in the human movement science or sport analysis field, to also participate. Therefore, the use of snowball sampling added two assistant coaches and three analysts to the sample (Merriam, 1998).

2.2.2 Data collection

The principal researcher conducted either face-to-face, Skype or telephonic interviews with the coaches and support staff according to their preferences. Face-to-face interviews were conducted at the coaches' team stadium or the opposition stadium where their teams were stationed or busy with competitions. The researcher emailed the interview schedule to participants two days ahead of the agreed upon interview date so that they could familiarise themselves with the questions. At the start of the interview, the researcher briefly explained the study objectives, indicated that participation was voluntary, anonymous and that the interview would be voice recorded for research purposes, since this was performed during the informed consent process as well. The researcher transcribed voice recorded interviews verbatim and emailed it to participants for validation purposes. None of the participants objected to the authenticity and accuracy of the transcriptions which enhanced data validation (Creswell, 2003). Participants also completed a demographic information questionnaire regarding age, gender, ethnicity, coaching experience, qualifications, successes and teams coached.

Sixteen males and one female participated in this study of whom twelve were head coaches, two assistant coaches and three analysts. Nine of the fourteen participant coaches had between ten and nineteen years' experience, three coaches between six to nine years, and two coaches more than twenty years' experience. Five participants had a level 2, four participants a level 3 and five participants a level 4 coaching qualification respectively. Two of the participants were involved at national, six on franchise or domestic professional, four at provincial, two at premier and three at university level. One coach was involved with a female team, one with both women and men's teams and the rest coached male cricket teams. Between the three analysts, two had between three to four years' experience on university level and one more than ten years at international level.

2.2.3 Qualitative data analysis.

Identified CI and PA constructs were used as the five deductive created themes which provided a framework for the data analysis. The CCM allowed for a systematic analysis of similarities and differences between interview data sets through the connection of theory and data driven codes to develop new categories (Leech & Onwuegbuzie, 2008b). Codes and categories were grouped as deductively identified themes. Researchers also followed the content analysis process proposed by DeCuir-Gunby *et al.* (2011) in creating a codebook to direct the coding process during the CCM. A codebook contains codes, related definitions and an example of each code which directs the analysis process (DeCuir-Gunby *et al.*, 2011). A code was defined as a meaning unit, which can also be viewed as a separate entity of meaning (Côté *et al.*, 1993). The researcher, together with a skilled colleague, created and revised data driven codes within the context of the data, referring to the code definition and examples (DeCuir-Gunby *et al.*, 2011). Intra- and inter-rater content analysis reliability was established through the calculation of Cohen's Kappa - a change-corrected measure

(Anderson *et al.*, 2001). The primary researcher coded two interviews on separate occasions more than a week apart and obtained a strong inter-rater reliability (Cohen's Kappa = 0.79). The inter-rater reliability for this study was found to be $\kappa = 0.78$ when a research colleague coded two interviews independently. The moderate inter-rater reliability achieved could be ascribed to the lower expertise on CI of the research colleague. However, due to the fact that reliability of between the 0.8 and 0.9 range is considered to be rich in analytical value, researchers proceeded with the content analysis (Campbell *et al.*, 2013). Although no new codes could be created after fifteen interviews, the researcher performed two more interviews and subsequent content analysis to unequivocally reach data saturation (Guest *et al.*, 2006). However, studies of this nature use as few as six participants (Creswell, 1998; Jette *et al.*, 2003).

2.3 Synthesis of literature and interview data

The third step in the survey development process endeavoured to merge literature and theory with empirical construct evidence to aid researchers in developing a comprehensive list of indicators for item development (Gehlbach & Brinkworth, 2011). In this regard, the quantitized interview data were quantitatively analysed.

2.3.1 Quantitative data analysis

The theory and data driven coded interview data were quantitized to achieve numerical conversion of the qualitative data by dichotomizing themes and counting qualitative codes (Saldanha & O'Brien, 2013). The statistical analysis of themes and codes counting holds valuable information for exploration within mixed method research (Collingridge, 2013). Therefore, a single-linkage, 1-Person correlation coefficient cluster analysis were performed with the quantitized data (Wilkinson *et al.*, 2009). Results of this analysis is presented by the

dendrogram in Figure 1. The linkage distance to detect clusters was set at four which rendered five themes.

The themes were titled according to conceptually concatenated categories which were created from cluster incidence similarities and their constituent value towards the overarching category. The cluster incidence similarities were categorised by referring to the vocabulary of participants (Gehlbach & Brinkworth, 2011) and placed under each corresponding theme within the dendrogram structure. The five themes and their definitions as well as conceptual categories which emerged are provided in Table 2. The five themes indicating the CI process followed by cricket coaches are strategy design, review, information transmission, CI process dynamics and information parameters.

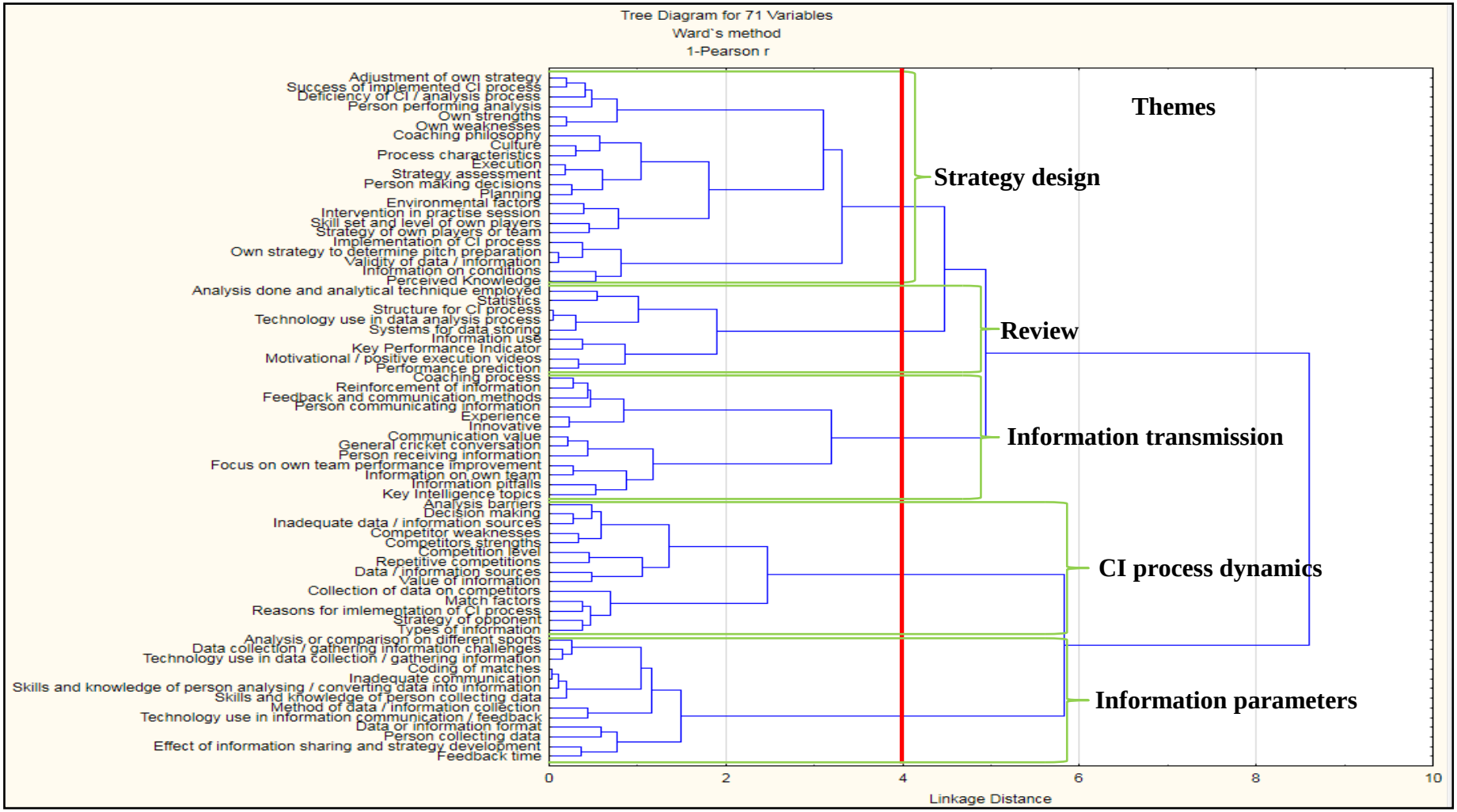


Figure 1: Dendrogram: A tree clustering, single-linkage, 1-Pearson Correlation Coefficient cluster analyses dendogram of all quantitized coded interview data indices with conceptually concatenated themes.

Table 2: Cricket coaches interview data CI themes and categories

No	Theme	Definition/description	Categories
1	Strategy design (Peterson et al., 2008b)	Factors and aspects that contribute to the design of the teams' match strategy by the coach	Coaching philosophy CI culture Strategy assessment Planning Environmental information Information on own strengths and weaknesses Strategy adjustment Knowledge implemented
2	Review (Franks & Miller, 1986)	The manner and method used by the coach to review information / look at info to confirm strategy design	Video analysis Statistics Formal analysis Storing system Key Performance Indicators (KPIs) and Opponents' strategy assessment
3	Information transmission (Bampouras et al., 2012)	The manner and method used by the coach to communicate information regarding the team strategy	Person communicating Person receiving KITs Type and focus Reinforcement Method and technology used
4	CI process dynamics (Saayman et al., 2008)	The forces or properties which could stimulate growth, development, or change within a system or process. Factors the coach has to manage to effect a successful CI process.	Systematic approach, Decision making and sources utilized
5	Information parameters (Wright & Calof, 2006)	Limitations coaches perceive or experience which negatively influence the process of CI being implemented (Parameter: a limit or boundary which defines the scope of a particular process or activity)	Feedback Technology CI value Person and skills

The first theme, namely *Strategy design,* relates to aspects and factors that contribute to the intended strategy developed by the coach and include the following categories: i) coaching philosophy, ii) CI culture, iii) strategy assessment, iv) planning, v) environmental information, vi) information on own strengths and weaknesses, vii) quality analysis, viii) strategy adjustment and ix) knowledge implemented. The second theme, namely *Review* describes how the coach appraises information to confirm his strategy design and denotes categories of i) video analysis, ii) statistics, iii) formal analysis, iv) storing system, v) KPI's and vi) opponents' strategy assessment. The theme, *Information transmission* relates to the "how and what" of information which coaches communicate regarding their designed strategy and include categories such as i) person communicating, ii) person receiving communication, iii) KITs, iv) type and focus, v) reinforcement and vi) method and technology used. Specific *CI process dynamics* as the fourth theme is characterised by forces which could stimulate the growth, development or change within the coaches' CI process and refers to factors which the coach has to manage effectively for successful CI implementation. These include i) the systematic approach, ii) decision making, and iii) sources utilized. The last theme, namely *Information parameters* refers to limitations that coaches experience or perceive which negatively influence the successful implementation of a systematic CI process. Categories within this last theme are i) feedback, ii) technology, iii) CI value and iv) person and skills. The dendrogram indicating the themes and categories is presented as a conceptual CI framework for cricket coaches in a related article (Van den Berg *et al.*, 2017a).

2.4 Development of items

The process of categorizing the quantitized data and placing them under conceptual themes, synthesized interview data into indicators and allowed researchers to compile preliminary items to address identified cluster constructs (Gehlbach & Brinkworth, 2011). Through the

synthesis of theory and empirical evidence, the final survey item numbers were reduced to twenty-eight items to enhance the potential administering, ease of completion, and response rate by participants (Gehlbach & Brinkworth, 2011; McGartland Rubio *et al.*, 2003). The themes and categories that were presented in Table 2 (i.e. Table of Specifications (ToS)), delineate the main constructs of the survey and were used to develop appropriate questions (Turocy, 2002). Special attention was given to the wording of constructed questions by guarding against the use of ambiguous language, bias, double-barrel questions and not obtaining sensitive information (Burton & Mazerolle, 2011; Gehlbach & Brinkworth, 2011). Each of the established categories with its overarching definition was used to create separate survey items (Gehlbach & Brinkworth, 2011). Best practices in item development were applied by avoiding the use of reverse scored items and numeric labels as well as by using five response anchors of “strongly agree”, “agree”, “neutral”, “disagree” and “strongly disagree” (Gehlbach & Brinkworth, 2011; Turocy, 2002). Item generation resulted in 28 items within five scales corresponding to the constructs/themes. Individual items aim to measure a specific concept and an explanation of each item concept is provided in Table 3. Additionally, a rationale from literature was compiled to describe each correlating concept and item. The description and rationale aim to corroborate the items created from the conceptual concatenation of codes and quantitized categories by substantiating it through literature within the scope of the survey’s “strongly agree” to “strongly disagree” Likert scale.

Table 3: Proposed constructs, items, concepts measured and rationale description of CI survey for cricket coaches.

No	Item	CI concept measured	Description and rationale
A	**Strategy design**		**What are the factors / aspects that contribute to the design of coaches' team match strategy**
1	My coaching philosophy is the guiding principal for my team strategy development	Coaching philosophy guide CI practice	If Strongly Agree (SA) = The elite coaches indicated that their coaching philosophies guide their coaching processes, which included the CI process (Wright *et al.*, 2012a)
2	A team culture is created whereby players and coaching staff consistently collect and analyse information on competitors in a formal and systematic manner	CI culture	If SA = the coach values information collection and analysis and fosters these activities within the team as part of their operational undertakings, and creates a CI culture for successful implementation (Wright & Calof, 2006)
3	The execution of the team strategy is assessed after every match	Strategy execution assessment	If SA = the process of CI is completed and the coach analyses the execution and effectiveness of strategy used, which was derived through CI activities performed (Begg & Du Toit, 2007)
4	Me as the coach, plan and decide on the team strategy to be followed	Person(s) planning and making decisions	If SA = The coach is ultimately responsible for decision making and strategy followed and is the person who should implement and drive the CI process (Du Toit & Sewdass, 2014b)
5	Environmental information (such as pitch and weather conditions) are gathered and analysed in a prescribed and structured manner before each match	Environmental information	If SA = environmental information is collected systematically through a standard process (Du Toit, 2003)
6	I need continuous information on my players' strengths and weaknesses for strategic decision making	Internal / own team strengths and weaknesses used for strategy design	If SA = The focus of the coach for strategy development is on his own players' strengths and weaknesses. This correlates with business CI whereby internal information enhance organisations' CI capabilities. However, this is only one facet of strategy development (Saayman *et al.*, 2008)

No	Item	CI concept measured	Description and rationale
7	High quality analysed information is used to determine the intervention training sessions before matches	Analysis of quality information	If SA = High quality information is gained through skilled people (Gatsoris, 2012). Therefore, an analyst is used to obtain quality data (Bampouras *et al.*, 2012)
8	I adjust my team's strategy if new information is gained before matches	Strategy adjustment	If SA = The coach values the continuous collection and analysis of information and sees the advantages of risk taking by adjusting the strategy (Gatsoris, 2012)
9	I have enough knowledge on competitors and the environment to guide a structured information collection and competitor analysis	Perceived knowledge implemented	If SA = Coach has high levels of perceived knowledge on competitors, and uses it to systematically evaluate and analyse information before and after each match. Elite coaches spend many hours reviewing PA information after matches to inform their strategy development for the next matches (Wright *et al.*, 2012a)
B	**Review**		**How does the coach review information/look at information to confirm his strategy design?**
10	After every match I would look at specific video footage and video analysis of that specific match	Video footage analysis	If SA = Elite coaches receives edited clips after matches and would spend additional time to complete their own PA (Wright *et al.*, 2012a)
11	I evaluate statistical data and information after each match	Sources and statistical information	If SA = Coach uses available statistics after a match to evaluate match specifics. Statistics are influential in cricket especially for determining critical factors for match strategy adjustments (Moore *et al.*, 2012)
12	At the onset of each season, we perform a SWOT analysis of opposition players	Formal analysis technique	If SA = Coach employs one of the most basic and used analytical techniques for opposition player analysis (Dai *et al.*, 2011; Gatsoris, 2012)
13	I have an established, well-functioning system for storing and retrieving previously analysed competitor and environmental information	Data storing system	If SA = Coach uses a formal system for storing and retrieving data – this is in accordance to research by Lyons (2011) which indicates that coaches use cloud computing to store and manage data

No	Item	CI concept measured	Description and rationale
15	The competitor information collected and analysed is primarily used for opponent strategy assessment and prediction	Information utilized for opponent strategy assessment / performance prediction	If SA = The focus of the coaches' intelligence process is to assess and evaluate the opposition strategy, usually with the goal to counter it (Lames & McGarry, 2007). Coaches use information proactively to predict performance and counter the performance of opposition players (Hughes, 2005)
C	**Information transmission**		**How and what information do coaches communicate regarding strategy**
16	As the coach I am primarily responsible to communicate information on the opposition, environment and team strategy to my team	Person communicating strategy	If SA = The coach is the main person to communicate and share information and strategy. Research indicates that the majority of elite coaches (more than 86%) give feedback to the team or individuals after match analysis (Wright *et al.*, 2012a)
17	I tailor my communication method on competitor and environmental information to suit the preferences of my individual players	Value and method of quality communication	If SA = The coach uses different methods to communicate to players such as verbal and visual communication (i.e. video footage) so that players better understand, value and enjoy the information that is conveyed. Sport coaches experiment with information and communication technology (Lyons, 2011)
18	I distribute competitor information to anyone in the team who is interested in it	Person receiving information	Reverse scoring with Strongly disagree as highest value. If SA = Information is not shared openly and widely to the whole team but only to those who are interested. Coaches receive information from sport scientists or analysts and communicate it to all players themselves or allows an analyst to communicate information to players and team directly (Bampouras *et al.*, 2012), including all team members and not just those interested
19	I communicate information on competitors and the environment to my players before each match	Information communication focus	If SA = The coach values specific competitor information and sees the need to communicate important aspects. (Bampouras *et al.*, 2012)

No	Item	CI concept measured	Description and rationale
20	I emphasize selected competitor information to my own players	Reinforcement vs. Information overload	If SA = The coach selects specific competition information to continuously communicate to players. The coach also reinforces key aspects (Bampouras *et al.*, 2012)
21	My key intelligence needs are communicated to a person who performs the information collection and competitor analysis	KITs	If SA = The coach as intelligence user informs those who collect and analyse data, on what information is needed (Nasri, 2011a). This is essential in CI process planning. Identified KITs direct the collection and analysis process (Fleisher & Wright, 2010)
D	**CI process dynamics**		**The forces or properties which could stimulate growth, development, or change within a CI system or process. Factors the coach has to manage to effect a successful CI process**
22	Our coaching management team follows a systematic, continuous process to collect and analyse competitor strengths and weaknesses	Systematic process for competitor analysis	If SA = One of the main focuses of coaches and the CI process, is to identify opposition strengths and weaknesses. Assigned personnel and a systematic approach is needed to continuously collect and analyse these strengths and weaknesses (Wright *et al.*, 2012b)
23	I access and utilize a number of sources (websites, video footage, coded video clips) to collect and analyse information on competitors and the environment	Sources of information	If SA = The coach has adequate sources available to use (Wright *et al.*, 2012a)
24	I continuously utilize analysed and high quality information to guide my decisions	Decision making based on intelligence	If SA = Decision making is done on intelligence with the aim of making decisions (Michaeli & Simon, 2008)

No	Item	CI concept measured	Description and rationale
E	**Data / Information parameters**		**Limitations coaches perceive or experience which negatively influence the process of CI being implemented (Parameter: a limit or boundary which defines the scope of a particular process or activity)**
25	We use highly sophisticated technology to code and analyse videos and data	Technology	If SA = Technology use for collection and analysis is adequate and available. Technology is used for PA and is accessible to coaches as a variety of products are available which coaches use more and more (Baca, 2006; Wright *et al.*, 2012a).
26	The person who performs competitor and environmental analysis for our team is skilled and trained in using technology driven analysis techniques	Person and skills for collecting and analysing	If SA = The coach has a skilled person available to perform CI activities (Wright *et al.*, 2012a). A skilled person is essential for the collection and analysis process to be valid and successful (O'Donoghue, 2006).
27	Feedback on own performance and strategy execution is performed shortly after each match	Feedback time	If SA = Feedback time is influential and coaches express a need for timely feedback from the analyst to the team (Wright *et al.*, 2012a). Timely feedback is also essential in strategic decision making (Tej Adidam *et al.*, 2012).
28	I value technology-driven competitor and environmental information above information gained from my own players	Value of technology enhanced information	If SA = The coach values CI and therefore invest in systematic information gathering and analysis of competitors. The coach also values the objective and analytical information gained from objective video analysis and statistics (Moore *et al.*, 2012; Wright *et al.*, 2012a)

2.5 Expert review

2.5.1 Validation

McGartland Rubio *et al.* (2003) developed a measure that allows researchers to operationalize a construct and test its validity during its conceptualization. Consequently, this measure was used to determine the content validity ("the extent to which the items on a measure assess the same content or how well the content material was sampled in the

measure") of the developed survey (McGartland Rubio *et al.*, 2003:94). Content validity is characterised by face and logical validity where face validity indicates that the measurement instrument or items appear to be valid, whereas logical validity uses a rigorous process during which an expert panel evaluates the content validity of the measurement instrument (McGartland Rubio *et al.*, 2003). Therefore, this study used research specialists to establish construct relevance as well as content validity (Gehlbach & Brinkworth, 2011; Turocy, 2002). The purpose of this step was also to obtain information on item clarity, representativeness, language use and other item-related concerns that research specialists highlighted (Burton & Mazerolle, 2011; Gehlbach & Brinkworth, 2011). Representativeness referred to an item's ability to represent the content domain as described through a theoretical definition, while the clarity of an item was evaluated on the basis of how clearly an item was worded (McGartland Rubio *et al.*, 2003). Anchors of "1=Not at all representative/clear", "2=Major revisions", "3=Minor revisions" and "4=Very much representative/clear" were used to evaluate last-mentioned aspects of different items (McGartland Rubio *et al.*, 2003). The reliability or inter-rater agreement was also calculated from the responses. Items were grouped together and experts were asked to indicate if the items fitted the subscale and therefore allowed the preliminary assessment of the factorial structure. Each item was individually measured according to these criteria and space was provided for paragraph type comments to be inserted after each item. This was done by making use of Google doc.

2.5.2 Expert panel

A new list of potential items needed to be validated at the onset of the process and researchers turned towards an academic audience to establish the construct relevance and validity of each individual item (Gehlbach & Brinkworth, 2011). The feedback from inter-university peers provided information on item clarity and construct complexities and allowed

the chance to quantify the content validity of the scale (Gehlbach & Brinkworth, 2011). An expert panel from universities other than the primary researcher's university was selected according to each person's experience in the fields of sport science and management (McGartland Rubio *et al.*, 2003). A total of six experts responded; one respondent did not complete the entire survey and was omitted from the group. The number of respondents was above the recommended minimum number of three and within the range of two to ten (Lynn, 1986; McGartland Rubio *et al.*, 2003).

2.5.3 Data analysis

Three types of analyses were performed, namely an analysis to test the content validity of measure, an analysis to test the factorial validity of each item and an analysis to test inter-rater agreement (Table 4).

Table 4: Validity ratings of the survey subscales by expert reviewers

Subscale and items	**Represen-tativeness CVI average score**	**Clarity average score**	**IRA Represen-tativeness score**	**IRA Clarity score**	**IRA Clarity score (2nd method)**	**Factorial Validity Index (FVI)**
Strategy design (Items 1-9)	0.96	0.93	0.78	0.67	1	0.96
Review (Items 10-15)	0.99	0.93	1	0.67	1	0.99
Information transmission (Items 16-21)	1	0.97	1	0.83	1	1
CI process dynamics (Items 22-24)	1	1	1	1	1	1
Information parameters (Items 25-28)	1	0.93	1	0.75	1	1
Average all items	0.99	0.95	0.96	0.82	1	0.99

i) Content validity index

Content validity was based on the representativeness of items and the content validity index (CVI) was calculated by counting the number of experts who rated the item as three or four (indicating “minor revisions” and “very much representative” respectively) and dividing that number by the total number of experts. This provides a value for each item as a proportion of the experts who deemed the content as valid (McGartland Rubio *et al.,* 2003) The CVI of each subscale was calculated by computing the average for the items per subscale, and the CVI for the instrument calculated as the average of all the subscales. A CVI of 0.8 for a new measurement instrument is recommended (Davis, 1992) and all the subscales within the new survey, as well as the instrument as a whole, were above this standard which confirms the content validity (Table 4).

ii) Clarity validity

The clarity values per item, subscale and instrument were calculated in the same manner as the CVI. The five subscales and instrument as a whole indicated clarity values of above 0.8, substantiating the presence of clearly worded items (McGartland Rubio *et al.*, 2003).

iii) Inter-rater agreement

Inter-rater agreement (IRA) determines the extent to which the experts were reliable in their ratings and is calculated by regarding the representativeness and clarity values for each item (McGartland Rubio *et al.*, 2003). The IRA per item was calculated by dividing the number of items considered to be hundred percent reliable by the total number of items (either in the subscale or the instrument as a whole) (Davis, 1992). The representativeness IRA was above the 0.8 value for the instrument as a whole and four out of the five subscales, with only the Strategy design subscale slightly below the 0.8 level. The clarity IRA was slightly below the

0.8 value on the Strategy design, Review and Information parameter subscales. However, a closer evaluation of the qualitative feedback from expert reviewers on these items within the three subscales, indicated no major changes to items. Minor changes to improve clarity were proposed by reviewers; e.g. “a team culture currently exists whereby...” instead of “a team culture is created whereby....” Experts had a hundred percent agreement on six out of the nine items within the Strategy design, four out of six items for the Review subscale and three out of the four items for the Information parameters subscale. When the less conservative approach is followed in calculating the clarity IRA, whereby the number of items with an IRA of at least 0.8 is divided by the total number of items (within the subscales and as a whole), the values were all equal to 1; indicating a high level of inter-rater agreement for clarity (McGartland Rubio *et al.*, 2003).

iv) Factorial validity index

McGartland Rubio *et al.* (2003) proposed the calculation of a Factorial Validity Index (FVI) to determine the degree to which experts consider items to be associated within the respective subscales. The FVI for each item, was calculated by dividing the number of experts, who associated the item with the subscale by the total number of experts. The FVI value for each subscale was again calculated by averaging items within the subscale and for the instrument as a whole by averaging all the subscales (McGartland Rubio *et al.*, 2003). Even though there is currently no criteria for an acceptable FVI, a value of 0.8 is proposed (McGartland Rubio *et al.*, 2003). The subscales and instrument as a whole satisfy the recommended level, since all FVI values were above the suggested value.

v) Revise the instrument

After the quantitative data analysis of the expert reviewers on the items of the newly developed CI survey for cricket coaches, researchers could turn to the qualitative feedback per item, to determine the necessary revisions (McGartland Rubio *et al.*, 2003). Minor adjustments in word and language use were necessary to improve the instrument (McGartland Rubio *et al.*, 2003). The revised instrument is therefore presented in Table 5 with adjusted items indicated in bold italic text. Seventeen out of the 28 items were changed according to the qualitative feedback received from the expert panel. This emphasises the valuable contribution of expert validation of content and face validity of newly developed items in a survey.

Table 5: Revised items of the CI survey for cricket coaches

No	Sub scale and items
A	**Strategy design**
1	***My coaching philosophy guides the development of my team strategy***
2	***A team culture is created whereby players and coaching staff consistently collect and analyse information on competitors in a systematic manner***
3	The execution of the team strategy is assessed after every match
4	***As coach, I primarily plan and decide on the team strategy to be followed for matches***
5	Environmental information (such as pitch and weather conditions) are gathered and analysed in a structured manner before each match
6	I need continuous information on my own team players' strengths and weaknesses for strategic decision making
7	High quality analysed information is used during planning and strategy design before matches
8	I adjust my teams' strategy if new information is gained before matches

No	Sub scale and items
9	***I have sufficient knowledge on competitors and the environment to direct a structured information collection and analysis***
B	**Review**
10	***After every match I look at specific video footage and analysis of that specific match***
11	***I evaluate statistical data after each match***
12	***At the onset of each season, a SWOT analysis of opposition players are performed***
13	I have an established, well-functioning system for storing and retrieving previously analysed competitor and environmental information
14	***The Key Performance Indicators (such as runs scored for batters and runs conceded for bowlers) that I evaluate to assess and develop new match strategies, differ from one match to another***
15	***The competitor information collected and analysed is primarily used for opponent strategy assessment***
C	**Information transmission**
16	As the coach I am primarily responsible to communicate information on the opposition, environment and team strategy to my team
17	***I tailor my communication method regarding competitor and environmental information to suit the preferences of my individual players***
18	***I share information about our competitors and environment mainly collectively to the whole team***
19	***I communicate only vital information on competitors and the environment to my players before each match***
20	***I re-accentuate selected competitor information to individual players***
21	***I communicate my key intelligence needs to a person who collects and analyse the competitor and environmental information***
D	**CI process dynamics**
22	Our coaching management team follows a systematic, continuous process to collect and analyse competitor strengths and weaknesses
23	I access and utilize a number of sources (websites, video footage, coded video clips) to collect and analyse information on competitors and the environment

No	Sub scale and items
24	I continuously utilize analysed and high quality information to guide my decisions
E	**Data / Information parameters**
25	***We use highly sophisticated technology to capture, code and analyse videos and data***
26	***The person who performs the analysis on competitors and the environment is skilled and trained in using technology driven analysis techniques***
27	Feedback on own team performance and strategy execution is performed shortly after each match
28	***I value technology-derived competitor and environmental information as most influential on my coaching practise***

3. Conclusions

The article named and explained the steps that were used to develop a CI survey for cricket coaches by the synthesis of several known techniques within survey development. The overall method that was followed balanced the use of diverse techniques, rather than predominantly relying on psychometric analysis alone. The use of diverse steps and experts in the sport science and management fields to establish the content and factorial validity at the onset of item and scale development, increased the efficiency and effectiveness of the instrument. Items and subscales for the CI survey delivered strong content and factorial validity values with a high overall IRA. Therefore, both the content and structure of the CI survey for cricket coaches are deemed to be acceptable. The newly developed CI survey is unique and holds promise of further refinement and development to other sporting codes. The measurement of the different subscales of the survey will shed light into the dearth of knowledge regarding coaches' strategy design, review and information transmission processes, as well as indicate how they deal with CI process dynamics and address

information parameters. The CI survey is able to identify strengths and weaknesses in the competitive process that coaches follow, ultimately to help enhance their CI creation process.

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CHAPTER 8

SUMMARY, CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS



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1. SUMMARY

A need existed to clarify the multifaceted competitive intelligence (CI) process and to develop more evidence-based theories and models that can guide coaches to gain a competitive advantage. In view of this need the objectives of this study were as follows: To evaluate the relevancy of the business CI process to the sport performance analysis (PA) domain as part of the coaching process in sport and specifically cricket by using a systematic literature review (SLR); to identify the key intelligence topics (KITs) of South African cricket coaches, using the 4Cs CI process model of Weiss (2002) as a framework and incorporating existing knowledge regarding cricket specific key performance indicators (KPIs); to identify the data collection properties of South African cricket coaches, using the first stage of the 4Cs CI process model of Weiss (2002) as framework; to provide a conceptual CI framework specifically developed for South African cricket coaches based on the 4Cs CI business process model as a theoretical foundation and to create a CI survey for South African cricket coaches by following the proposed five step process of Gehlbach and Brinkworth (2011).

Chapter 1 provided a concise problem statement which indicated that sport coaches perform certain activities within their coaching function that are related to the sport PA domain which are similar to CI properties. Even though structured CI models and processes are available to the business domain, currently there are no formal structures or processes that coaches can follow to conduct CI activates i.e. collect and analyse data, to communicate information and to make decisions based on the intelligence created. This chapter included the theoretical and empirical research questions, objectives and related premises of the study. This chapter also provided an outline of the study structure with reference to chapters with specific research articles written to answer the different research questions.

Chapter 2 gave a detailed explanation of the study methodology. The exploratory study used a multi-mode research method that could be categorised into the partially mixed sequential dominant status multi-mode design. In this regard the study was completed in three sequential phases which involved two dominant qualitative phases that were conducted first, whereafter the quantitative data analysis phase followed. The qualitative research phase consisted of the systematic literature review (SLR), the interview schedule design and analysis through intra-university peer interviews, cricket coach and support staff interviews and analyses. This was followed by the quantitative analysis from the quantitized qualitative data. The qualitative data

were quantitized to enable researchers to perform tree cluster analysis as part of the predominant quantitative analysis. The dendrogram obtained from the tree cluster rendered five themes with sub-categories which were conceptually concatenated by the individual codes clustered together. The categories and themes from the cluster analysis provided the CI process framework for cricket coaches as well as the structure of the item and sub-scales for the development of a CI survey for cricket coaches. A panel of experts quantitatively and qualitatively assessed the survey to determine the content and face validity. The qualitative analysis was performed to supplement the findings from the quantitative survey analysis.

Chapter 3 consisted of a systematic literature review (SLR) in the form of a research article. This article was compiled according to the guidelines of the *International Journal of Performance Analysis in Sport*. The title of the article is: *Relevancy of the business competitive intelligence process to sport performance analysis: A systematic literature review*. The aim of the SLR was to evaluate the relevancy of the business CI process to the sport PA domain as part of the coaching process in sport and specifically cricket. The SLR investigation was to establish similarities and differences between the business CI and the sport PA processes and activities, by using the 4 stages of the 4Cs CI process model. The document analysis showed that there was substantial agreement between the business CI and the sport PA domains with regard to the four stages of the CI model. Furthermore, the SLR rendered the following five themes for the CI process of both domains: data collection, conversion, communication, countering and the CI process as a whole. The differences and similarities between the two domains were explored within these five themes and were presented as combined data networks that indicated the occurrence of the CI activities within both domains.

The first theme of data collection indicated substantial similarities with ten out of the thirteen codes that were similar between the CI and PA literature. Similarities were found with regard to the person collecting data, sources utilized, skills and knowledge of the person collecting data, person directing the initial activities, technology and systems used, validation of collected data, specific methods used for collection and problems that were encountered during the process. The most profound difference within this stage of the CI process model and the first theme, were related to KITs that were evident within the CI domain but not within the PA domain. KITs were categorised as three types of information, such as strategic decisions, early warning signals and description of key competitors. Business managers employ these KITs categories to direct the

data collection process; for example they instructed that data on key competitors should be gathered. This analysis of key competitors rendered sufficient information on the key players' (oppositions') strengths, weaknesses, opportunities and threats (SWOT). Additionally, CI data collection would include early warning signals for the manager to avert surprises. The intelligence created through the SWOT and additional analysis would then be used to make strategic decisions to counter the opposition. In this regard, sport coaches and analysts utilize KPIs to assess own team and opposition teams' efforts and performance. KPIs are specific and measurable variables and in cricket KPI examples included runs scored, wickets taken, dot balls bowled, run rate and boundaries scored. On the surface it would seem that KITs and KPIs are alike, however, they differ slightly. In this regard, KITs are more thematic in nature and related to issues that are important for the CI user, such as changes in the economic environment, or alterations made by opposition businesses. KPIs as designated specific measured pieces of information, showed characteristics similar to KITs but could not be individually employed to direct a whole data collection and analysis process as KITs do. This identified gap accentuated need to explore the KITs that cricket coaches identify by using the existing business CI literature and operations as a framework for the investigation. The substantiation of KITs that direct the collection and analysis process within the sport coaching domain, also gave rise to the second part of the study that aimed to identify the data collection properties of cricket coaches, using the first stage of the 4Cs CI process model as framework.

The theme of data conversion indicated seven similarities between the CI and PA domains as both the business CI and PA domains made use of an analyst and analytical techniques to analyse data or information. Additionally, technology and software were utilized during the analysis, while the storing and validation of data were also identified as important aspects. Both domains are also confronted with certain problems that may hinder the analysis process. For example, in the business CI domain, the analyst needs specific skills to be able to execute the analysis process. On the other hand, statistics play a major role in the PA domain, and data or information is usually provided in video format that must be converted to statistical results. However, the business CI domain did not refer to these aspects of data conversion. Nevertheless, both domains indicated the importance of communicating analysed information correctly and efficiently.

The third theme and stage of the business CI model was communication, and substantial similarities were found between domains in this regard. For example, both domains accentuated the importance of information sharing or feedback, the person giving and persons receiving information, the relationship between involved people, technology employed as well as the methods used to communicate information. Communication processes were also found to be unique and individual organisations' needs determined the set-up and manner of communication utilisation. Literature also suggests that communicated information positions the decision maker to plan and strategize ahead. However, within the sport PA domain, video clips and analysed match recordings were identified as the most important forms and methods of communication. Conversely, literature of both domains indicated that the communication process accounts for certain communication problems or feedback barriers.

The countering stage of the CI process showed four similarities and three differences between the business CI and sport PA domains. Managers and sport coaches from both domains have to make strategic decisions, must have specific knowledge on competitors or opponents and have to devise a strategy and utilize PA or CI information to be able to counter the opposition. Within the sport PA context, performance prediction plays an important role during the countering stage, while the ineffective use of CI for decision-making and other factors influenced CI countering. Nonetheless, very little detailed information concerning this stage of the business CI and sport PA domains could be found. A possible reason for this is organisations' or coaches' tendency to hold on to their competitive edge and not to disclose their intelligence of the decisions derived from information.

The CI process implementation was also investigated, and thirteen out of the 26 codes overlapped and showed similarities between domains. However, even though CI-related codes and concepts overlapped within the two domains, specific differences were also apparent. For example, the business CI definition for the process referred to a definite analysis of data concerning the competitors and the environment, whereas sport PA referred to the investigation of relevant aspects of player and/or team performance in competitive sport. Last-mentioned investigation is not necessarily concerned with aspects that are only related to the opponent or competitive environment. Therefore, the focus of the two domains differs slightly. Both domains indicated the following aspects: types of CI or PA used; purposes, benefits, history and the development of the business CI and PA disciplines; business CI and sport PA users,

environmental factors, a CI or PA culture, barriers to the implementation of the process, as well as the value given to CI in business organisations and PA within sport coaching.
Business CI and sport PA showed various occurrences within a wide range of business and different sporting codes with numerous factors influencing the application of the data collection, conversion, communication and countering stages. Within the business CI domain and sport PA context, specific skills and training are needed to develop the personnel involved and to optimise the process. Within both domains subject specific models exist; however within the sport PA context, no model exists that describes the activities or processes aimed at competitor analysis and countering. This identified gap led to the third aim of this study, namely to provide a conceptual CI framework specifically developed for cricket coaches based on the 4Cs CI business process model as a theoretical foundation.

On the other hand, the CI process in the business domain may be influenced by factors such as the type and size of the industry, individuals assigned to CI-related tasks within the organisation and the location of the CI unit in the organisation. In this regard, formalised structures and activities within organisations are necessary to enhance the created intelligence since CI professionals employ a range of techniques and methods within each stage of the CI process. Process characteristics such as financial support provided for CI operations determine successful process implementation. However, numerous organisations still do not have adequate CI processes and activities in place. Identified codes that differentiated the sport PA from the business CI domain include characteristics of the sport such as the structure and objective of the sport, performance prediction through the use of KPIs and technology use for effective competitor analysis.

Findings of the SLR suggested that the majority of activities and properties within different stages of the business CI process are similar to that of sport PA which coaches incorporate into the coaching process. Similar properties are specific to data collection and analysis, communication of information, strategic decision-making under the countering stage as well to the CI process as a whole. Strong similarities between business CI activities that are aimed at obtaining intelligence and to counter opposition strategies and certain sport PA activities indicate that the CI process is relevant and can be applied to a sport coaching context to ensure a formal and structured process. Despite the applicability of the CI process to the PA domain, specific and clear differences between the two domains were also observed. These differences indicated the

need for further research into the specific activities and properties of the different stages of the CI process that cricket coaches perform. Findings of the SLR indicated that the CI domain possessed clear structures and models whereas the sport domain did not have a formal CI structure or model. The development of a conceptual CI framework for coaches would establish guidelines for cricket coaches to determine and execute activities aimed at gaining a competitive advantage, since there is currently no available literature and reference for coaches in this regard. SLR findings substantiated the need to answer the empirical research question pertaining to the development of a CI framework for South African cricket coaches. Furthermore, literature indicated that the majority of business CI research was performed using questionnaires and measurement instruments to identify, calculate and direct CI activities. On the contrary, no formalised CI-related instrument to measure coaches' CI activities was identified within the sport coaching and PA domain. The necessity of the development of a CI survey for coaches was highlighted through the SLR and findings from sport CI survey research would enhance future research of CI in a competitive sport domain. Not only was the theoretical objective that was aimed at finding similarities between the CI properties and sport coaching domain achieved through the SLR, but the need for empirical research into the data collection properties of cricket coaches and the importance of developing a CI framework and survey for this population were identified (empirical objectives). The following chapters addressed each objective separately.

Chapter 4 consisted of the second article which was compiled in accordance with the guidelines for the *International Journal of Performance Analysis in Sport* and titled: *Directing the competitive intelligence process in sport: key intelligence needs and performance indicators identified by high level cricket coaches*. The aim of this article was to identify the KITs of cricket coaches, using the 4Cs CI process model of Weiss (2002) as a framework and incorporating existing knowledge regarding cricket specific KPIs. The main finding of the study indicated the identification and classification of coaches' key intelligence needs (KINs), as categorized according to the business CI functional KITs categories. Cricket coaches' informational needs could be translated to all three of the business type KITs, namely strategic, early warning and key player KITs. However, coaches identified inadequate exclusive strategic decision and early warning type KITs, with an over-emphasis on key player type KITs. The identified KPIs were classified as a key player type KIT and explained the over-emphasis on one type of informational topic. The KITs and KPIs were successfully linked to three out of the four kinds of knowledge which are created as part of the countering stage of the 4Cs CI process model. The application of

the business CI process model, highlighted shortcomings in coaches' KITs identification and knowledge creation process. The shortcomings could be addressed through coaches' education programs that include the CI model to identify and use KITs to drive a successful data collection process by incorporating research on current cricket KPIs.

Chapter 5 consisted of the third article which was compiled in accordance with the guidelines for the *International Journal of Performance Analysis in Sport* and titled: *The competitive intelligence process in sport: data collection properties of high-level cricket coaches.* This article built on the previous KITs article, since it explored the first stage of the CI process model of data collection. The main aim of this article was to identify the data collection properties of cricket coaches, using the first stage of the 4Cs CI process model of Weiss (2002) as framework. Overall, findings indicated that coaches collectively made use of various information sources on competitors, own team and the environment, which are similar to that of the business CI domain. The collection effort was usually performed by numerous persons within the team set-up and a variety of information formats were utilized. Findings further indicated that easily available sources were not effectively utilized; data collection processes were not performed in a structured manner and coaches needed skill development regarding data collection and analysis processes. Furthermore, the lack of technology, the absence of a person who could collect data as well as the shortage of skills with the person who is responsible for data collection, were main challenges which coaches faced. The empirical findings based on the business CI model, provide a framework for cricket coaches that may govern their data collection activities, since no formalized and organised data collection process is currently available within the sport domain.

Chapter 6 presented the fourth article titled: *The development of a competitive intelligence framework for cricket coaches.* This article was compiled according to the guidelines of *Sport Management Review*. The aim of this study was to provide a conceptual CI framework specifically developed for cricket coaches based on the 4Cs CI business process model as a theoretical foundation. The quantitized qualitative interview data and successive cluster analysis produced five conceptually concatenated themes, namely: strategy design, review, information transmission, CI process dynamics and information parameters, each with corresponding sub-themes. The sub-themes were concatenated by the clustered codes. The first theme of *Strategy design* was related to aspects and factors that contribute to the intended strategy developed by the coach and included the following categories: i) coaching philosophy, ii) CI culture, iii) strategy

assessment, iv) planning, v) environmental information, vi) information on own strengths and weaknesses, vii) quality analysis, viii) strategy adjustment and ix) knowledge implemented. The second theme of *Review* described how the coach appraises information to confirm his strategy design and denotes categories of i) video analysis, ii) statistics, iii) formal analysis, iv) storing system, v) KPIs and vi) opponents' strategy assessment. The theme of *Information transmission* was related to the "how and what" of information coaches communicate regarding their designed strategy and included categories such as i) person communicating, ii) person receiving, iii) KITs, iv) type and focus, v) reinforcement and vi) method and technology used. Specific *CI process dynamics* as the fourth theme referred to forces which could stimulate the growth, development or change within the coaches' CI process and included factors that the coach has to manage effectively for successful CI implementation, namely: i) systematic approach, ii) decision-making and iii) sources utilized. The last theme, namely *Information parameters* referred to limitations that coaches experience or perceive which negatively influence the successful implementation of a systematic CI process. Categories within this last theme were i) feedback, ii) technology, iii) CI value and iv) person and skills. An elaboration on each theme and subcategories with reference to coaches' quotes were provided. Therefore, this part of the study enabled researchers to establish a conceptual CI framework for cricket coaches in the form of a schematic concatenated tree diagram.

Chapter 7 presented article number five which was titled: *The development of a competitive intelligence survey for cricket coaches.* This article was compiled according to the guidelines of *Sport Management Review*. The aim of this article was to create a CI survey for cricket coaches by following the five step process of Gehlbach and Brinkworth (2011). In this regard, the CI framework which was developed in chapter 6 was used as the basis to develop survey items from the concatenated codes and categories. The five overarching themes of strategy design, review, information transmission, CI process dynamics and information parameters were set as subscales, with items corresponding to the categories created within each category and theme. The survey consisted of 28 items within the five themes and the content and a preliminary factorial validity of items were confirmed by subject experts' quantitative and qualitative evaluation. The expert recommendations and feedback established the CI survey for cricket coaches as a novel measurement instrument.

2. CONCLUSIONS

Conclusions are presented in accordance with the set premises in chapter 1.

Premise 1: *Substantial similarities between the CI and PA domains exist, which will be indicated through the SLR, thereby confirming the relevancy of the CI 4Cs process model to a sport PA and cricket coaching context.*

Premise 1 is accepted since the document analysis indicated a substantial agreement between the business CI and sport PA domains with regard to the four stages of the CI model. Similarities within the data collection stage were established since ten out of the thirteen codes corresponded while seven out of the ten codes of the conversion stage also overlapped. The SLR indicated that all six codes from the CI and sport PA domains under the communication stage were similar. The most prominent difference between the two domains was related to the countering stage were four out of the seven codes showed similarities. The evaluation of the CI process as a whole within the business and sport PA domains indicated thirteen of the 26 created codes overlapped and showed similarities. Even though differences were also noticeable, which led to the confirmation of the empirical research questions, the overall similarities confirmed the relevancy of the business CI 4Cs properties and process model to the sport PA domain and specific to a cricket coaching context.

Premise 2: *South African cricket coaches' KITs will be identified by using the CI 4Cs process model incorporating current sport KPIs.*

Premise 2 is accepted due to the fact that South African cricket coaches identified KITs which were successfully linked to the business CI type KITs of strategic decision, early warning and key player KITs. In this regard, coaches also mentioned numerous sport KPIs as measurable pieces of information which they needed to make certain decisions. The KPIs were categorised into the key player type CI KIT, which indicated an overemphasis by the coaches on competitor informational needs. However, coaches also expressed numerous KITs and made the statement that they needed information on their own team first and foremost. Coaches displayed a loose standing informational focus on individual KPIs, which indicated that their identified KITs did not direct the data collection and analysis process, as is the case with KITs within the business CI process.

Premise 3: *Although South African cricket coaches' data collection properties will be similar to those of the CI 4Cs process model, coaches do not follow a structured data collection process.* This premise is accepted based on the conclusion that, although cricket coaches' data collection properties were similar to those of the CI process model collection stage, individual coaches did not follow a structured data collection process. Collectively the coaches' feedback indicated that easily available sources were not effectively utilized and that they lacked formal data storage systems and software. Inadequate technology availability and the absence of a person who can collect data, together with a skills shortage of a responsible person, accentuated certain problems that coaches face during data collection. Even at a professional level, coaches who had a centralised analyst to their disposal, did not continuously obtain data from this person and also did not frequently store data received from the expert analyst. Therefore, although high-level cricket coaches performed certain data collection activities which are similar to the properties within the CI data collection domain, these activities were performed as alone standing elements and not interconnected in a systematic and purposeful manner. Consequently, findings of the article indicate that coaches need data collection skills training to enable them to utilize easily available sources and to set up simple databases for continuous use. Furthermore, coaches are in need of a structured model or framework which can guide their data collection activities and which can govern the different stages of the whole CI process.

Premises 4: *The key elements of a newly developed conceptual CI process framework for South African cricket coaches would be similar to the CI 4Cs process model.* This premise is only partly accepted. Although certain similarities did exist with regard to elements and stages between the 4Cs CI business process model and the conceptual CI framework for cricket coaches (CIFC), noteworthy differences were still observed. For example, similarities existed between the CI 4Cs model countering stage and the strategy design theme from the sport CIFC. Likewise, the communication stage of CI 4Cs model compared well with the information transmission theme within the sport CIFC and the review theme within the CIFC with the conversion stage of the CI 4Cs model. The two other themes, namely the CI process dynamics and information parameters within the CIFC, could not be compared to any stage of the CI 4Cs model.

However, certain elements from the CI sport framework and five themes, such as the person communicating, person receiving information, KITs, method of communication, technology, analysis, knowledge, decision-making, storing systems and opposition strengths and weakness

were similar to elements identified with the CI 4Cs business model. Nevertheless, mentioned elements were situated in different stages and not clustered together in the same manner as within the 4Cs CI process model. Additionally, the CIFC starts off with strategy design, whereas strategy formation through the countering stage was the last stage within the CI 4Cs model. Certain elements within the sport CIFC are sport specific, such as coaching philosophy, KPIs (key performance indicators) and video analysis and therefore only found within the CI sport framework. The sport CIFC lacks the central standing intelligence user as well as a CI information system which exist in the conversion stage of the 4Cs business model. A storing system is mentioned with the review stage of the CIFC as part of this theme's properties.

The review, information transmission, CI process dynamics and information parameters stages are interconnected to and influence the strategy design, which explains that the CIFC end with strategy design just as the CI 4Cs model. On the other hand, the CIFC displayed more two-way interactions between different themes and elements, which caused continuous interdependence. Not only were the five themes of strategy design, review, information transmission, CI process dynamics and information parameters interdependent, but the different elements within each theme were also interconnected. The linkage of stage elements indicates that these elements should be addressed for that specific theme to successfully add to the overall CI process in creating intelligence. This also implies that an inadequately addressed element within one theme could negatively impact not only that theme's development, but also other interdependent themes. This is also true for the 4Cs CI model as some stages and stage elements are also interdependent. Therefore, an element within the 4Cs CI model which is inadequately incorporated into the CI process will also result in failed attempts to create intelligence. Subsequently, coaches should focus on understanding and utilizing all elements and themes within the CIFC just as business managers should address the all-encompassing CI process with all its elements. This approach is needed since all themes and elements work together to develop a sound strategy that is based on comprehensive information from different sources, which was adequately analysed and transmitted.

The observable similarities in properties between the CI model and CIFC indicate the relatedness and the applicability of the 4Cs CI business model to the sport coaching context. The unique sport CI framework provides empirical evidence of the business process' application within the sport context and may enable coaches to perform CI creation, decision-making and opposition

strategy countering in a structured manner. The CIFC is therefore a comprehensive framework that addresses numerous and influential elements and themes that coaches could employ to gain a competitive advantage.

Premises 5: *A new CI survey for South African cricket coaches will be developed by following the proposed and will render acceptable content and face validity.* This premise is fully accepted. The five step process of Gehlbach and Brinkworth (2011) allowed researchers to implement diverse techniques to develop a CI sport survey with acceptable content and face validity. The 28 item CI survey was based on the newly developed CI framework for cricket coaches. The five themes were used as subscales, while the categories within each theme aided the development of survey items. The survey was quantitatively and qualitatively scrutinised by subject related experts and the data analysis rendered highly acceptable values of mainly above 0.8 for content and face validity (clarity and representativeness) as well as preliminary factorial validity (values above 0.96). Inter-rater agreement was deemed acceptable with values above 0.8 when calculated with a second recommended method.

The extensive SLR indicated only two other studies which have applied the business related CI process and activities to a sport coaching and performance analysis context. Both these studies concentrated either on a singular activity or only a few aspects within the encompassing CI process. This is the first study to investigate the encompassing CI activities of cricket coaches using the business 4Cs CI process model as a framework. The use of a SLR to compare the two domains and shed light on the similarities and applicability of the business CI model to the sport coaching context, is also unique in this field of sport PA. The development of a CI framework for cricket coaches paves the way for coaches to systematically collect and analyse data, communicate information and counter opposition strategies. The framework also highlighted certain parameters and process dynamics which coaches need to address in order to successfully implement the CI process and to attain a competitive advantage. The different elements within each theme of the sport CI framework refer to specific and detailed activities, which if adequately addressed in coach education programmes would direct coaches and support staff in their endeavour to accomplish CI. The proposed process would also help them to address a wide variety of elements in a systematic manner, which to date are seen as loose-standing features within the coaching process. The CI framework process is the first of its kind to focus on

competitor analysis and intelligence creation. Therefore, it can be proposed that the CI framework should be employed within coach education programmes.

The newly created CI survey for cricket coaches with suitable content and preliminary factorial validity is appropriate for the exploration of a niche CI research area in sport. The CI survey is unique and has the potential to be further developed and refined for use in other sporting codes. The fact that the survey allows researchers and sport practitioners alike to measure different aspects of the CI process will shed light on the dearth of knowledge regarding coaches' strategy design, review and information transmission processes, as well as indicate how they deal with CI process dynamics and overcome information parameters. Strategy design per se is a vastly under-researched topic and little is known about the strategic decision-making process that sport coaches follow. Information from the survey will allow sport administrators to address specific elements that coaches need to strengthen and validate their strategy design. Results from the survey may also assist coaches to overcome certain CI process dynamics that hinder coaching processes and to focus their attention on aspects that will allow them to stimulate growth and development with regard to CI-related aspects. For example, the information parameter subscale would highlight limitations that coaches need to overcome for enhanced coaching and CI creation. Therefore, evaluation of and feedback on different survey elements would strengthen cricket coaches' education programmes. A CI survey for sport coaches will also allow other researchers to extend their knowledge of CI, especially as it is related to sport PA.

An exploration of cricket coaches' data collection activities rendered insight into an undiscovered phenomenon. It also accentuated needs with regard to areas of education and skill development which should be incorporated into the national governing body's coaches' educational programmes. Coaches indicated limited data collection and analytical skills, and need to be educated in simple, yet effective ways to access and use easily available data bases and to create and manage their own databases. The current process they follow also needs to be systemized. Likewise, the exploration of cricket coaches' KITs revealed that coaches do not follow adequate strategic processes when identifying key informational needs and in directing data collection and analysis activities. KITs is a new theme within the sport PA and coaching domain, and coaches' education programmes should focus more on new ways of identifying, searching and directing coaches' informational needs.

3. LIMITATIONS AND RECOMMENDATIONS

Although this study is the first of its kind to show that a current business domain CI process model is applicable to the sport coaching and PA domain, several study shortcomings should be considered for future researchers who wish to focus on this study field:

- **Limitation:** The CI framework for cricket coaches was specifically developed for South African cricket coaches.

  Recommendation: The accuracy and workability of this model should be tested in coaches from different countries and backgrounds to verify its practical applicability within a cricket coaching context.

- **Limitation:** The newly developed CI survey for cricket coaches was only scrutinized for content and face validity, with preliminary factorial validity evident.

  Recommendation: To assess the full degree of factorial validity, a pilot study with a revised measure can be conducted to assess other psychometric properties through a factor analysis.

- **Limitation:** The CI framework for coaches was specifically designed for cricket.

  Recommendation: An exploration should follow to investigate the occurrence of CI properties within other sporting codes with the aim to develop an encompassing CI framework for various sporting codes. In this regard, sporting codes with similar properties such as ball or racquet sports, could be grouped together for the inquiry and development of a framework that would enhance coaches' competitive advantage.

- **Limitation:** The qualitative interview analysis rendered sufficient evidence and was performed until data saturation was achieved. However, the amount of data were insufficient to develop a model through structured equation modelling (SEM).

  Recommendation: The acquisition of additional interview data and the analysis of this data will allow for a quantitative analysis in the form of a SEM to be performed, which may render an even stronger CI model for coaches.

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Weiss, A. 2002. A brief guide to competitive intelligence: how to gather and use information on competitors. *Business Information Review*, 19 (2):39-47.

ADDENDA

ADDENDUM 2.1: CI SEARCHES

Systematic literature review: Search						
Search process documentation						
No	**Date**	**Database**	**Keywords**	**Hits**	**Selection**	**Inclusion**
1	22-Jun	Academic Search Premier	Competitive AND Intelligence (In title)	79	10	
2	22-Jun	EsbcoHost - Business Search premier MasterFILE premier Regional Business News	Competitive AND Intelligence In title, Full text, 2000 - 2015, Scholarly peer review	83	38	
3	22-Jun	Emerald insight (Advanced search)	Competitive AND intelligence - Abstract, 2000 - 2015 Include - content access to, Backfiles, Articles and chapters	232	31	Selection with CI in title
4	22-Jun	EbscoHost	Competitive AND Intelligence	0	0	
5	22-Jun	Google Scholar	Competitive AND Intelligence In title, 20005 - 2015	2270	0	Search refined to authors
6	22-Jun	Google Scholar	Calof (Author, 2005 - 2015)	16	11	7
7	22-Jun	Google Scholar	Fleisher (Author, 2005 - 2015)	16	11	9
8	22-Jun	Google Scholar	Du Toit (Author, 2005 - 2015)	25	25	16
9	22-Jun	Google Scholar	Saayman (Author, 2005 - 2015)	7	7	7
10	22-Jun	Google scholar	Competitive AND Intelligence AND sport In title 2000-2015	3	1	
11	22-Jun	(EbscoHost)*	Competitive AND Intelligence AND sport	0	0	
12	22-Jun	Emerald insight (Advanced search)	Competitive AND Intelligence AND Sport In title, 2000 - 2015, articles and chapters	0	0	
				Total	**134**	Only 86 Available to researcher

ADDENDUM 2.2: PERFORMANCE ANALYSIS COMBINATION WITH CI SERCHES

Systematic literature review: Search databasis: Performance Analysis in sport						
Search process documentation						
No	**Date**	**Database**	**Keywords**	**Hits**	**Selection**	**Exclusion**
1	03-Aug	Ebscohost	Performance+ analysis +	54	8	Articles relating to a wider academic setting: Performance analysis in eLearning, Psychological
		Sport discus	sport.		PA in sport in	variables in sports, physical aspects measured, too specific to other sports, marketing related,
			In titles		title, applicable	dieting performance analysis.
			Peer reviewed		to study	
			Scholarly articles			
			2000-2015			
2	03-Aug	Ebscohost	Performance+ analysis +	5	4	Article related to history of Pakistan cricket development over 40 years
		Sport discus	cricket		PA in CRICKET in	
			In titles		title, applicable	
			Peer reviewed		to study	
			Scholarly articles			
			2000-2015			
3	03-Aug	Ebscohost	Data + analysis + cricket	3	2	Data relating to spectator behaviour in cricket
		Sport discus	In titles			
			Peer reviewed			
			Scholarly articles			
			2000-2015			
4	03-Aug	Ebscohost	Data + analysis + sport	18	1	Articles related to HR functions, injuries. Different languages and not available
		Sport discus	In titles			
			Peer reviewed			
			Scholarly articles			
			2000-2015			

Continue..

No	Date	Database	Keywords	Hits	Selection	Exclusion
5	03-Aug	Ebscohost	Match + analysis + sport	4	0	Too sport specific and related to other sports than cricket
		Sport discus	In titles			
			Peer reviewed			
			Scholarly articles			
			2000-2015			
6	03-Aug	Ebscohost	Match + analysis + cricket	2	0	Spectator spending patters, already identified within another search
		Sport discus	In titles			
			Peer reviewed			
			Scholarly articles			
			2000-2015			
7	03-Aug	Journals + eBooks				
		AT NWU	Performance analysis,	450	27	Any article related to specific sport other than cricket.
		International Journal	notational analysis,		Included for	Specific analysis within different sports
		of Performance	coaching		PA in sport in	
		Analysis in Sport			general, theories	
		2001 - 2015			methods,	
					statistics,	
					models,	
					frameworks	
					review articles	
					cricket	
8	03-Aug	Google scholar	Mike Hughes	76	**2**	Books, many articles not available or already included in other search and selected
			Sport performance analysis			
9	03-Aug	Google scholar	Peter O'Donaghue	89	0	Books, many articles not available or already included in other search and selected
			Sport performance analysis			
10	03-Aug	Google scholar	Ian. M Franks	55	0	Books, many articles not available or already included in other search and selected
			Sport performance analysis			

ADDENDUM 2.3: CI FIRST ROUND OF EXCLUSIONS (CI IN TITLE)

No	Author	Type of document
1	Du Toit, A.S.A. & Sewdass, N.	Afr. J. Lib. Arch. & Inf. Sc. 24 (1):3-13
2	Marin, J. & Poulter, A.	Journal of Information Science, 30 (2):165–180
3	Sewdass, N. & Du Toit, A.S.A.	International Journal of Information Management 34 (2014) 185–190
4	Salvetat, D. & Laarraf, Z.	Human Systems Management, 32:121–130
5	Wright, S., Bisson, C, & Duffy, A.P.	Journal of Strategic Marketing, 20 (1):19–33
6	Rapp, A., Agnihotri, R. & Baker, T.L.	J. of the Acad. Mark. Sci., 43:357–374
7	Fleisher, C.S. & Wright, S.	Journal of Strategic Marketing, 18 (7):553–572
8	Wright, S., Eid, E.R. & Fleisher, C.S.	Journal of Marketing Management, 25 (9-10):941-964
9	Du Toit, A.S.A.	International Journal of Information Management, 23:111–120
10	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.	South African Business Management, 2002, 33(3), 27-37
11	Theo, T.S.H. & Choo, W.Y.	Information Management, 39:67-83
12	Michaeli, R. & Simon, L.	European Journal of Marketing, 42 (7/8):804 - 813
13	Franco, M., Magrinho, A. & Silva, J.R.	Business Process Management Journal, 17 (2):332 - 356
14	Gatsoris, L.	EuroMed Journal of Business, 7 (3):224 - 242
15	Wright, S., Pickton, D.W. & Callow, J.	Marketing Intelligence & Planning, 20 (6):349 - 360
16	De Pelsmacker, O., Muller, M-L., Viviers, W., et al.	Marketing Intelligence & Planning, 23 (6):606 - 620
17	Dishman, P.L. & Calof, J.L.	European Journal of Marketing, 42 (7/8):766 - 785
18	Saayman, A., Pienaar, J., de Pelsmacker, P.,et al.	Aslib Proceedings, 60 (4):383 - 411
19	Priporas, C-V., Gatsoris, L. & Zacharis, V.	Marketing Intelligence & Planning, 23 (7):659 - 669
20	Tej Adidam, P., Banerjee, M. & Shukla, P.	Journal of Business & Industrial Marketing, 27 (3):242 - 254
21	Nasri, W.	Journal of Enterprise Information Management, 24 (1):53 - 67
22	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.	Aslib Proceedings, 65 (3):262 - 288
23	Wright, S. & Calof, J.L.	European Journal of Marketing, 40 (5/6):453 - 465
24	Zangoueinezhad, A,. & Moshabaki, A.	Industrial Management & Data Systems, 109 (2):262 - 280
25	Dai, Y., Kakkonen, T. & Sutinen, E.	International Journal of Computer Information Systems and Industrial Management Applications, 3:165 -173
26	Qiu, T.	European Journal of Marketing, 42 (7/8)
27	Du Toit, A.S.A. & Sewdass, N.	Acta Commercii 14(1), Art. #234, 7 pages. http://dx.doi.org/10.4102/ac.v14i1.234
28	Du Toit, A.S.A. & Sewdass, N.	Mousaion, 32 (1):85—98
29	Fatti, A. & Du Toit, A.S.A.	Asia Pacific Journal of Business and Management, 4 (1):39-54
30	Strauss, C. & Du Toit, A.S.A.	Journal of Contemporary Management, 7:308 - 325
31	Fleisher, C.S.	Inteligencia y Seguridad, 4: 115-141
32	Varol, I.	Athens: ATINER'S Conference Paper Series, No: SPO2012-0262.
33	Evans, D.M. & Smith, A.C.T.	Sport Management Review, 7:27–56
34	Hughes, S. & Beasley, F.	Proceedings of the Academy of Strategic Management, 3 (2)

Continue...

No	Author	Year	Title	CI	PA	Sport	Cricket
40	Gatsoris, L.	2012	Competitive intelligence in Greek furniture retailing: a qualitative approach				
41	Johns, P. & Van Doren, D.C.	2010	Competitive intelligence in service marketing: A new approach with practical application				
42	Wright, S., Pickton, D.W. & Callow, J.	2002	Competitive intelligence in UK firms: a typology				
43	Tanev, S. & Bailetti. T.	2008	Competitive intelligence information and innovation in small Canadian firms				
44	De Pelsmacker, O., Muller, M-L., Viviers, W., Saayman, A., Cuyvers, L. & Jegers, M.	2005	Competitive intelligence practices of South African and Belgian exporters				
45	Bose, R.	2008	Competitive intelligence process and tools for intelligence analysis				
46	Dishman, P.L. & Calof, J.L.	2008	Competitive intelligence: a multiphasic precedent to marketing strategy				
47	Saayman, A., Pienaar, J., de Pelsmacker, P., Viviers, W., Cuyvers, L., Muller, M-L. & J	2008	Competitive intelligence: construct exploration, validation and equivalence				
48	Priporas, C-V., Gatsoris, L. & Zacharis, V.	2005	Competitive intelligence activity: evidence from Greece				
49	Tej Adidam, P., Banerjee, M. & Shukla, P.	2012	Competitive intelligence and firm's performance in emerging markets: an exploratory study in India				
50	Nasri, W.	2011	Competitive intelligence in Tunisian companies				
51	Trong Tuan, L.	2013	Corporate social responsibility, upward influence behaviour, team processes and competitive intelligence				
52	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.	2013	Enabler and inhibitor factors influencing competitive intelligence practices				
53	Viviers, W.M Saayman, A. & Muller, M-L.	2005	Enhancing a competitive intelligence culture in South Africa				
54	Magnusson, C.	2010	Improving competitive analysis with temporal text visualization				
55	Luu, T.	2014	Knowledge sharing and competitive intelligence				
56	Heppes, D. & Du Toit, A.S.A	2009	Level of maturity of the competitive intelligence function: Case study of a retail bank in South Africa				
57	Yap, C.S., Rashid, M.Z.B. & Sapuan, D.A.	2013	Perceived environmental uncertainty and competitive intelligence practices				
58	Qiu, T.	2008	Scanning for competitive intelligence: a managerial perspective				
59	Guimaraes, T.	2000	The impact of competitive intelligence and IS support in changing small business organizations				
60	Tuan, L.T.	2013	Leading to learning and competitive intelligence				
61	Wright, S. & Calof, J.L.	2006	The quest for competitive, business and marketing intelligence: A country comparison of current practices				
62	Zangoueinezhad, A,. & Moshabaki, A.	2009	The role of structural capital on competitive intelligence				
63	Fleisher, C.S.	2008	Using open source data in developing competitive and marketing intelligence				
64	Dai, Y., Kakkonen, T. & Sutinen, E.	2011	MinEDec: a Decision-Support Model That Combines Text-Mining Technologies with Two Competitive Intelligence Analysis Methods				
65	Calof, J.L.	2014	Evaluating the Impact and Value of Competitive Intelligence From The users Perspective - The Case of the National Research Council's Technical Intelligence Unit				
66	Calof, J.L., Richards, G. & Smith, J.	2015	Foresight, competitive intelligence and business analytics - tools for making industrial programmes more efficient				
67	Qiu, T.	2007	Scanning for competitive intelligence: a managerial perspective				
68	Du Toit, A.S.A.	2013	Comparative Study of Competitive Intelligence Practices between Two Retail Banks in Brazil and South Africa				
69	Du Toit, A.S.A. & Sewdass, N.	2014	A comparison of competitive intelligence activities in Brazil, Malaysia, Morocco and South Africa				
70	Viviers, W., Muller, M-L. & Du Toit, A.S.A.	2005	Competitive Intelligence: an instrument to enhance South Africa's competitiveness				
71	Du Toit, A.S.A. & Straus, C.	2010	Competitive intelligence and Africa's competitiveness: What's happening in South Africa?				
72	Strauss, C. & Du Toit, A.S.A.	2010	Competitive intelligence skills needed to enhance South Africa's competitiveness				
73	Du Toit, A.S.A.	2003	Competitive intelligence in the knowledge economy: what is in it for South African manufacturing enterprises?				
74	Du Toit, A.S.A. & Sewdass, N.	2014	Competitive Intelligence practices in Brazil: An exploratory study				
75	Fatti, A. & Du Toit, A.S.A.	2013	Competitive Intelligence challenges faced by South African Pharmaceutical companies				
76	Heppes, D. & Du Toit, A.S.A.	2008	Level of maturity of the competitive intelligence function: Case study of a retail bank in South Africa Case study of a retail bank in South Africa				
77	Du Toit, A.S.A. & Muller, M-L.	2004	Organizational structure of competitive intelligence activities: a South African case study				
78	Strauss, C. & Du Toit, A.S.A.	2010	Skills shortages and competitiveness in South Africa: the need for competitive intelligence skills				
79	Du Toit, A.S.A. & Muller, M-L.	2005	Training Competitive Intelligence Analysts via the Web: The University of Johannesburg Experience				
80	Fleisher, C.S. & Wright, S.	2008	Setting the Standards for the Professionalization of Competitive Intelligence Practice				
81	Wright, S., Eid, E.R. & Fleisher, C.S.	2009	Competitive intelligence in practice: empirical evidence from the UK retail banking sector				
82	Wright, S. & Fleisher, C.S.	2009	Competitive Intelligence Practice: China, Japan and the West				
83	Fleisher, C.S.	2008	OSINT: Its Implications for Business/Competitive Intelligence Analysis and Analysts				
84	Varol, I.	2012	Investigating Competitive Intelligence Systems of Professional Football Clubs in Turkey				
85	Evans, D.M. & Smith, A.C.T.	2004	The Internet and Competitive Advantage: A Study of Australia's Four Premier Professional Sporting Leagues				
86	Hughes, S. & Beasley, F.	2004	Competitive Intelligence in Professional Sports				

ADDENDUM 2.4: CI 2ND ROUND OF EXCLUSIONS

(4Cs ASPECTS IN ABSTRACT OR FULL TEXT)

No	Author	Year	Title
1	Du Toit, A.S.A. & Sewdass, N.	2014	Competitive Intelligence (CI) in Morocco
2	Barrett, S.E.	2010	Competitive Intelligence: Significance in Higher Education
3	Schwarz, J.O.	2007	Competitive Intelligence: a field for futurists?
4	Canongia, C.	2006	Synergy between Competitive Intelligence (CI), Knowledge Management (KM) and Technological Foresight (TF) as a strategic
			model of prospecting — The use of biotechnology in the development of drugs against breast cancer
5	McGonagle, J.J. & Vella, C.M.	2004	Competitive Intelligence in action
6	Marin, J. & Poulter, A.	2003	Dissemination of competitive intelligence
7	McGonagle, J.J. & Vella, C.M.	2002	A case for Competitive Intelligence
8	Tan, B., Foo, S.& Hui, S.C.	2002	Web information monitoring for competitive intelligence
9	Sewdass, N. & Du Toit, A.S.A.	2014	Current state of competitive intelligence in South Africa
10	Yitmen, I.	2013	Organizational Cultural Intelligence: A Competitive Capability for Strategic Alliances in the International Construction Industry
11	Tuana, L.T.	2013	Competitive intelligence and other levers of brand performance
12	Salvetat, D. & Laarraf, Z.	2013	Competitive intelligence key players within firms: The case of high-technology European firms: The case of high-technology European firms
13	Wright, S., Bisson, C, & Duffy, A.P.	2012	Applying a behavioural and operational diagnostic typology of competitive intelligence practice: empirical evidence from the SME sector in Turkey
14	Rapp, A., Agnihotri, R., Baker, T.L. & Andzulis, J.	2015	Competitive intelligence collection and use by sales and service representatives: how managers' recognition and autonomy moderate individual performance
15	Agnihotri, R. & Rapp, A.	2014	Perspectives on competitive intelligence within business: A tactical tool for salespeople to gain a competitive advantage
16	Xu, K., Shaoyi, S.S., Liao, J. & Song, Y.	2010	Mining comparative opinions from customer reviews for Competitive Intelligence
17	Rapp, A., Agnihotri, R. & Baker, T.L.	2011	Conceptualizing salesperson competitive intelligence: an individual-level perspective
18	Vaughan, L. & You, J.	2011	Exploring web data for competitive intelligence
19	Smith, J.R., Wright, S. & Pickton, D.	2010	Competitive Intelligence programmes for SMEs in France: evidence of changing attitudes
20	Fleisher, C.S. & Wright, S.	2010	Competitive Intelligence analysis failure: diagnosing individual level causes and implementing organisational level remedies
21	Calof, J. & Smith, J.	2010	The integrative domain of foresight and competitive intelligence and its impact on R&D management
22	Wright, S., Eid, E.R. & Fleisher, C.S.	2009	Competitive intelligence in practice: empirical evidence from the UK retail banking sector
23	Fleisher, C.S. & Wright, S.	2009	Examining Differences in Competitive Intelligence Practice: China, Japan, and the West
24	Boncella, R.J.	2003	Competitive Intelligence and the web
25	Fitzpatrick	2003	Uncovering trade secrets: The legal and ethical conundrum of creative competitive intelligence
26	Du Toit, A.S.A.	2003	Competitive intelligence in the knowledge economy: what is in it for South African manufacturing enterprises?
27	Fitzpatrick, W.M. & Burke, D.R.	2003	Competitive intelligence, corporate security and the virtual organization
28	Chen, H., Chau, M. & Zeng, D.	2002	CI Spider: a tool for competitive intelligence on the Web
29	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.	2002	Competitive intelligence practices: a South African study
30	Theo, T.S.H. & Choo, W.Y.	2001	Assessing the impact of using the internet for competitive intelligence
31	Rouch, D. & Santi, P.	2001	Competitive Intelligence Adds Value: Five Intelligence Attitudes
32	Drott, M.C.	2001	Personal knowledge, corporate information: the challenges for competitive intelligence
33	Norling, P.M., Herring, J.P., Rosenkrans, W.A., Stel	2000	Putting Competitive technology intelligence to work
34	Powell, J.H. & Bradford, J.P.	2000	Targeting intelligence gathering in a dynamic competitive environment
35	Calof, J. & Wright, S.	2008	Competitive intelligence: A practitioner, academic and inter-disciplinary perspective
36	Michaeli, R. & Simon, L.	2008	An illustration of Bayes' theorem and its use as a decision-making aid for competitive intelligence and marketing analysts
37	Fahey, L.	2007	Connecting strategy and competitive intelligence: refocusing intelligence to produce critical strategy inputs
38	Do Nascimento Mélo, M.A. & De Medeiros, D.D.	2007	A model for analysing the competitive strategy of health plan insurers using a system of competitive intelligence
39	Franco, M., Magrinho, A. & Silva, J.R.	2011	Competitive intelligence: a research model tested on Portuguese firms

Continue...

No	Author	Type of document
1	Du Toit, A.S.A. & Sewdass, N.	Afr. J. Lib. Arch. & Inf. Sc. 24 (1):3-13
2	Barrett, S.E.	World Future Review August-September, 26-30
3	Schwarz, J.O.	Futures Research Quarterly
4	Canongia, C.	Biotechnology Advances, 25: 57–74
5	McGonagle, J.J. & Vella, C.M.	International Management Journal, 64-68
6	Marin, J. & Poulter, A.	Journal of Information Science, 30 (2):165–180
7	McGonagle, J.J. & Vella, C.M.	International Management Journal, 35-40
8	Tan, B., Foo, S.& Hui, S.C.	Cybernetics and Systems: An International Journal, 33:225– 251
9	Sewdass, N. & Du Toit, A.S.A.	International Journal of Information Management, 34:185–190
10	Yitmen, I.	Project Management Journal, 44 (4):5–25
11	Tuana, L.T.	Journal of Strategic Marketing, 21 (3):217–239
12	Salvetat, D. & Laarraf, Z.	Human Systems Management, 32:121–130
13	Wright, S., Bisson, C, & Duffy, A.P.	Journal of Strategic Marketing, 20 (1):19–33
14	Rapp, A., Agnihotri, R., Baker, T.L. & Andzulis, J.	J. of the Acad. Mark. Sci., 43:357–374
15	Agnihotri, R. & Rapp, A.	The Marketing Review, 11 (4):363-380
16	Xu, K., Shaoyi, S.S., Liao, J. & Song, Y.	Decision Support Systems, 50:743–754
17	Rapp, A., Agnihotri, R. & Baker, T.L.	Journal of Personal Selling & Sales Management, XXXI (2):141–155.
18	Vaughan, L. & You, J.	ACR, 19 (1&2)
19	Smith, J.R., Wright, S. & Pickton, D.	Journal of Strategic Marketing, 18 (7):523–536
20	Fleisher, C.S. & Wright, S.	Journal of Strategic Marketing, 18 (7):553–572
21	Calof, J. & Smith, J.	R&D Management, 40 (1):31-39
22	Wright, S., Eid, E.R. & Fleisher, C.S.	Journal of Marketing Management, 25 (9-10):941-964
23	Fleisher, C.S. & Wright, S.	Thunderbird International Business Review, 51 (3)
24	Boncella, R.J.	Communications of the Association for Information Systems, 12:327-340
25	Fitzpatrick	SAM Advanced management journal, 4-13
26	Du Toit, A.S.A.	International Journal of Information Management, 23:111–120
27	Fitzpatrick, W.M. & Burke, D.R.	ACR, 11 (1):5-40
28	Chen, H., Chau, M. & Zeng, D.	Decision Support Systems, 34:1-17
29	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.	South African Business Management, 33 (3): 27-37
30	Theo, T.S.H. & Choo, W.Y.	Information Management, 39:67-83
31	Rouch, D. & Santi, P.	European Management Journal, 19 (5):552–559
32	Drott, M.C.	Business Horizons, 31-37
33	Norling, P.M., Herring, J.P., Rosenkrans, W.A., Stellflug,	Industrial Research, 23-29
34	Powell, J.H. & Bradford, J.P.	International Journal of Information Management, 20:181-195
35	Calof, J. & Wright, S.	European Journal of Marketing, 42 (7/8):717 - 730
36	Michaeli, R. & Simon, L.	European Journal of Marketing, 42 (7/8):804 - 813
37	Fahey, L.	Strategy & Leadership, 35 (1):4 - 12
38	Do Nascimento Mélo, M.A. & De Medeiros, D.D.	The TQM Magazine, 19 (3):206 - 216
39	Franco, M., Magrinho, A. & Silva, J.R.	Business Process Management Journal, 17 (2):332 - 356

Continue...

No	Author	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion
1	Du Toit, A.S.A. & Sewdass, N.					Quantitative						
2	Barrett, S.E.					Review						
3	Schwarz, J.O.					Review						
4	Canongia, C.					Review						
						Quantitative						
5	McGonagle, J.J. & Vella, C.M.					Case study						
6	Marin, J. & Poulter, A.					Quantitative + qualitative						
7	McGonagle, J.J. & Vella, C.M.					Review						
8	Tan, B., Foo, S.& Hui, S.C.					Quantitative						
9	Sewdass, N. & Du Toit, A.S.A.					Quantitative						
10	Yitmen, I.					Quantitative						
11	Tuana, L.T.					Quantitative						
12	Salvetat, D. & Laarraf, Z.					Quantitative						
13	Wright, S., Bisson, C, & Duffy, A.P.					Quantitative						
14	Rapp, A., Agnihotri, R., Baker, T.L. & Andzulis, J.					Quantitative						
15	Agnihotri, R. & Rapp, A.					Review						
16	Xu, K., Shaoyi, S.S., Liao, J. & Song, Y.					Review						
17	Rapp, A., Agnihotri, R. & Baker, T.L.					Quantitative						
18	Vaughan, L. & You, J.					Quantitative						
19	Smith, J.R., Wright, S. & Pickton, D.					Qualitative						
20	Fleisher, C.S. & Wright, S.					Quantitative						
21	Calof, J. & Smith, J.					Review						
22	Wright, S., Eid, E.R. & Fleisher, C.S.					Qualitative, Exploratory, Descriptive						
23	Fleisher, C.S. & Wright, S.					Review						
24	Boncella, R.J.					Quantitative						
25	Fitzpatrick					Review						
26	Du Toit, A.S.A.					Quantitative: Empirical						
27	Fitzpatrick, W.M. & Burke, D.R.					Review						
28	Chen, H., Chau, M. & Zeng, D.					Quantitative						
29	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.					Quantitative						
30	Theo, T.S.H. & Choo, W.Y.					Quantitative						
31	Rouch, D. & Santi, P.					Review						
32	Drott, M.C.					Review						
33	Norling, P.M., Herring, J.P., Rosenkrans, W.A. et al.					Review						
34	Powell, J.H. & Bradford, J.P.					Quantitative						
35	Calof, J. & Wright, S.					Review						
36	Michaeli, R. & Simon, L.					Mathematical concept						
37	Fahey, L.					Review						
38	Do Nascimento Mélo, M.A. & De Medeiros, D.D.					Review						
39	Franco, M., Magrinho, A. & Silva, J.R.					Quantitative						

Continue...

No	Author	Year	Title
40	Gatsoris, L.	2012	Competitive intelligence in Greek furniture retailing: a qualitative approach
41	Johns, P. & Van Doren, D.C.	2010	Competitive intelligence in service marketing: A new approach with practical application
42	Wright, S., Pickton, D.W. & Callow, J.	2002	Competitive intelligence in UK firms: a typology
43	Tanev, S. & Bailetti. T.	2008	Competitive intelligence information and innovation in small Canadian firms
44	De Pelsmacker, O., Muller, M-L., Viviers, W., Saayı	2005	Competitive intelligence practices of South African and Belgian exporters
45	Bose, R.	2008	Competitive intelligence process and tools for intelligence analysis
46	Dishman, P.L. & Calof, J.L.	2008	Competitive intelligence: a multiphasic precedent to marketing strategy
47	Saayman, A., Pienaar, J., de Pelsmacker, P., Vivier	2008	Competitive intelligence: construct exploration, validation and equivalence
48	Priporas, C-V., Gatsoris, L. & Zacharis, V.	2005	Competitive intelligence activity: evidence from Greece
49	Tej Adidam, P., Banerjee, M. & Shukla, P.	2012	Competitive intelligence and firm's performance in emerging markets: an exploratory study in India
50	Nasri, W.	2011	Competitive intelligence in Tunisian companies
51	Trong Tuan, L.	2013	Corporate social responsibility, upward influence behaviour, team processes and competitive intelligence
52	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.	2013	Enabler and inhibitor factors influencing competitive intelligence practices
53	Viviers, W.M Saayman, A. & Muller, M-L.	2005	Enhancing a competitive intelligence culture in South Africa
54	Magnusson, C.	2010	Improving competitive analysis with temporal text visualization
55	Luu, T.	2014	Knowledge sharing and competitive intelligence
56	Heppes, D. & Du Toit, A.S.A	2009	Level of maturity of the competitive intelligence function: Case study of a retail bank in South Africa
57	Yap, C.S., Rashid, M.Z.B. & Sapuan, D.A.	2013	Perceived environmental uncertainty and competitive intelligence practices
58	Qiu, T.	2008	Scanning for competitive intelligence: a managerial perspective
59	Guimaraes, T.	2000	The impact of competitive intelligence and IS support in changing small business organizations
60	Tuan, L.T.	2013	Leading to learning and competitive intelligence
61	Wright, S. & Calof, J.L.	2006	The quest for competitive, business and marketing intelligence: A country comparison of current practices
62	Zangoueinezhad, A,. & Moshabaki, A.	2009	The role of structural capital on competitive intelligence
63	Fleisher, C.S.	2008	Using open source data in developing competitive and marketing intelligence
64	Dai, Y., Kakkonen, T. & Sutinen, E.	2011	MinEDec: a Decision-Support Model That Combines Text-Mining Technologies with Two Competitive Intelligence Analysis Methods
65	Calof, J.L.	2014	Evaluating the Impact and Value of Competitive Intelligence From The users Perspective - The Case of the National Research Council's Technical Intelligence Unit
66	Calof, J.L., Richards, G. & Smith, J.	2015	Foresight, competitive intelligence and business analytics - tools for making industrial programmes more efficient
67	Qiu, T.	2007	Scanning for competitive intelligence: a managerial perspective
68	Du Toit, A.S.A.	2013	Comparative Study of Competitive Intelligence Practices between Two Retail Banks in Brazil and South Africa
69	Du Toit, A.S.A. & Sewdass, N.	2014	A comparison of competitive intelligence activities in Brazil, Malaysia, Morocco and South Africa
70	Viviers, W., Muller, M-L. & Du Toit, A.S.A.	2005	Competitive Intelligence: an instrument to enhance South Africa's competitiveness
71	Du Toit, A.S.A. & Straus, C.	2010	Competitive intelligence and Africa's competitiveness: What's happening in South Africa?
72	Strauss, C. & Du Toit, A.S.A.	2010	Competitive intelligence skills needed to enhance South Africa's competitiveness
73	Du Toit, A.S.A.	2003	Competitive intelligence in the knowledge economy: what is in it for South African manufacturing enterprises?
74	Du Toit, A.S.A. & Sewdass, N.	2014	Competitive Intelligence practices in Brazil: An exploratory study
75	Fatti, A. & Du Toit, A.S.A.	2013	Competitive Intelligence challenges faced by South African Pharmaceutical companies
76	Heppes, D. & Du Toit, A.S.A.	2008	Level of maturity of the competitive intelligence function: Case study of a retail bank in South Africa Case study of a retail bank in South Africa
77	Du Toit, A.S.A. & Muller, M-L.	2004	Organizational structure of competitive intelligence activities: a South African case study
78	Strauss, C. & Du Toit, A.S.A.	2010	Skills shortages and competitiveness in South Africa: the need for competitive intelligence skills
79	Du Toit, A.S.A. & Muller, M-L.	2005	Training Competitive Intelligence Analysts via the Web: The University of Johannesburg Experience
80	Fleisher, C.S. & Wright, S.	2008	Setting the Standards for the Professionalization of Competitive Intelligence Practice
81	Wright, S. & Fleisher, C.S.	2009	Competitive Intelligence Practice: China, Japan and the West
82	Fleisher, C.S.	2008	OSINT: Its Implications for Business/Competitive Intelligence Analysis and Analysts
83	Varol, I.	2012	Investigating Competitive Intelligence Systems of Professional Football Clubs in Turkey
84	Evans, D.M. & Smith, A.C.T.	2004	The Internet and Competitive Advantage: A Study of Australia's Four Premier Professional Sporting Leagues
85	Hughes, S. & Beasley, F.	2004	Competitive Intelligence in Professional Sports

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No	Author	Type of document
40	Gatsoris, L.	EuroMed Journal of Business, 7 (3):224 - 242
41	Johns, P. & Van Doren, D.C.	Marketing Intelligence & Planning, 28 (5):551 - 570
42	Wright, S., Pickton, D.W. & Callow, J.	Marketing Intelligence & Planning, 20 (6):349 - 360
43	Tanev, S. & Bailetti. T.	European Journal of Marketing, 42 (7/8):786 - 803
44	De Pelsmacker, O., Muller, M-L., Viviers, W., Saayman,	Marketing Intelligence & Planning, 23 (6):606 - 620
45	Bose, R.	Industrial Management & Data Systems, 108 (4):510 - 528
46	Dishman, P.L. & Calof, J.L.	European Journal of Marketing, 42 (7/8):766 - 785
47	Saayman, A., Pienaar, J., de Pelsmacker, P., Viviers, W.	Aslib Proceedings, 60 (4):383 - 411
48	Priporas, C-V., Gatsoris, L. & Zacharis, V.	Marketing Intelligence & Planning, 23 (7):659 - 669
49	Tej Adidam, P., Banerjee, M. & Shukla, P.	Journal of Business & Industrial Marketing, 27 (3):242 - 254
50	Nasri, W.	Journal of Enterprise Information Management, 24 (1):53 - 67
51	Trong Tuan, L.	Team Performance Management: An International Journal, 19 (1/2):6 - 33
52	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.	Aslib Proceedings, 65 (3):262 - 288
53	Viviers, W.M Saayman, A. & Muller, M-L.	International Journal of Social Economics, 32 (7):576 - 589
54	Magnusson, C.	Marketing Intelligence & Planning, 28 (5):571 - 581
55	Luu, T.	Marketing Intelligence & Planning, 32 (3):269 - 292
56	Heppes, D. & Du Toit, A.S.A	Aslib Proceedings, 61 (1):48 - 66
57	Yap, C.S., Rashid, M.Z.B. & Sapuan, D.A.	VINE: The journal of information and knowledge management systems, 43 (4):462 - 481
58	Qiu, T.	European Journal of Marketing, 42 (7/8):814 - 835
59	Guimaraes, T.	Logistics Information Management, 13 (3):117 - 125
60	Tuan, L.T.	The Learning Organization, 20 (3):216 - 239
61	Wright, S. & Calof, J.L.	European Journal of Marketing, 40 (5/6):453 - 465
62	Zangoueinezhad, A,. & Moshabaki, A.	Industrial Management & Data Systems, 109 (2):262 - 280
63	Fleisher, C.S.	European Journal of Marketing, 42 (7/8):852 - 866
64	Dai, Y., Kakkonen, T. & Sutinen, E.	International Journal of Computer Information Systems and Industrial Management Applications, 3:165 -173
65	Calof, J.L.	Journal of Intelligence Studies in Business, 4 (2):79-90
66	Calof, J.L., Richards, G. & Smith, J.	Foresight-Russia, 9 (1):68–81.
67	Qiu, T.	European Journal of Marketing, 42 (7/8)
68	Du Toit, A.S.A.	Journal of Intelligence Studies in Business, 2:30-39
69	Du Toit, A.S.A. & Sewdass, N.	Acta Commercii 14(1), Art. #234, 7 pages. http://dx.doi.org/10.4102/ac.v14i1.234
70	Viviers, W., Muller, M-L. & Du Toit, A.S.A.	SAJEMS NS, 8 (2):46-254
71	Du Toit, A.S.A. & Straus, C.	Mousaion 28 (2):17–31
72	Strauss, C. & Du Toit, A.S.A.	Aslib Proceedings: New Information Perspectives, 62(3)
73	Du Toit, A.S.A.	International Journal of Information Management, 23:111–120
74	Du Toit, A.S.A. & Sewdass, N.	Mousaion, 32 (1):85—98
75	Fatti, A. & Du Toit, A.S.A.	Asia Pacific Journal of Business and Management, 4 (1):39-54
76	Heppes, D. & Du Toit, A.S.A.	Aslib Proceedings: New Information Perspectives, 62 (3)
77	Du Toit, A.S.A. & Muller, M-L.	South African Journal of Information Management, 6 (3)
78	Strauss, C. & Du Toit, A.S.A.	Journal of Contemporary Management, 7:308 - 325
79	Du Toit, A.S.A. & Muller, M-L.	J. of Education for Library and Information Science, 46 (4)
80	Fleisher, C.S. & Wright, S.	European Competitive Intelligence Symposium (ECIS), Lisbon, Portugal
81	Wright, S. & Fleisher, C.S.	Thunderbird International Business Review
82	Fleisher, C.S.	Inteligencia y Seguridad, 4: 115-141
83	Varol, I.	Athens: ATINER'S Conference Paper Series, No: SPO2012-0262.
84	Evans, D.M. & Smith, A.C.T.	Sport Management Review, 7:27–56
85	Hughes, S. & Beasley, F.	Proceedings of the Academy of Strategic Management, 3 (2)

Continue...

No	Author	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion
40	Gatsoris, L.					Qualitative						
41	Johns, P. & Van Doren, D.C.					Qualitative						
42	Wright, S., Pickton, D.W. & Callow, J.					Qualitative						
43	Tanev, S. & Bailetti. T.					Qualitative						
44	De Pelsmacker, O., Muller, M-L., Viviers, W. et al.					Qualitative						
45	Bose, R.					Review						
46	Dishman, P.L. & Calof, J.L.					Qualitative						
47	Saayman, A., Pienaar, J., de Pelsmacker, P., et al.					Quantitative						
48	Priporas, C-V., Gatsoris, L. & Zacharis, V.					Qualitative						
49	Tej Adidam, P., Banerjee, M. & Shukla, P.					Quantitative						
50	Nasri, W.					Qualitative						
51	Trong Tuan, L.					Quantitative						
52	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.					Qualitative						
53	Viviers, W.M Saayman, A. & Muller, M-L.					Quantitative						
54	Magnusson, C.					Qualitative						
55	Luu, T.					Quantitative						
56	Heppes, D. & Du Toit, A.S.A					Review						
57	Yap, C.S., Rashid, M.Z.B. & Sapuan, D.A.					Quantitative						
58	Qiu, T.					Quantitative						
59	Guimaraes, T.					Quantitative						
60	Tuan, L.T.					Quantitative						
61	Wright, S. & Calof, J.L.					Quantitative						
62	Zangoueinezhad, A,. & Moshabaki, A.					Quantitative						
63	Fleisher, C.S.					Conceptual paper						
64	Dai, Y., Kakkonen, T. & Sutinen, E.					Quantitative						
65	Calof, J.L.					Quantitative						
66	Calof, J.L., Richards, G. & Smith, J.					Quantitative						
67	Qiu, T.					Quantitative						
68	Du Toit, A.S.A.					Quantitative						
69	Du Toit, A.S.A. & Sewdass, N.					Quantitative						
70	Viviers, W., Muller, M-L. & Du Toit, A.S.A.					Review						
71	Du Toit, A.S.A. & Straus, C.					Review						
72	Strauss, C. & Du Toit, A.S.A.					Review						
73	Du Toit, A.S.A.					Quantitative						
74	Du Toit, A.S.A. & Sewdass, N.					Quantitative						
75	Fatti, A. & Du Toit, A.S.A.					Quantitative						
76	Heppes, D. & Du Toit, A.S.A.					Review						
77	Du Toit, A.S.A. & Muller, M-L.					Review						
78	Strauss, C. & Du Toit, A.S.A.					Quantitative						
79	Du Toit, A.S.A. & Muller, M-L.					Quantitative						
80	Fleisher, C.S. & Wright, S.					Review						
81	Wright, S. & Fleisher, C.S.					Review						
82	Fleisher, C.S.					Quantitative						
83	Varol, I.					Quantitative						
84	Evans, D.M. & Smith, A.C.T.					Qualitative						
85	Hughes, S. & Beasley, F.					Quantitative						

ADDENDUM 2.5: PA FIRST ROUND OF EXCLUSIONS (PA IN TITLE)

No	Author	Year	Title	CI	PA	Sport	Cricket
1	Cooper, S.J., Hughes, M., O'Donoghue, P. & Nevill, A.M.	2007	A simple statistical method for assessing the reliability of data entered into sport performance analysis systems				
2	Robinson, G. & O'Donoghue, P.	2007	A weighted kappa statistic for reliability testing in performance analysis of sport				
3	Rial, A., Rial, J., Varela, J. & Real, E.	2008	An application of importance-performance analysis (IPA) to the management of sport centres				
4	McGarry, T.	2009	Applied and theoretical perspectives of performance analysis in sport: Scientific issues and challenges				
5	O'Donoghue, P.	2008	Principal Components Analysis in the selection of Key Performance Indicators in Sport				
6	Atkinson, G. & Nevill, A.M.	2001	Selected issues in the design and analysis of sport performance research				
7	Duarte, R., Araújo, D., Correia, V. & Davids, K.	2012	Sports Teams as Super organisms: Implications of Sociobiological Models of Behaviour for Research and Practice in Team Sports Performance Analysis				
8	Moore, A., Turner, D.J. & Johnstone, J.A.	2012	A preliminary analysis of team performance in English first-class Twenty-Twenty (T20) cricket				
9	Lemmer, H.H.	2012	An analysis of players' performances in the first Cricket Twenty20 World Cup Series				
10	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.	2008	Analysis of performance at the 2007 Cricket World Cup				
11	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.	2008	Analysis of Twenty/20 Cricket performance during the 2008 Indian Premier League				
12	Amin, G.R. & Sharma, S.K.	2014	Cricket team selection using data envelopment analysis				
13	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,	2006	The viability of business data mining in the sports environment: cricket match analysis as application				
14	Borrie, A., Jonsson, G.K. & Magnusson, M.S.	2002	Temporal pattern analysis and its applicability in sport: an explanation and exemplar data				
15	Franks, I.M., Hodges, N. & More, K.	2001	Analysis of coaching behaviour				
16	Hughes, M., Cooper, S-M. & Nevill, A.	2002	Analysis procedures for non-parametric data from performance analysis				
17	Franks, I.M.	2002	Evidence-based practice and the coaching process				
18	Hughes, M.	2004	Performance analysis – a 2004 perspective.				
19	Reed, D & O'Donoghue, P.	2005	Development and application of computer-based prediction methods				
20	O'Donoghue, P.	2005	Normative Profiles of Sports Performance				
21	Hughes, M.	2005	Notational analysis – a mathematical perspective.				
22	Lyons, K.	2005	Performance Analysis in Applied Contexts				
23	Baca, A.	2006	Innovative diagnostic methods in elite sport.				
24	O'Donoghue, P.	2006	The use of feedback videos in sport.				
25	Di Salvo, V., Collins, A., McNeill, B. & Cardinale, M.	2006	Validation of Prozone ®: A new video-based performance analysis system				
26	Cooper, S.M., Hughes, M., O'Donoghue, P. & Nevill, A.M.	2007	A simple statistical method for assessing the reliability of data entered into sport performance analysis systems				
27	Lames, M. & McGarry, T.	2007	On the search for reliable performance indicators in game sports				
28	O'Donoghue, P.	2007	Reliability Issues in Performance Analysis				
29	James, N., Taylor, J. & Stanley, S.	2007	Reliability procedures for categorical data in Performance Analysis				
30	Bradley, P., O'Donoghue, P., Wooster, B. & Tordoff, P.	2007	The reliability of ProZone MatchViewer: a video-based technical performance analysis system				
31	O'Donoghue, P.	2008	Principal Components Analysis in the selection of Key Performance Indicators in Sport				
32	McGarry, T.	2009	Applied and theoretical perspectives of performance analysis in sport: Scientific issues and challenges				
33	O'Donoghue, P.	2009	Interacting Performances Theory				
34	Petersen, C., Pyne, D.B., Portus, M.R. & Dawson, B.	2009	Quantifying positional movement patterns in Twenty20 cricket				
35	O'Donoghue, P. & Cullinane, A.	2011	A regression-based approach to interpreting sports performance				
36	Williams, J.J.	2012	Operational definitions in performance Analysis and the need for consensus.				
37	Wright, C., Atkins, S. & Jones, B.	2012	An analysis of elite coaches' engagement with performance analysis services (match, notational analysis and technique analysis)				
38	Sharma, S.K., Amin, G.R. & Gattoufi, S.	2012	Choosing the best Twenty20 cricket batsmen using ordered weighted averaging				
39	Bampouras, T.M., Cronin, C. & Miller, P.K.	2012	Performance analytic processes in elite sport practice: An exploratory investigation of the perspectives of a sport scientist, coach and athlete.				
40	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.	2012	Predicting the Performance of Bowlers in IPL: An Application of Artificial Neural Network				
41	Lorains, M., Ball, K. & MacMahon, C.	2013	Performance analysis for decision making in team sports				
42	Butterworth, A., O'Donoghue, P. & Cropley, B.	2013	Performance profiling in sports coaching: a review				
43	Sankaran, S.	2014	Comparing Pay versus Performance of IPL Bowlers: An application of Cluster Analysis				
44	Najdan, M.J., Robins, M.T. & Glazier, P.S.	2014	Determinants of success in English domestic Twenty20 cricket				
45	Bhattacharjee, D. & Saikia, H.	2014	On Performance Measurement of Cricketers and Selecting an Optimum Balanced Team				
46	Lyons, K.	2011	Sport Coaches Use of Cloud Computing: From here to Ubiquity				

ADDENDUM 2.6: PA 2ND ROUND EXCLUSIONS (4Cs IN ABSTRACT AND FULL TEXT)

No	Author	Year	Title
1	Cooper, S.J., Hughes, M., O'Donoghue, P. & Nevill, A.M.	2007	A simple statistical method for assessing the reliability of data entered into sport performance analysis systems
2	Robinson, G. & O'Donoghue, P.	2007	A weighted kappa statistic for reliability testing in performance analysis of sport
3	Rial, A., Rial, J., Varela, J. & Real, E.	2008	An application of importance-performance analysis (IPA) to the management of sport centres
4	McGarry, T.	2009	Applied and theoretical perspectives of performance analysis in sport: Scientific issues and challenges
5	O'Donoghue, P.	2008	Principal Components Analysis in the selection of Key Performance Indicators in Sport
6	Atkinson, G. & Nevill, A.M.	2001	Selected issues in the design and analysis of sport performance research
7	Duarte, R., Araújo, D., Correia, V. & Davids, K.	2012	Sports Teams as Super organisms: Implications of Sociobiological Models of Behaviour for Research and Practice in Team Sports Performance Analysis
8	Moore, A., Turner, D.J. & Johnstone, J.A.	2012	A preliminary analysis of team performance in English first-class Twenty-Twenty (T20) cricket
9	Lemmer, H.H.	2012	An analysis of players' performances in the first Cricket Twenty20 World Cup Series
10	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.	2008	Analysis of performance at the 2007 Cricket World Cup
11	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.	2008	Analysis of Twenty/20 Cricket performance during the 2008 Indian Premier League
12	Amin, G.R. & Sharma, S.K.	2014	Cricket team selection using data envelopment analysis
13	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,	2006	The viability of business data mining in the sports environment: cricket match analysis as application
14	Borrie, A., Jonsson, G.K. & Magnusson, M.S.	2002	Temporal pattern analysis and its applicability in sport: an explanation and exemplar data
15	Franks, I.M., Hodges, N. & More, K.	2001	Analysis of coaching behaviour
16	Hughes, M., Cooper, S-M. & Nevill, A.	2002	Analysis procedures for non-parametric data from performance analysis
17	Franks, I.M.	2002	Evidence-based practice and the coaching process
18	Hughes, M.	2004	Performance analysis – a 2004 perspective.
19	Reed, D & O'Donoghue, P.	2005	Development and application of computer-based prediction methods
20	O'Donoghue, P.	2005	Normative Profiles of Sports Performance
21	Hughes, M.	2005	Notational analysis – a mathematical perspective.
22	Lyons, K.	2005	Performance Analysis in Applied Contexts
23	Baca, A.	2006	Innovative diagnostic methods in elite sport.
24	O'Donoghue, P.	2006	The use of feedback videos in sport.
25	Di Salvo, V., Collins, A., McNeill, B. & Cardinale, M.	2006	Validation of Prozone ®: A new video-based performance analysis system
26	Lames, M. & McGarry, T.	2007	On the search for reliable performance indicators in game sports
27	O'Donoghue, P.	2007	Reliability Issues in Performance Analysis
28	James, N., Taylor, J. & Stanley, S.	2007	Reliability procedures for categorical data in Performance Analysis
29	Bradley, P., O'Donoghue, P., Wooster, B. & Tordoff, P.	2007	The reliability of ProZone MatchViewer: a video-based technical performance analysis system
30	O'Donoghue, P.	2009	Interacting Performances Theory
31	Petersen, C., Pyne, D.B., Portus, M.R. & Dawson, B.	2009	Quantifying positional movement patterns in Twenty20 cricket
32	O'Donoghue, P. & Cullinane, A.	2011	A regression-based approach to interpreting sports performance
33	Williams, J.J.	2012	Operational definitions in performance Analysis and the need for consensus.
34	Wright, C., Atkins, S. & Jones, B.	2012	An analysis of elite coaches' engagement with performance analysis services (match, notational analysis and technique analysis)
35	Sharma, S.K., Amin, G.R. & Gattoufi, S.	2012	Choosing the best Twenty20 cricket batsmen using ordered weighted averaging
36	Bampouras, T.M., Cronin, C. & Miller, P.K.	2012	Performance analytic processes in elite sport practice: An exploratory investigation of the perspectives of a sport scientist, coach and athlete.
37	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.	2012	Predicting the Performance of Bowlers in IPL: An Application of Artificial Neural Network
38	Lorains, M., Ball, K. & MacMahon, C.	2013	Performance analysis for decision making in team sports
39	Butterworth, A., O'Donoghue, P. & Cropley, B.	2013	Performance profiling in sports coaching: a review
40	Sankaran, S.	2014	Comparing Pay versus Performance of IPL Bowlers: An application of Cluster Analysis
41	Najdan, M.J., Robins, M.T. & Glazier, P.S.	2014	Determinants of success in English domestic Twenty20 cricket
42	Bhattacharjee, D. & Saikia, H.	2014	On Performance Measurement of Cricketers and Selecting an Optimum Balanced Team
43	Lyons, K.	2011	Sport Coaches Use of Cloud Computing: From here to Ubiquity

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No	Author	Type of document
1	Cooper, S.J., Hughes, M., O'Donoghue, P. & Nevill, A.M	International Journal of Performance Analysis in Sport, 7 (1):87-109.
2	Robinson, G. & O'Donoghue, P.	International Journal of Performance Analysis in Sport, 7 (1):12-19.
3	Rial, A., Rial, J., Varela, J. & Real, E.	Managing Leisure 13:179-188.
4	McGarry, T.	International Journal of Performance Analysis of Sport, 9:128-140.
5	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 8 (3):145-155.
6	Atkinson, G. & Nevill, A.M.	Journal of Sport Sciences, 19:811-827.
7	Duarte, R., Araújo, D., Correia, V. & Davids, K.	Sports Medicine, 42 (8):633-642.
8	Moore, A., Turner, D.J. & Johnstone, J.A.	International Journal of Performance Analysis in Sport, 12:188-207.
9	Lemmer, H.H.	South African Journal for Research in Sport, Physical Education and Recreation, 30 (2):71-77.
10	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawso	International Journal of Performance Analysis in Sport, 8 (1):1-8.
11	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.	International Journal of Performance Analysis in Sport, 8 (3):63-69.
12	Amin, G.R. & Sharma, S.K.	European Journal of Sport Science, 14 (1):369-376.
13	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,	South African Journal for Research in Sport, Physical Education and Recreation, 28 (1):109-125.
14	Borrie, A., Jonsson, G.K. & Magnusson, M.S.	Journal of Sports Sciences, 20:845- 852.
15	Franks, I.M., Hodges, N. & More, K.	International Journal of Performance Analysis in Sport, 1 (1):27-36.
16	Hughes, M., Cooper, S-M. & Nevill, A.	International Journal of Performance Analysis in Sport, 2 (1):6-20.
17	Franks, I.M.	International Journal of Performance Analysis in Sport, 2 (1):1-6.
18	Hughes, M.	International Journal of Performance Analysis in Sport, 4 (2):103-109.
19	Reed, D & O'Donoghue, P.	International Journal of Performance Analysis in Sport, 5 (3):12-28.
20	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 5 (1):104-119.
21	Hughes, M.	International Journal of Performance Analysis in Sport, 4 (2):97-139.
22	Lyons, K.	International Journal of Performance Analysis in Sport, 5 (3):155-162.
23	Baca, A.	International Journal of Performance Analysis in Sport, 6 (2):148-156.
24	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 6 (2):1-4.
25	Di Salvo, V., Collins, A., McNeill, B. & Cardinale, M.	International Journal of Performance Analysis in Sport, 6 (2):108-119.
26	Lames, M. & McGarry, T.	International Journal of Performance Analysis in Sport, 7 (1):62-79.
27	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 7 (1):35-48.
28	James, N., Taylor, J. & Stanley, S.	International Journal of Performance Analysis in Sport, 7 (1):1-11.
29	Bradley, P., O'Donoghue, P., Wooster, B. & Tordoff, P.	International Journal of Performance Analysis in Sport, 7 (3):117-129.
30	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 9 (1):26-46.
31	Petersen, C., Pyne, D.B., Portus, M.R. & Dawson, B.	International Journal of Performance Analysis of Sport, 9:128-140.
32	O'Donoghue, P. & Cullinane, A.	International Journal of Performance Analysis in Sport, 11:295-307.
33	Williams, J.J.	International Journal of Performance Analysis in Sport, 12 (1):52-63
34	Wright, C., Atkins, S. & Jones, B.	International Journal of Performance Analysis in Sport, 12 (2):436-451.
35	Sharma, S.K., Amin, G.R. & Gattoufi, S.	International Journal of Performance Analysis in Sport, 12 (3):614-628.
36	Bampouras, T.M., Cronin, C. & Miller, P.K.	International Journal of Performance Analysis in Sport, 12 (2):468-483.
37	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.	International Journal of Performance Analysis in Sport, 12 (1):75-89.
38	Lorains, M., Ball, K. & MacMahon, C.	International Journal of Performance Analysis in Sport, 13 (1):110-119.
39	Butterworth, A., O'Donoghue, P. & Cropley, B.	International Journal of Performance Analysis in Sport, 13 (3):572-593.
40	Sankaran, S.	International Journal of Performance Analysis in Sport, 14 (1):174-187.
41	Najdan, M.J., Robins, M.T. & Glazier, P.S.	International Journal of Performance Analysis in Sport, 14 (1):276-295.
42	Bhattacharjee, D. & Saikia, H.	International Journal of Performance Analysis in Sport, 14 (1:262-275.
43	Lyons, K.	International Journal of Computer Science in Sport, 10 (1):1-26.

Continue...

No	Author	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion	Exclusion
1	Cooper, S.J., Hughes, M., O'Donoghue, P. & Nevill, A.M.					Quantitative: Experiment							
2	Robinson, G. & O'Donoghue, P.					Quantitative: Experiment							
3	Rial, A., Rial, J., Varela, J. & Real, E.					Qualitative							
4	McGarry, T.					Systematic Review							
5	O'Donoghue, P.					Quantitative: Observational							
6	Atkinson, G. & Nevill, A.M.					Quantitative: Statistical							
7	Duarte, R., Araújo, D., Correia, V. & Davids, K.					Modelling							
8	Moore, A., Turner, D.J. & Johnstone, J.A.					Quantitative: statistics							
9	Lemmer, H.H.					Quantitative: statistics							
10	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.					Quantitative: statistics							
11	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.					Quantitative: statistics							
12	Amin, G.R. & Sharma, S.K.					Quantitative: statistics							
13	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,					Quantitative: statistics							
14	Borrie, A., Jonsson, G.K. & Magnusson, M.S.					Quantitative: Observational							
15	Franks, I.M., Hodges, N. & More, K.					Systematic Review							
16	Hughes, M., Cooper, S-M. & Nevill, A.					Quantitative: statistics							
17	Franks, I.M.					Systematic Review							
18	Hughes, M.					Quantitative							
19	Reed, D & O'Donoghue, P.					Quantitative							
20	O'Donoghue, P.					Quantitative: statistics							
21	Hughes, M.					Quantitative: statistics							
22	Lyons, K.					Quantitative: statistics							
23	Baca, A.					Quantitative: Observational							
24	O'Donoghue, P.					Quantitative: Observational							
25	Di Salvo, V., Collins, A., McNeill, B. & Cardinale, M.					Quantitative							
26	Lames, M. & McGarry, T.					Quantitative: statistics							
27	O'Donoghue, P.					Quantitative: statistics							
28	James, N., Taylor, J. & Stanley, S.					Quantitative: statistics							
29	Bradley, P., O'Donoghue, P., Wooster, B. & Tordoff, P.					Quantitative: statistics							
30	O'Donoghue, P.					Quantitative: statistics							
31	Petersen, C., Pyne, D.B., Portus, M.R. & Dawson, B.					Quantitative: statistics							
32	O'Donoghue, P. & Cullinane, A.					Quantitative: statistics							
33	Williams, J.J.					Quantitative: statistics							
34	Wright, C., Atkins, S. & Jones, B.					Quantitative: stratified sample							
35	Sharma, S.K., Amin, G.R. & Gattoufi, S.					Quantitative: statistics							
36	Bampouras, T.M., Cronin, C. & Miller, P.K.					Qualitative							
37	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.					Quantitative: statistics							
38	Lorains, M., Ball, K. & MacMahon, C.					Quantitative: statistics							
39	Butterworth, A., O'Donoghue, P. & Cropley, B.					Review							
40	Sankaran, S.					Quantitative							
41	Najdan, M.J., Robins, M.T. & Glazier, P.S.					Quantitative: statistics							
42	Bhattacharjee, D. & Saikia, H.					Quantitative: statistics							
43	Lyons, K.					Quantitative							

ADDENDUM 2.7: PA 3RD ROUND EXCLUSIONS

(PA WITH CI 4Cs IN ABSTRACT AND FULL TEXT)

No	Author	Year	Title
1	Cooper, S.J., Hughes, M., O'Donoghue, P. & Nevill, A.M.	2007	A simple statistical method for assessing the reliability of data entered into sport performance analysis systems
2	Robinson, G. & O'Donoghue, P.	2007	A weighted kappa statistic for reliability testing in performance analysis of sport
3	O'Donoghue, P.	2008	Principal Components Analysis in the selection of Key Performance Indicators in Sport
4	Atkinson, G. & Nevill, A.M.	2001	Selected issues in the design and analysis of sport performance research
5	Moore, A., Turner, D.J. & Johnstone, J.A.	2012	A preliminary analysis of team performance in English first-class Twenty-Twenty (T20) cricket
6	Lemmer, H.H.	2012	An analysis of players' performances in the first Cricket Twenty20 World Cup Series
7	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.	2008	Analysis of performance at the 2007 Cricket World Cup
8	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.	2008	Analysis of Twenty/20 Cricket performance during the 2008 Indian Premier League
9	Amin, G.R. & Sharma, S.K.	2014	Cricket team selection using data envelopment analysis
10	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,	2006	The viability of business data mining in the sports environment: cricket match analysis as application
11	M. Hughes, S-M. Cooper and A. Nevill	2002	Analysis procedures for non-parametric data from performance analysis
12	Hughes, M.	2004	Performance analysis – a 2004 perspective.
13	O'Donoghue, P.	2005	Normative Profiles of Sports Performance
14	Hughes, M.	2005	Notational analysis – a mathematical perspective.
15	Lyons, K.	2005	Performance Analysis in Applied Contexts
16	Baca, A.	2006	Innovative diagnostic methods in elite sport.
17	O'Donoghue, P.	2006	The use of feedback videos in sport.
18	Lames, M. & McGarry, T.	2007	On the search for reliable performance indicators in game sports
19	O'Donoghue, P.	2007	Reliability Issues in Performance Analysis
20	James, N., Taylor, J. & Stanley, S.	2007	Reliability procedures for categorical data in Performance Analysis
21	O'Donoghue, P.	2009	Interacting Performances Theory
22	O'Donoghue, P. & Cullinane, A.	2011	A regression-based approach to interpreting sports performance
23	Wright, C., Atkins, S. & Jones, B.	2012	An analysis of elite coaches' engagement with performance analysis services (match, notational analysis and technique analysis)
24	Sharma, S.K., Amin, G.R. & Gattoufi, S.	2012	Choosing the best Twenty20 cricket batsmen using ordered weighted averaging
25	Bampouras, T.M., Cronin, C. & Miller, P.K.	2012	Performance analytic processes in elite sport practice: An exploratory investigation of the perspectives of a sport scientist, coach and
26	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.	2012	Predicting the Performance of Bowlers in IPL: An Application of Artificial Neural Network
27	Lorains, M., Ball, K. & MacMahon, C.	2013	Performance analysis for decision making in team sports
28	Najdan, M.J., Robins, M.T. & Glazier, P.S.	2014	Determinants of success in English domestic Twenty20 cricket
29	Bhattacharjee, D. & Saikia, H.	2014	On Performance Measurement of Cricketers and Selecting an Optimum Balanced Team
30	Lyons, K.	2011	Sport Coaches Use of Cloud Computing: From here to Ubiquity

Continue..

No	Author	Type of document
1	Cooper, S.J., Hughes, M., O'Donoghue, P. & Nevill, A.M.	International Journal of Performance Analysis in Sport, 7 (1):87-109.
2	Robinson, G. & O'Donoghue, P.	International Journal of Performance Analysis in Sport, 7 (1):12-19.
3	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 8 (3):145-155.
4	Atkinson, G. & Nevill, A.M.	Journal of Sport Sciences, 19:811-827.
5	Moore, A., Turner, D.J. & Johnstone, J.A.	International Journal of Performance Analysis in Sport, 12:188-207.
6	Lemmer, H.H.	South African Journal for Research in Sport, Physical Education and Recreation, 30 (2):71-77.
7	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.	International Journal of Performance Analysis in Sport, 8 (1):1-8.
8	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.	International Journal of Performance Analysis in Sport, 8 (3):63-69.
9	Amin, G.R. & Sharma, S.K.	European Journal of Sport Science, 14 (1):369-376.
10	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,	South African Journal for Research in Sport, Physical Education and Recreation, 28 (1):109-125.
11	M. Hughes, S-M. Cooper and A. Nevill	International Journal of Performance Analysis in Sport, 2 (1):6-20.
12	Hughes, M.	International Journal of Performance Analysis in Sport, 4 (2):103-109.
13	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 5 (1):104-119.
14	Hughes, M.	International Journal of Performance Analysis in Sport 2005, 4(2), 97-139
15	Lyons, K.	International Journal of Performance Analysis in Sport, 5 (3):155-162.
16	Baca, A.	International Journal of Performance Analysis in Sport 2006, 6(2), 148-156
17	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 6 (2):1-4.
18	Lames, M. & McGarry, T.	International Journal of Performance Analysis in Sport 2007, 7(1), 62-79
19	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 7 (1):35-48.
20	James, N., Taylor, J. & Stanley, S.	International Journal of Performance Analysis in Sport 2007, 7(1), 1-11
21	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 9 (1):26-46.
22	O'Donoghue, P. & Cullinane, A.	International Journal of Performance Analysis in Sport 2011, 11, 295-307.
23	Wright, C., Atkins, S. & Jones, B.	International Journal of Performance Analysis in Sport, 12 (2):436-451.
24	Sharma, S.K., Amin, G.R. & Gattoufi, S.	International Journal of Performance Analysis in Sport, 12 (3):614-628.
25	Bampouras, T.M., Cronin, C. & Miller, P.K.	International Journal of Performance Analysis in Sport, 12 (2):468-483.
26	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.	International Journal of Performance Analysis in Sport, 12 (1):75-89.
27	Lorains, M., Ball, K. & MacMahon, C.	International Journal of Performance Analysis in Sport, 13 (1):110-119.
28	Najdan, M.J., Robins, M.T. & Glazier, P.S.	International Journal of Performance Analysis in Sport, 14 (1):276-295.
29	Bhattacharjee, D. & Saikia, H.	International Journal of Performance Analysis in Sport 2014, 14(1), 262-275.
30	Lyons, K.	International Journal of Computer Science in Sport, 10 (1):1-26.

Continue..

No	Author	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion
1	Cooper, S.J., Hughes, M., O'Donoghue, P. & Nevill, A.M.					Quantitative: Experiment						
2	Robinson, G. & O'Donoghue, P.					Quantitative: Experiment						
3	O'Donoghue, P.					Quantitative: Observational						
4	Atkinson, G. & Nevill, A.M.					Quantitative: Statistical						
5	Moore, A., Turner, D.J. & Johnstone, J.A.					Quantitative: statistics						
6	Lemmer, H.H.					Quantitative: statistics						
7	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.					Quantitative: statistics						
8	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.					Quantitative: statistics						
9	Amin, G.R. & Sharma, S.K.					Quantitative: statistics						
10	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,					Quantitative: statistics						
11	M. Hughes, S-M. Cooper and A. Nevill					Quantitative: statistics						
12	Hughes, M.					Quantitative						
13	O'Donoghue, P.					Quantitative: statistics						
14	Hughes, M.					Quantitative: statistics						
15	Lyons, K.					Quantitative: statistics						
16	Baca, A.					Quantitative: Observational						
17	O'Donoghue, P.					Quantitative: Observational						
18	Lames, M. & McGarry, T.					Quantitative: statistics						
19	O'Donoghue, P.					Quantitative: statistics						
20	James, N., Taylor, J. & Stanley, S.					Quantitative: statistics						
21	O'Donoghue, P.					Quantitative: statistics						
22	O'Donoghue, P. & Cullinane, A.					Quantitative: statistics						
23	Wright, C., Atkins, S. & Jones, B.					Quantitative: stratified sample						
24	Sharma, S.K., Amin, G.R. & Gattoufi, S.					Quantitative: statistics						
25	Bampouras, T.M., Cronin, C. & Miller, P.K.					Qualitative						
26	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.					Quantitative: statistics						
27	Lorains, M., Ball, K. & MacMahon, C.					Quantitative: statistics						
28	Najdan, M.J., Robins, M.T. & Glazier, P.S.					Quantitative: statistics						
29	Bhattacharjee, D. & Saikia, H.					Quantitative: statistics						
30	Lyons, K.					Quantitative						

ADDENDUM 2.8: CI HIERARCHY OF EVIDENCE APPLIED

No	Author	Year	Title
1	Du Toit, A.S.A. & Sewdass, N.	2014	Competitive Intelligence (CI) in Morocco
2	Marin, J. & Poulter, A.	2003	Dissemination of competitive intelligence
3	Sewdass, N. & Du Toit, A.S.A.	2014	Current state of competitive intelligence in South Africa
4	Salvetat, D. & Laarraf, Z.	2013	Competitive intelligence key players within firms: The case of high-technology European firms: The case of high-technology European firms
5	Wright, S., Bisson, C, & Duffy, A.P.	2012	Applying a behavioural and operational diagnostic typology of competitive intelligence practice: empirical evidence from the SME sector in Turkey
6	Rapp, A., Agnihotri, R. & Baker, T.L.	2011	Conceptualizing salesperson competitive intelligence: an individual-level perspective
7	Fleisher, C.S. & Wright, S.	2010	Competitive Intelligence analysis failure: diagnosing individual level causes and implementing organisational level remedies
8	Wright, S., Eid, E.R. & Fleisher, C.S.	2009	Competitive intelligence in practice: empirical evidence from the UK retail banking sector
9	Du Toit, A.S.A.	2003	Competitive intelligence in the knowledge economy: what is in it for South African manufacturing enterprises?
10	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.	2002	Competitive intelligence practices: a South African study
11	Theo, T.S.H. & Choo, W.Y.	2001	Assessing the impact of using the internet for competitive intelligence
12	Michaeli, R. & Simon, L.	2008	An illustration of Bayes' theorem and its use as a decision-making aid for competitive intelligence and marketing analysts
13	Franco, M., Magrinho, A. & Silva, J.R.	2011	Competitive intelligence: a research model tested on Portuguese firms
14	Gatsoris, L.	2012	Competitive intelligence in Greek furniture retailing: a qualitative approach
15	Wright, S., Pickton, D.W. & Callow, J.	2002	Competitive intelligence in UK firms: a typology
16	De Pelsmacker, O., Muller, M-L., Viviers, W., Saayman, A., Cuyvers, L. & Jegers, M.	2005	Competitive intelligence practices of South African and Belgian exporters
17	Dishman, P.L. & Calof, J.L.	2008	Competitive intelligence: a multiphasic precedent to marketing strategy
18	Saayman, A., Pienaar, J., de Pelsmacker, P., Viviers, W., Cuyvers, L., Muller, M-L. & Jegers, M.	2008	Competitive intelligence: construct exploration, validation and equivalence
19	Priporas, C-V., Gatsoris, L. & Zacharis, V.	2005	Competitive intelligence activity: evidence from Greece
20	Tej Adidam, P., Banerjee, M. & Shukla, P.	2012	Competitive intelligence and firm's performance in emerging markets: an exploratory study in India
21	Nasri, W.	2011	Competitive intelligence in Tunisian companies
22	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.	2013	Enabler and inhibitor factors influencing competitive intelligence practices
23	Wright, S. & Calof, J.L.	2006	The quest for competitive, business and marketing intelligence: A country comparison of current practices
24	Zangoueinezhad, A,. & Moshabaki, A.	2009	The role of structural capital on competitive intelligence
25	Dai, Y., Kakkonen, T. & Sutinen, E.	2011	MinEDec: a Decision-Support Model That Combines Text-Mining Technologies with Two Competitive Intelligence Analysis Methods
26	Qiu, T.	2007	Scanning for competitive intelligence: a managerial perspective
27	Du Toit, A.S.A. & Sewdass, N.	2014	A comparison of competitive intelligence activities in Brazil, Malaysia, Morocco and South Africa
28	Du Toit, A.S.A. & Sewdass, N.	2014	Competitive Intelligence practices in Brazil: An exploratory study
29	Fatti, A. & Du Toit, A.S.A.	2013	Competitive Intelligence challenges faced by South African Pharmaceutical companies
30	Strauss, C. & Du Toit, A.S.A.	2010	Skills shortages and competitiveness in South Africa: the need for competitive intelligence skills
31	Fleisher, C.S.	2008	OSINT: Its Implications for Business/Competitive Intelligence Analysis and Analysts
32	Varol, I.	2012	Investigating Competitive Intelligence Systems of Professional Football Clubs in Turkey
33	Evans, D.M. & Smith, A.C.T.	2004	The Internet and Competitive Advantage: A Study of Australia's Four Premier Professional Sporting Leagues
34	Hughes, S. & Beasley, F.	2004	Competitive Intelligence in Professional Sports

Continue..

No	Author	Type of document
1	Du Toit, A.S.A. & Sewdass, N.	Afr. J. Lib. Arch. & Inf. Sc. 24 (1):3-13
2	Marin, J. & Poulter, A.	Journal of Information Science, 30 (2):165–180
3	Sewdass, N. & Du Toit, A.S.A.	International Journal of Information Management 34 (2014) 185–190
4	Salvetat, D. & Laarraf, Z.	Human Systems Management, 32:121–130
5	Wright, S., Bisson, C, & Duffy, A.P.	Journal of Strategic Marketing, 20 (1):19–33
6	Rapp, A., Agnihotri, R. & Baker, T.L.	J. of the Acad. Mark. Sci., 43:357–374
7	Fleisher, C.S. & Wright, S.	Journal of Strategic Marketing, 18 (7):553–572
8	Wright, S., Eid, E.R. & Fleisher, C.S.	Journal of Marketing Management, 25 (9-10):941-964
9	Du Toit, A.S.A.	International Journal of Information Management, 23:111–120
10	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.	South African Business Management, 2002, 33(3), 27-37
11	Theo, T.S.H. & Choo, W.Y.	Information Management, 39:67-83
12	Michaeli, R. & Simon, L.	European Journal of Marketing, 42 (7/8):804 - 813
13	Franco, M., Magrinho, A. & Silva, J.R.	Business Process Management Journal, 17 (2):332 - 356
14	Gatsoris, L.	EuroMed Journal of Business, 7 (3):224 - 242
15	Wright, S., Pickton, D.W. & Callow, J.	Marketing Intelligence & Planning, 20 (6):349 - 360
16	De Pelsmacker, O., Muller, M-L., Viviers, W., et al.	Marketing Intelligence & Planning, 23 (6):606 - 620
17	Dishman, P.L. & Calof, J.L.	European Journal of Marketing, 42 (7/8):766 - 785
18	Saayman, A., Pienaar, J., de Pelsmacker, P.,et al.	Aslib Proceedings, 60 (4):383 - 411
19	Priporas, C-V., Gatsoris, L. & Zacharis, V.	Marketing Intelligence & Planning, 23 (7):659 - 669
20	Tej Adidam, P., Banerjee, M. & Shukla, P.	Journal of Business & Industrial Marketing, 27 (3):242 - 254
21	Nasri, W.	Journal of Enterprise Information Management, 24 (1):53 - 67
22	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.	Aslib Proceedings, 65 (3):262 - 288
23	Wright, S. & Calof, J.L.	European Journal of Marketing, 40 (5/6):453 - 465
24	Zangoueinezhad, A,. & Moshabaki, A.	Industrial Management & Data Systems, 109 (2):262 - 280
25	Dai, Y., Kakkonen, T. & Sutinen, E.	International Journal of Computer Information Systems and Industrial Management Applications, 3:165 -173
26	Qiu, T.	European Journal of Marketing, 42 (7/8)
27	Du Toit, A.S.A. & Sewdass, N.	Acta Commercii 14(1), Art. #234, 7 pages. http://dx.doi.org/10.4102/ac.v14i1.234
28	Du Toit, A.S.A. & Sewdass, N.	Mousaion, 32 (1):85—98
29	Fatti, A. & Du Toit, A.S.A.	Asia Pacific Journal of Business and Management, 4 (1):39-54
30	Strauss, C. & Du Toit, A.S.A.	Journal of Contemporary Management, 7:308 - 325
31	Fleisher, C.S.	Inteligencia y Seguridad, 4: 115-141
32	Varol, I.	Athens: ATINER'S Conference Paper Series, No: SPO2012-0262.
33	Evans, D.M. & Smith, A.C.T.	Sport Management Review, 7:27–56
34	Hughes, S. & Beasley, F.	Proceedings of the Academy of Strategic Management, 3 (2)

Continue..

No	Author	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion
1	Du Toit, A.S.A. & Sewdass, N.					Quantitative						
2	Marin, J. & Poulter, A.					Quantitative + qualitative						
3	Sewdass, N. & Du Toit, A.S.A.					Quantitative						
4	Salvetat, D. & Laarraf, Z.					Quantitative						
5	Wright, S., Bisson, C, & Duffy, A.P.					Quantitative						
6	Rapp, A., Agnihotri, R. & Baker, T.L.					Quantitative						
7	Fleisher, C.S. & Wright, S.					Quantitative						
8	Wright, S., Eid, E.R. & Fleisher, C.S.					Qualitative, Exploratory						
9	Du Toit, A.S.A.					Quantitative: Empirical						
10	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.					Quantitative						
11	Theo, T.S.H. & Choo, W.Y.					Quantitative						
12	Michaeli, R. & Simon, L.					Mathematical concept						
13	Franco, M., Magrinho, A. & Silva, J.R.					Quantitative						
14	Gatsoris, L.					Qualitative						
15	Wright, S., Pickton, D.W. & Callow, J.					Qualitative						
16	De Pelsmacker, O., Muller, M-L., Viviers, W., et al.					Qualitative						
17	Dishman, P.L. & Calof, J.L.					Qualitative						
18	Saayman, A., Pienaar, J., de Pelsmacker, P.,et al.					Quantitative						
19	Priporas, C-V., Gatsoris, L. & Zacharis, V.					Qualitative						
20	Tej Adidam, P., Banerjee, M. & Shukla, P.					Quantitative						
21	Nasri, W.					Qualitative						
22	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.					Qualitative						
23	Wright, S. & Calof, J.L.					Quantitative						
24	Zangoueinezhad, A,. & Moshabaki, A.					Quantitative						
25	Dai, Y., Kakkonen, T. & Sutinen, E.					Quantitative						
26	Qiu, T.					Quantitative						
27	Du Toit, A.S.A. & Sewdass, N.					Quantitative						
28	Du Toit, A.S.A. & Sewdass, N.					Quantitative						
29	Fatti, A. & Du Toit, A.S.A.					Quantitative						
30	Strauss, C. & Du Toit, A.S.A.					Quantitative						
31	Fleisher, C.S.					Quantitative						
32	Varol, I.					Quantitative						
33	Evans, D.M. & Smith, A.C.T.					Qualitative						
34	Hughes, S. & Beasley, F.					Quantitative						

ADDENDUM 2.9: CI EXPERT RECOMMENDATIONS SEARCH

Expert in CI field document search		**Documents**
1st round of extraction	Sources suggested by experts' literature overview study	114
Exclusion criteria set	Does not have CI in title	49
	Books	23
	Sources too old (before 2000)	11
	Already included in list of articles for SLR	19
	Subtotal (exclusions or already included in SLR documents)	102
2nd round of extraction	Possible new inclusions	12
Exclusion criteria set	No access to documents	7
Exclusion criteria set	Articles included in 2nd round searches	5
Expert researcher document suggestions inclusion	New article included for SLR as per criteria	1

Systematic literature review search after expert in field feedback: 2nd round of extraction																
Search documentation										Related Aspects of CI					min 3	
No	Author	Year	Title	Type of document	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion	
1	Groom, J.R. and David, F.R.	2001	Competitive intelligence activity among strategic management firms	AM Advanced Management Journal, Winter:12-20.					Quantitative							
2	Adidam, P.T., Gajre, S. and Kejriwal, S.	2009	Cross-cultural competitive intelligence strategies	Marketing Intelligence & Planning, 27 (5):666-680.					Review							
3	Sewlal, R.	2004	Effectiveness of the Web as a competitive intelligence tool", S	South African Journal of Information Management, 6 (1), available at: www.sajim.co.za (accessed 7 Sept 2015).					Quantitative							

Continue..

Systematic literature review search after expert in field feedback: 2nd round of extraction																
Search documentation										Related Aspects of CI					min 3	
No	Author	Year	Title	Type of document	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion	
4	Taib, K.M., Yatin, S.F.M., Ahmad, A.R. and Mansor, A.N	2008	Knowledge management and competitive intelligence: a synergy for organizational competitiveness in the K-Economy	Communications of the IBIMA, 6:25-34.					Review							
5	Begg, M. and Du Toit, A.S.A.	2007	Level of importance attached to competitive intelligence at a mass import-retail organization	South African Journal of Information Management, 9 (4), available at: http://www.sajim.co.za (accessed 7 September 2015).					Quantitative							

ADDENDUM 2.10: CI FINAL LIST OF DOCUMENTS INCLUDED

No	Author	Year	Title
1	Du Toit, A.S.A. & Sewdass, N.	2014	A comparison of competitive intelligence activities in Brazil, Malaysia, Morocco and South Africa
2	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.	2013	Enabler and inhibitor factors influencing competitive intelligence practices
3	Wright, S., Bisson, C, & Duffy, A.P.	2012	Applying a behavioural and operational diagnostic typology of competitive intelligence practice: empirical evidence from the SME sector in Turkey
4	Gatsoris, L.	2012	Competitive intelligence in Greek furniture retailing: a qualitative approach
5	Fleisher, C.S. & Wright, S.	2010	Competitive Intelligence analysis failure: diagnosing individual level causes and implementing organisational level remedies
6	Zangoueinezhad, A,. & Moshabaki, A.	2009	The role of structural capital on competitive intelligence
7	Dishman, P.L. & Calof, J.L.	2008	Competitive intelligence: a multiphasic precedent to marketing strategy
8	Saayman, A., Pienaar, J., de Pelsmacker, P., Viviers, W., Cuyvers, L., Muller, M-L. & Jegers, M.	2008	Competitive intelligence: construct exploration, validation and equivalence
9	Michaeli, R. & Simon, L.	2008	An illustration of Bayes' theorem and its use as a decision-making aid for competitive intelligence and marketing analysts
10	Qiu, T.	2007	Scanning for competitive intelligence: a managerial perspective
11	Wright, S. & Calof, J.L.	2006	The quest for competitive, business and marketing intelligence: A country comparison of current practices
12	De Pelsmacker, O., Muller, M-L., Viviers, W., Saayman, A., Cuyvers, L. & Jegers, M.	2005	Competitive intelligence practices of South African and Belgian exporters
13	Priporas, C-V., Gatsoris, L. & Zacharis, V.	2005	Competitive intelligence activity: evidence from Greece
14	Du Toit, A.S.A.	2003	Competitive intelligence in the knowledge economy: what is in it for South African manufacturing enterprises?
15	Marin, J. & Poulter, A.	2003	Dissemination of competitive intelligence
16	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.	2002	Competitive intelligence practices: a South African study
17	Wright, S., Pickton, D.W. & Callow, J.	2002	Competitive intelligence in UK firms: a typology
18	Du Toit, A.S.A. & Sewdass, N.	2014	Competitive Intelligence (CI) in Morocco
19	Tej Adidam, P., Banerjee, M. & Shukla, P.	2012	Competitive intelligence and firm's performance in emerging markets: an exploratory study in India
20	Varol, I.	2012	Investigating Competitive Intelligence Systems of Professional Football Clubs in Turkey
21	Nasri, W.	2011	Competitive intelligence in Tunisian companies
22	Rapp, A., Agnihotri, R. & Baker, T.L.	2011	Conceptualizing salesperson competitive intelligence: an individual-level perspective
23	Hughes, S. & Beasley, F.	2004	Competitive Intelligence in Professional Sports
24	Du Toit, A.S.A. & Sewdass, N.	2014	Competitive Intelligence practices in Brazil: An exploratory study
25	Sewdass, N. & Du Toit, A.S.A.	2014	Current state of competitive intelligence in South Africa
26	Salvetat, D. & Laarraf, Z.	2013	Competitive intelligence key players within firms: The case of high-technology European firms: The case of high-technology European firms
27	Fatti, A. & Du Toit, A.S.A.	2013	Competitive Intelligence challenges faced by South African Pharmaceutical companies
28	Franco, M., Magrinho, A. & Silva, J.R.	2011	Competitive intelligence: a research model tested on Portuguese firms
29	Dai, Y., Kakkonen, T. & Sutinen, E.	2011	MinEDec: a Decision-Support Model That Combines Text-Mining Technologies with Two Competitive Intelligence Analysis Methods
30	Strauss, C. & Du Toit, A.S.A.	2010	Skills shortages and competitiveness in South Africa: the need for competitive intelligence skills
31	Wright, S., Eid, E.R. & Fleisher, C.S.	2009	Competitive intelligence in practice: empirical evidence from the UK retail banking sector
32	Fleisher, C.S.	2008	OSINT: Its Implications for Business/Competitive Intelligence Analysis and Analysts
33	Evans, D.M. & Smith, A.C.T.	2004	The Internet and Competitive Advantage: A Study of Australia's Four Premier Professional Sporting Leagues
34	Theo, T.S.H. & Choo, W.Y.	2001	Assessing the impact of using the internet for competitive intelligence
35	Begg, M. and Du Toit, A.S.A.	2007	Level of importance attached to competitive intelligence at a mass import-retail organization

Continue..

No	Author	Type of document
1	Du Toit, A.S.A. & Sewdass, N.	Acta Commercii 14(1), Art. #234, 7 pages. http://dx.doi.org/10.4102/ac.v14i1.234
2	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.	Aslib Proceedings, 65 (3):262 - 288
3	Wright, S., Bisson, C, & Duffy, A.P.	Journal of Strategic Marketing, 20 (1):19–33
4	Gatsoris, L.	EuroMed Journal of Business, 7 (3):224 - 242
5	Fleisher, C.S. & Wright, S.	Journal of Strategic Marketing, 18 (7):553–572
6	Zangoueinezhad, A,. & Moshabaki, A.	Industrial Management & Data Systems, 109 (2):262 - 280
7	Dishman, P.L. & Calof, J.L.	European Journal of Marketing, 42 (7/8):766 - 785
8	Saayman, A., Pienaar, J., de Pelsmacker, P., Viviers, W., Cuyvers, L., M	Aslib Proceedings, 60 (4):383 - 411
9	Michaeli, R. & Simon, L.	European Journal of Marketing, 42 (7/8):804 - 813
10	Qiu, T.	European Journal of Marketing, 42 (7/8)
11	Wright, S. & Calof, J.L.	European Journal of Marketing, 40 (5/6):453 - 465
12	De Pelsmacker, O., Muller, M-L., Viviers, W., Saayman, A., Cuyvers, L	Marketing Intelligence & Planning, 23 (6):606 - 620
13	Priporas, C-V., Gatsoris, L. & Zacharis, V.	Marketing Intelligence & Planning, 23 (7):659 - 669
14	Du Toit, A.S.A.	International Journal of Information Management, 23:111–120
15	Marin, J. & Poulter, A.	Journal of Information Science, 30 (2):165–180
16	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.	South African Business Management, 2002, 33(3), 27-37
17	Wright, S., Pickton, D.W. & Callow, J.	Marketing Intelligence & Planning, 20 (6):349 - 360
18	Du Toit, A.S.A. & Sewdass, N.	Afr. J. Lib. Arch. & Inf. Sc. 24 (1):3-13
19	Tej Adidam, P., Banerjee, M. & Shukla, P.	Journal of Business & Industrial Marketing, 27 (3):242 - 254
20	Varol, I.	Athens: ATINER'S Conference Paper Series, No: SPO2012-0262.
21	Nasri, W.	Journal of Enterprise Information Management, 24 (1):53 - 67
22	Rapp, A., Agnihotri, R. & Baker, T.L.	J. of the Acad. Mark. Sci., 43:357–374
23	Hughes, S. & Beasley, F.	Proceedings of the Academy of Strategic Management, 3 (2)
24	Du Toit, A.S.A. & Sewdass, N.	Mousaion, 32 (1):85—98
25	Sewdass, N. & Du Toit, A.S.A.	#REF!
26	Salvetat, D. & Laarraf, Z.	Human Systems Management, 32:121–130
27	Fatti, A. & Du Toit, A.S.A.	Asia Pacific Journal of Business and Management, 4 (1):39-54
28	Franco, M., Magrinho, A. & Silva, J.R.	Business Process Management Journal, 17 (2):332 - 356
29	Dai, Y., Kakkonen, T. & Sutinen, E.	International Journal of Computer Information Systems and Industrial Management Applications, 3:165 -173
30	Strauss, C. & Du Toit, A.S.A.	Journal of Contemporary Management, 7:308 - 325
31	Wright, S., Eid, E.R. & Fleisher, C.S.	Journal of Marketing Management, 25 (9-10):941-964
32	Fleisher, C.S.	Inteligencia y Seguridad, 4: 115-141
33	Evans, D.M. & Smith, A.C.T.	Sport Management Review, 7:27–56
34	Theo, T.S.H. & Choo, W.Y.	Information Management, 39:67-83
35	Begg, M. and Du Toit, A.S.A.	South African Journal of Information Management, 9 (4), available at: http://www.sajim.co.za (accessed 7 September 2015).

Continue..

No	Author	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion	Elements
1	Du Toit, A.S.A. & Sewdass, N.					Quantitative							5
2	Garcia-Alsina, M., Ortoll, E. & Cobarsí-Morales, J.					Qualitative							5
3	Wright, S., Bisson, C, & Duffy, A.P.					Quantitative							5
4	Gatsoris, L.					Qualitative							5
5	Fleisher, C.S. & Wright, S.					Hierarchical model							5
6	Zangoueinezhad, A,. & Moshabaki, A.					Quantitative							5
7	Dishman, P.L. & Calof, J.L.					Qualitative							5
8	Saayman, A., Pienaar, J., de Pelsmacker, P., et al.					Quantitative							5
9	Michaeli, R. & Simon, L.					Mathematical concept							5
10	Qiu, T.					Quantitative							5
11	Wright, S. & Calof, J.L.					Quantitative							5
12	De Pelsmacker, O., Muller, M-L., Viviers, W., et al.,					Qualitative							5
13	Priporas, C-V., Gatsoris, L. & Zacharis, V.					Qualitative							5
14	Du Toit, A.S.A.					Quantitative: Empirical							5
15	Marin, J. & Poulter, A.					Quantitative + qualitative							5
16	Viviers, W., Saayman, A., Muller, M-L. & Calof, J.					Quantitative							5
17	Wright, S., Pickton, D.W. & Callow, J.					Qualitative							5
18	Du Toit, A.S.A. & Sewdass, N.					Quantitative							4
19	Tej Adidam, P., Banerjee, M. & Shukla, P.					Quantitative							4
20	Varol, I.					Quantitative							4
21	Nasri, W.					Qualitative							4
22	Rapp, A., Agnihotri, R. & Baker, T.L.					Quantitative							4
23	Hughes, S. & Beasley, F.					Quantitative							4
24	Du Toit, A.S.A. & Sewdass, N.					Quantitative							3
25	Sewdass, N. & Du Toit, A.S.A.					Quantitative							3
26	Salvetat, D. & Laarraf, Z.					Quantitative							3
27	Fatti, A. & Du Toit, A.S.A.					Quantitative							3
28	Franco, M., Magrinho, A. & Silva, J.R.					Quantitative							3
29	Dai, Y., Kakkonen, T. & Sutinen, E.					Quantitative							3
30	Strauss, C. & Du Toit, A.S.A.					Quantitative							3
31	Wright, S., Eid, E.R. & Fleisher, C.S.					Qualitative, Exploratory							3
32	Fleisher, C.S.					Quantitative							3
33	Evans, D.M. & Smith, A.C.T.					Qualitative							3
34	Theo, T.S.H. & Choo, W.Y.					Quantitative							3
35	Begg, M. and Du Toit, A.S.A.					Quantitative							5

ADDENDUM 2.11: PA FINAL LIST OF DOCUMENTS INCLUDED

No	Author	Year	Title
1	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,	2006	The viability of business data mining in the sports environment: cricket match analysis as application
2	Wright, C., Atkins, S. & Jones, B.	2012	An analysis of elite coaches' engagement with performance analysis services (match, notational analysis and technique analysis)
3	Bampouras, T.M., Cronin, C. & Miller, P.K.	2012	Performance analytic processes in elite sport practice: An exploratory investigation of the perspectives of a sport scientist, coach and athlete.
4	James, N., Taylor, J. & Stanley, S.	2007	Reliability procedures for categorical data in Performance Analysis
5	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.	2008	Analysis of performance at the 2007 Cricket World Cup
6	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.	2008	Analysis of Twenty/20 Cricket performance during the 2008 Indian Premier League
7	Bhattacharjee, D. & Saikia, H.	2014	On Performance Measurement of Cricketers and Selecting an Optimum Balanced Team
8	Moore, A., Turner, D.J. & Johnstone, J.A.	2012	A preliminary analysis of team performance in English first-class Twenty-Twenty (T20) cricket
9	Hughes, M., Cooper, S-M. & Nevill, A.	2002	Analysis procedures for non-parametric data from performance analysis
10	O'Donoghue, P.	2005	Normative Profiles of Sports Performance
11	Hughes, M.	2005	Notational analysis – a mathematical perspective.
12	O'Donoghue, P.	2006	The use of feedback videos in sport.
13	Lames, M. & McGarry, T.	2007	On the search for reliable performance indicators in game sports
14	O'Donoghue, P.	2007	Reliability Issues in Performance Analysis
15	O'Donoghue, P.	2009	Interacting Performances Theory
16	Lyons, K.	2011	Sport Coaches Use of Cloud Computing: From here to Ubiquity
17	Lorains, M., Ball, K. & MacMahon, C.	2013	Performance analysis for decision making in team sports
18	O'Donoghue, P.	2008	Principal Components Analysis in the selection of Key Performance Indicators in Sport
19	Sharma, S.K., Amin, G.R. & Gattoufi, S.	2012	Choosing the best Twenty20 cricket batsmen using ordered weighted averaging
20	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.	2012	Predicting the Performance of Bowlers in IPL: An Application of Artificial Neural Network
21	Najdan, M.J., Robins, M.T. & Glazier, P.S.	2014	Determinants of success in English domestic Twenty20 cricket
22	Amin, G.R. & Sharma, S.K.	2014	Cricket team selection using data envelopment analysis
23	Lyons, K.	2005	Performance Analysis in Applied Contexts
24	Baca, A.	2006	Innovative diagnostic methods in elite sport.
25	O'Donoghue, P. & Cullinane, A.	2011	A regression-based approach to interpreting sports performance
26	Cooper, S.M., Hughes, M., O'Donoghue, P. & Nevill, A.M.	2007	A simple statistical method for assessing the reliability of data entered into sport performance analysis systems
27	Robinson, G. & O'Donoghue, P.	2007	A weighted kappa statistic for reliability testing in performance analysis of sport
28	Lemmer, H.H.	2012	An analysis of players' performances in the first Cricket Twenty20 World Cup Series

Continue..

No	Author	Type of document
1	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,	South African Journal for Research in Sport, Physical Education and Recreation, 28 (1):109-125.
2	Wright, C., Atkins, S. & Jones, B.	International Journal of Performance Analysis in Sport, 12 (2):436-451.
3	Bampouras, T.M., Cronin, C. & Miller, P.K.	International Journal of Performance Analysis in Sport, 12 (2):468-483.
4	James, N., Taylor, J. & Stanley, S.	International Journal of Performance Analysis in Sport, 7 (1):1-11.
5	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.	International Journal of Performance Analysis in Sport, 8 (1):1-8.
6	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.	International Journal of Performance Analysis in Sport, 8 (3):63-69.
7	Bhattacharjee, D. & Saikia, H.	International Journal of Performance Analysis in Sport, 14 (1:262-275.
8	Moore, A., Turner, D.J. & Johnstone, J.A.	International Journal of Performance Analysis in Sport, 12:188-207.
9	Hughes, M., Cooper, S-M. & Nevill, A.	International Journal of Performance Analysis in Sport, 2 (1):6-20.
10	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 5 (1):104-119.
11	Hughes, M.	International Journal of Performance Analysis in Sport, 4 (2):97-139.
12	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 6 (2):1-4.
13	Lames, M. & McGarry, T.	International Journal of Performance Analysis in Sport, 7 (1):62-79.
14	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 7 (1):35-48.
15	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 9 (1):26-46.
16	Lyons, K.	International Journal of Computer Science in Sport, 10 (1):1-26.
17	Lorains, M., Ball, K. & MacMahon, C.	International Journal of Performance Analysis in Sport, 13 (1):110-119.
18	O'Donoghue, P.	International Journal of Performance Analysis in Sport, 8 (3):145-155.
19	Sharma, S.K., Amin, G.R. & Gattoufi, S.	International Journal of Performance Analysis in Sport, 12 (3):614-628.
20	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.	International Journal of Performance Analysis in Sport, 12 (1):75-89.
21	Najdan, M.J., Robins, M.T. & Glazier, P.S.	International Journal of Performance Analysis in Sport, 14 (1):276-295.
22	Amin, G.R. & Sharma, S.K.	European Journal of Sport Science, 14 (1):369-376.
23	Lyons, K.	International Journal of Performance Analysis in Sport, 5 (3):155-162.
24	Baca, A.	International Journal of Performance Analysis in Sport, 6 (2):148-156.
25	O'Donoghue, P. & Cullinane, A.	International Journal of Performance Analysis in Sport, 11:295-307.
26	Cooper, S.M., Hughes, M., O'Donoghue, P. & Nevill, A.M.	International Journal of Performance Analysis in Sport, 7 (1):87-109.
27	Robinson, G. & O'Donoghue, P.	International Journal of Performance Analysis in Sport, 7 (1):12-19.
28	Lemmer, H.H.	South African Journal for Research in Sport, Physical Education and Recreation, 30 (2):71-77.

Continue..

No	Author	CI	PA	Sport	Cricket	Method	Data collection	Data conversion	Info communication	Countering	Process	Inclusion
1	Schoeman, J.H., Matthee, M.C. & Van der Merwe, P,					Quantitative: statistics						
2	Wright, C., Atkins, S. & Jones, B.					Quantitative: stratified sample						
3	Bampouras, T.M., Cronin, C. & Miller, P.K.					Qualitative						
4	James, N., Taylor, J. & Stanley, S.					Quantitative: statistics						
5	Petersen, C., Pyne, D.B., Portus, M.R., Cordy, J. & Dawson, B.					Quantitative: statistics						
6	Petersen, C., Pyne, D.B., Portus, M.J. & Dawson, B.					Quantitative: statistics						
7	Bhattacharjee, D. & Saikia, H.					Quantitative: statistics						
8	Moore, A., Turner, D.J. & Johnstone, J.A.					Quantitative: statistics						
9	Hughes, M., Cooper, S-M. & Nevill, A.					Quantitative: statistics						
10	O'Donoghue, P.					Quantitative: statistics						
11	Hughes, M.					Quantitative: statistics						
12	O'Donoghue, P.					Quantitative: Observational						
13	Lames, M. & McGarry, T.					Quantitative: statistics						
14	O'Donoghue, P.					Quantitative: statistics						
15	O'Donoghue, P.					Quantitative: statistics						
16	Lyons, K.					Quantitative						
17	Lorains, M., Ball, K. & MacMahon, C.					Quantitative: statistics						
18	O'Donoghue, P.					Quantitative: Observational						
19	Sharma, S.K., Amin, G.R. & Gattoufi, S.					Quantitative: statistics						
20	Saikia, H., Bhattacharjee, D. & Lemmer, H.H.					Quantitative: statistics						
21	Najdan, M.J., Robins, M.T. & Glazier, P.S.					Quantitative: statistics						
22	Amin, G.R. & Sharma, S.K.					Quantitative: statistics						
23	Lyons, K.					Quantitative: statistics						
24	Baca, A.					Quantitative: Observational						
25	O'Donoghue, P. & Cullinane, A.					Quantitative: statistics						
26	Cooper, S.M., Hughes, M., O'Donoghue, P. & Nevill, A.M.					Quantitative: Experiment						
27	Robinson, G. & O'Donoghue, P.					Quantitative: Experiment						
28	Lemmer, H.H.					Quantitative: statistics						

ADDENDUM 2.12: PA EXPERT RECOMMENDATION SEARCHES

Systematic literature review: Search databasis: Notational Analysis in sport (Expert recommendation)						
Search process documentation						
No	**Date**	**Database**	**Keywords**	**Hits**	**Selection**	**Exclusion**
1	03-Sep	Ebscohost	Notational + analysis +	1	0	
		Sport discus	sport.			
			In titles			
			Peer reviewed			
			Scholarly articles			
			2000-2015			
2	03-Sep	Web of Science	Notational + analysis +	1	0	
			sport.			
			In titles			
			Peer reviewed			
			Scholarly articles			
			2000-2015			
3	03-Sep	Scopus	Notational + analysis +	76	0	2 already included in selected list with preveous searches
			sport.			Many included in search of International Journal of Performance Analysis in Sport
			Title			
			Peer reviewed			
			Scholarly articles			
			2000-2015			
4	03-Sep	Academic Search	Notational + analysis +	0	0	
		Premier	sport.			
			In titles			
			Peer reviewed			
			Scholarly articles			
			2000-2015			

Continue..

No	Date	Database	Keywords	Hits	Selection	Exclusion
5	03-Sep	Google scholar	Review article of IM Franks "Evidence based practice and coaching practice Citings	8 Cites	0	Textbooks, 2 already included in search, other articles does not meet the criteria
6	03-Sep	Google scholar	Review article of M Hughes "Performance Analysis - a 2004 reperspective" Citings	30 Cites	0	A few already included in selection process Others excluded because it does not meet the cirteria of language etc.
7	03-Sep	Google scholar	Review article of P O'Donoghue "Performance profiling in sports coaching: a review	2 cites	0	Does not meet criteria
8	03-Sep	Scopus	Notational + analysis + cricket Title Peer reviewed Scholarly articles 2000-2015	0	**0**	
9	03-Sep	Web of Science	Notational + analysis + cricket Title Peer reviewed Scholarly articles 2000-2015	0	0	
10	03-Sep	EbscoHost SportsDiscus	Notational + analysis + cricket Title Peer reviewed Scholarly articles 2000-2015	0	0	

ADDENDUM 2.13: SLR DOCUMENT ANALYSIS CODES AND DEFINITIONS TABLE

CI Themes	Codes for CI documents	Definition / Explanation
***@Data collection**	****@Collection of data**	All types of information collected and All types of information collected, together with the validation thereof
	****@Data mining**	Searching through large amounts of data using specific techniques and software
	****@Info characteristics**	Characteristics of information
	****@Key intelligence topics**	The specific information topics that are identified from which the initial data collection strategy and activities are derived from.
	****@Knowledge**	CI users need knowledge to assign KITs and collection process
	****@Person collecting data**	Referring to a specific person collecting the data
	****@Primary sources**	Those types of sources viewed by literature as the first source utilized for data collection as well as specific sources identified and used for the specific KITs need
	****@Problems data collection**	Problems occurring that hinders the collection of data, could be environmental factors, the available sources or a person.
	****@Secondary sources**	Sources identified by literature as an additional supplication for data collection
	****@Skills**	Employees need specific skills to perform the data collection
	****@Sources**	Sources used without knowledge if it is a primary or secondary source for the organisation
	****@Systems in data collection**	Specific systems in place to collect data
	****@Technology**	Use of technology to collect data
	****@Validation of collected data**	Collected data should be validated and from a reliable source and person collecting data should check the validity of data

CI Themes	Codes for CI documents	Definition / Explanation
**#Data conversion	**##Analyst skills	Specific skills needed by a good CI data analysts
	**#Analyst	The persons responsible for conducting the conversion of data
	**#Analytical techniques	Techniques used to analyse data
	**#Information / data analysis	Referring to the process of using different methods, software, statistical techniques to verify and converse data
	**#Problems in conversion of data	Problems experience with data conversion
	**#Storing data and information	The where and how data is stored in the organization especially during the conversion stage
	**#Technology utilization in data conversion	Referring to the technology (systems / hardware / software) is used to analyse data?
	**#Validation of data	Validating data before the conversion through the use of mechanisms or techniques
*$Information communication	**$Communication problems	Problems and barriers in the communication of information during the whole process
	**$Information and data sharing	The information communication process is conducted effectively and it ensures specific benefits
	**$Methods of communication	The channels and manners used to communicate the findings and conversion of data into information
	**$Person to receive information	The person who makes the decisions is the person who should receive the data or conversed information
	**$Relationships	The relationship between the analyst and the information user and the communication between them

CI Themes	Codes for CI documents	Definition / Explanation
***%Countering**	****%CI not utilized effectively for decision-making**	Instances where CI activities are performed and data is conversed into information / knowledge, but not used to make decisions or for strategy development
	****%Decision-making**	The activity of using the available data / intelligence / knowledge to make decisions
	****%Factors influencing decision-making**	Aspects within the CI process that influence the successful or unsuccessful decision-making by the relevant persons
	****%Knowledge on competitor**	That which employees and managers poses to enhance the organizations' functioning, as well as the end result of CI which refers to the information / knowledge that is known about the competitor
	****%Strategy**	The result or purpose of CI, CI used to develop a strategy, the occurrence or reference to a strategy developed from intelligence created
***&Process**	****&Barriers to CI implementation**	Factors and aspects that hinder individuals or organizations to use CI for their advantage
	****&CI activities**	Activities performed during the CI process, either to improve or implement the process.
	****&CI benefits**	The benefit that the organization or individual will derive from implementing CI process Explaining how CI implementation can benefit sport domains
	****&CI culture**	The view point of the managers / employers regarding CI and its use in the organization – the value they give it in the benefits derived from CI activities
	****&CI definition**	Definitions on CI or aspects related to it by different authors
	****&CI individual**	People involved in specific stages / phases of the process with specific tasks

CI Themes	Codes for CI documents	Definition / Explanation
	**&CI occurrence	The different organizations, countries and situations where CI has been applied
	**&CI purpose	The reason why organizations or individuals use CI
	**&CI users	Characteristics of people or organizations who use and utilize CI activities or the job title or position held by individuals responsible for CI in organizations
	**&Environmental factors	Factors from the environment of the organization that influenced the organization to utilize CI process
	**&Factors influencing CI	Specific factors that causes different degrees and systematisation of practices and their efficacy within different organisations
	**&Formalised structures and activities	The occurrence of structures and formalized procedures within an organization followed during CI activities / process
	**&History and development	Referring to the history and development of the CI process over time
	**&Location of CI in organization	The department from which the CI function is performed within the organization
	**&No CI utilized in organization	Occurrences where no CI was present in organizations
	**&Process characteristics	CI process characteristics describing different aspects and factors involved in the total process
	**&Process model	A model representing the CI process with related and variety of factors and aspects
	**&Skills	Specific skills needed by a variety of people for the successful implementation of the CI process
	**&Techniques and methods	Techniques and methods employed within the process of CI
	**&Training	Training of CI specialists in performing the total process
	**&Types of CI	A discernment between different categories (business, marketing)

CI Themes	Codes for CI documents	Definition / Explanation
	****&Value**	The perception from employees that CI adds value and how it is measured

PA Themes	Codes for PA documents	Definition / Explanation
^@Data collection	**^^@Collection of data**	Collecting data on matches / competitors performance
	^^@Data mining	Search and collection of large amounts of data in sport using specific techniques and software
	^^@Data validity	Reliability of data correctness collected
	^^@Knowledge	Knowledge and experience of the person in charge that guides the initial search for data
	^^@Person collecting	Person who collects information
	^^@KPI	A selective or combined group of actions with the purpose of addressing a part of the performance or the whole performance (Hughes & Bartlett, 2002)
	^^@Problems with data collection	Any possible problem experienced when collecting data
	^^@Skills in data collection	Skills needed by person to collect data well
	^^@Sources	Sources from which data is used to analyse specific elements
	^^@Systems in Data collection	Specific systems used for data collection and later conversion
	^^@Technology and methods in data collection	Hardware, software and methods used to collect data

PA Themes	Codes for PA documents	Definition / Explanation
^#Data conversion	**^^#Analysis**	The analysis that was performed the analysis to produce information and intelligence
	^^#Analyst	The person performing the collection or analysis / conversion of data
	^^#Analytical technique	A variety of methods and statistics used to measure individual performances and to convert data
	^^#Data / info format	The format the data is conversed into (e.g. video clips)
	^^#Data storing	Hardware / software / systems used to store data
	^^#Relationship	The existence of a relationship between the CI user and analyst it of great importance (in sport between the coach and analyst)
	^^#Reliability	Reliability of data has to be assessed before it may be analysed
	^^#Statistics	The practice or science of collecting and analysing numerical data in large quantities, especially for the purpose of inferring proportions in a whole from those in a representative sample
	^^#Technology / tools / software	Technology / tools / software used to perform analysis
^$Information communication	**^^$Barriers to feedback**	Factors hindering coaches / analysts to provide feedback
	^^$Feedback	The process referred to in the sport domain whereby the coach or analyst communicate results or information
	^^$Methods of Info communication	The manner in which the information is shared and the time frame (e.g. team talk)
	^^$Persons receiving info	Those persons receiving the analysed information to make decisions / devise a strategy
	^^$Technology	The use of technology to communicate information

PA Themes	Codes for PA documents	Definition / Explanation
^%Countering	**^^%Decision-making**	A person use the information to make decisions on team / practice session
	^^%Knowledge on opponents	Information and knowledge on opponents which is used to devise a strategy and make decisions.
	^^%PA information utilized	The occurrence of information used to make decisions / develop a strategy
	^^%Performance prediction	Methods or performance indicators used to predict performance outcomes
	^^%Strategy	A plan of action designed to achieve a primary or overall goal
CI Themes	**Codes for CI documents**	**Definition / Explanation**
^&Process	**^^& PA training**	The skills developed through training to perform PA
	^^&Characteristics of sport	The nature and characteristics of different sports
	^^&Culture	The existence of the overall team culture for the implementation of PA
	^^&Environmental factors	External factors urging coaches / athletes to use PA for performance enhancement
	^^&History	The development and increased use of technology and PA through the years
	^^&Notational analysis	The mention of notational analysis specifically. The study of movement patterns, strategy and tactics in team sports.
	^^&PA benefits	The benefits derived from utilizing PA in sport
	^^&PA Definition	Definition of Performance Analysis / related aspects
	^^&PA Purpose	The reasons why PA is used by sport teams and coaches
	^^&PA Users	Persons who use Performance Analysis - very often the coach.

PA Themes	Codes for PA documents	Definition / Explanation
	^^**&PA Value**	The perception or value attributed to the performance of the team / athlete through the implementation of PA
	^^**&Performance**	Measurable level of how successfully an athlete or team competed
	^^**& Key Performance Indicators**	A selective or combined group of actions with the purpose of addressing a part of the performance or the whole performance – more applied within the process as a whole
	^^**&Process barriers**	Factors hindering the process of PA to take place
	^^**&Technology**	Technology used in the PA process

ADDENDUM 2.14: INTER-RATER RELIABILITY ON ARTICLES (COHEN'S KAPPA)

Data in table format

		Rater 1		Row	
		normal	abnormal	Marginals	
Rater 2	normal	187	2	189	rm^1
	abnormal	3	25	28	rm^2
Column Marginals		190	27	217	
		cm^1	cm^2		

$$Pr(a) = \frac{187 + 25}{217} = \frac{212}{217}$$

Pr(a) = 0.97696

$$Pr(e) = \frac{\left[\frac{190 \times 189}{217}\right] + \left[\frac{27 \times 28}{217}\right]}{217} = \frac{\left[\frac{35910}{217}\right] + \left[\frac{756}{217}\right]}{217}$$

$$= \frac{165.484 + 3.48387}{217} = \frac{168.968}{217}$$

Pr(e) = 0.77865

$$\kappa = \frac{0.97696 - 0.7787}{1 - 0.7787} = \frac{0.1983}{0.2213}$$

κ = 0.8959

ADDENDUM 2.15: INTRA-RATER RELIABILITY ON ARTICLES (COHEN'S KAPPA)

Data in table format

		Rater 1		Row	
		normal	abnormal	Marginals	
Rater 2	normal	191	2	193	rm^1
	abnormal	6	25	31	rm^2
Column Marginals		197	27	224	
		cm^1	cm^2		

$$Pr(a) = \frac{191 + 25}{224}$$

$$= \frac{216}{224}$$

Pr(a) = 0.96429

$$Pr(e) = \frac{\left[\frac{197 \times 193}{224}\right] + \left[\frac{27 \times 31}{224}\right]}{224}$$

$$= \frac{\left[\frac{38021}{224}\right] + \left[\frac{837}{224}\right]}{224}$$

$$= \frac{169.737 + 3.73661}{224}$$

$$= \frac{173.473}{224}$$

Pr(e) = 0.77443

$$\kappa = \frac{0.96429 - 0.774}{1 - 0.774}$$

$$= \frac{0.19}{0.226}$$

κ = 0.842

ADDENDUM 2.16: SYSTEMATIC LITERATURE REVIEW SUMMARY TABLES OF CI DOCUMENTS INCLUDED

Article		4Cs elements	CI
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
1	Du Toit and Sewdass (2014a)	**Purpose:** The comparison of CI activities in Brazil, Malaysia, Morocco and South Africa and how these countries could use CI to increase their competitiveness. Customer feedback used as the primary data source with corporate websites as a secondary source. A lack of advanced analysis techniques and formal systems as well as a need for identifying of key intelligence needs. CI provides facts, which are implemented reactively but should be used for proactive strategy development and decision-making.	The development of a CI culture and awareness in a company is necessary. CI is needed to enhance competitiveness in a global economy and companies need to redress critical competitive issues such as the establishment of the CI function as a strategic tool.
2	Garcia-Alsina *et al.* (2013)	**Purpose:** To gain insight into CI practices in the Spanish higher education sector and to identify factors influencing CI in this sector. An unequal weighting of informational activities is evident – a lower priority is given to the analysis stage of the process which reduces knowledge generation. Information sharing amongst managers as info collectors should improve lack in coordination between units. Irregular frequency and the diversification of info sources and gathering should be aligned with management objectives and strategy.	The following inhibitor factors were identified: inadequate formalization and the need for the development of CI practices such as integrated processes for information management. Regional and national regulations limit the capacity of innovation and the application of CI, since managers are nationally elected and intelligence function is placed within the quality department.
3	Wright *et al.* (2012b)	**Purpose:** Findings on SME's in Istanbul, Turkey enabled the creation of behavioural and operational typology of CI practices. Too much effort is spent on collecting easy gatherable data from public sources, which results in volume but not value of data. The dominance of web-based public domain sources is insufficient to secure a competitive advantage. Decision makers should focus more on "need to know" information. The dominant use of information was only for own company operations. The awareness of location where information needs to be sent is also important.	The development of an approach to CI is needed. The majority of firms show a lack of skills and the proper attitude and culture. The successful implementation of CI in firms is evident in firms which have defined roles, responsibilities and location of the CI unit. A standardized system should be tailored.

Article		4Cs elements	CI
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
4	Gatsoris (2012)	**Purpose:** To examine how furniture retailing businesses in Greece monitor competitors and how their own strategies are formulated from CI. Traditional tools such as the examination of a competitor product catalogue and store visits are used for data collection. A SWOT analysis and market research are used as analysis techniques.	A gap exists between the monitoring of data and a strategy, which indicates an inadequate formal process. A vast amount of information, lack of time, knowledge, fear of the unknown and unwillingness to invest in new processes inhibit CI implementation. An organisational culture to support CI is needed and management has an influence on the use of CI.
5	Fleisher and Wright (2010)	**Purpose:** To present a four-level hierarchical model of analysis of failure, to identify common causes of failure at individual level, 10 continua of CI analysis skills and guiding principles to follow in the CI process. The analyst skills continuum consists of: Creative vs. scientific, deduction to abduction to induction, individual vs. enterprise, intuition vs. intellect, precision vs. perspective, past to present to future, qualitative vs. quantitative, automotive vs. human process, written/spoken vs. visualisation and objectivity vs. subjectivity.	The four level hierarchical model of analysis failure include: individual analyst level failures, analysis task level failures, internal organisational level failures and external environmental level failures are identified. A10continua is described which identify the skills needed by CI analysts and CI analysts lack formal training.
6	Zangoueinezhad and Moshabaki (2009)	**Purpose:** To explore the role of structural organisational capital (CI) in Iranian companies. The internal and external operations are information systems constructs while cultural and social intelligence constructs fall within content factors which influence the admission of CI information and competitive advantage positively.	Information systems and content factors are significantly related to the attainment of CI, which is positively related to an organisational competitive advantage.
7	Dishman and Calof (2008b)	**Purpose:** To explore CI as a complex business construct for a marketing strategy formulation on Canadian technology firm executives. Inadequate planning, focus, analysis, communication, systems and procedures are evident. Management is not communicating their informational needs. Researchers identified factors which influence processes and stages. Study reveals multiple stages of the CI process followed, and while most firms are strong in the area of information collection, they are weak with their analysis.	The existence of a formal infrastructure and the level of employee involvement directly impact CI efficacy. The study proposes a model of CI.
8	Saayman *et al.* (2008)	**Purpose:** Exploring and validating the theoretical constructs of the CI process from South African and Flemish exporter companies. The following process constructs were identified: planning and focus, collection and analysis as well as communication. Context constructs included: awareness, internal information, formal infrastructure and employee involvement. The context influences the CI process to a large extent.	An improvement in businesses' formal infrastructure, employee involvement and internal information processes could enhance CI capability. The organisation size is an important influencing factor.

Article		4Cs elements	CI
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
9	Michaeli and Simon (2008)	**Purpose:** To enable CI practitioners to use the Bayes' theorem when they are confronted with conditional uncertainties. Bayes' theorem can be applied in a decision-making situation to evade risks and reduce misjudgements. It could further demonstrate at which point data collection becomes a cost. With Bayes' theorem approach, a CI analyst can design a collection of key indicators that will optimize overall performance.	The application of Bayes' theorem could be implemented as a foundation to CI education. This paper indicates how to take a computational approach to conditional uncertainties in CI projects.
10	Qiu (2008)	**Purpose:** To empirically investigate how the entrepreneurial attitude and normative beliefs of USA managers influence managerial scanning for CI in relation to the interpretation of the organisations' strengths and weaknesses. The scanning process (data collection) is more proactively applied by entrepreneurial managers. Managers are significantly influenced by the cultural orientation of the organisation, with market-oriented organisations providing a supportive CI culture. Scanning efforts and knowledge on customer needs, competitor products, actions, etc. by managers, lead to positive assessment of own strengths and weaknesses and better CI.	Entrepreneurial attitude orientation and market orientation by managers significantly impact managerial scanning for CI which leads to managerial representations of competitive advantage.
11	Wright and Calof (2006)	**Purpose:** To examine three empirical studies in Canada, UK and Europe with comparisons drawn on their approach and findings. The planning and focus of CI activities ranged from a broad focus to specific aspects on competitors. In all three countries used secondary sources for data collection. Countries' activities ranged from little analysis in some organisations to a high percentage that is using appropriate analytical techniques. Written reports dominated as the primary form of communication across all three countries.	The study indicates numerous variations in the CI process followed. The structure among companies also varies with some companies indicating no formal CI unit, whilst others have highly formalised CI units.
12	De Pelsmacker *et al.* (2005)	**Purpose:** To compare the CI practices of exporters in South Africa and Belgium A CI culture is evident from both countries, however not well equipped to conduct effective CI. Inadequate planning, data collection, data analysis, skills development, implementation of a process and structure is evident. CI activities are not organised in separate departments and is run from marketing and sales departments.	Recommendations are made specific to SA companies in regards to utilize a degree of centralisation of a CI unit with the implementation of s strong structure and people closely aligned to function together. Skills development of CI staff is also recommended.

Article		4Cs elements	CI
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
13	Priporas *et al.* (2005)	**Purpose:** To investigate awareness, attitudes and implementation of CI in Greece (well-known companies around Thessaloniki). The implementation of CI within the Greek companies is behind the USA but on par with the UK. Reasons for the slow implementation includes: unawareness, insufficient competent staff, shortage of experts to train staff, perceptions of the cost and complacent satisfaction with the general market research activities already performed. The main focus is on short term customer satisfaction rather than long-term competitiveness. Methods of analysis mainly used include: Profile competition with traditional method: SWOT analysis, market and financial analysis. Information collection on competitors' technology and employees.	In turbulent business environments, CI can significantly contribute to the competitive success of businesses. There is a clear value to strategic marketing planning for Greece business and in general.
14	Du Toit (2003)	**Purpose:** To determine the role of CI in South African manufacturing enterprises. Managers view CI as an important business tool. Sources of information used include the following: newspapers, collegial relationships, customers, annual reports, trade shows, advertising, distributors, suppliers, internet, conference reports and government departments. Information transferred orally through intra-organisational communication networks and the main focus is on the analysis of competitors. The senior management is directly involved in CI function and accept credibility of data and use it for decision-making.	CI systems are in place, but the majority thereof are insufficient. There is a low occurrence of formalised units. Enterprises in SA need more information handling skills in order to be successful in the rapid changing business environment and should be cognizant of the changes in access and utilization of intelligence word wide.
15	Marin and Poulter (2003)	**Purpose:** To determine how CI is distributed through technology within organisations, the sources used and the persons who distributes and receives the information. Sources used by members of SCIP include: news, corporate websites, trade publications and competitors' annual reports. Primary sources are valued higher, but are harder to find. Technological tools and software utilised by CI professionals to automatically gather info from secondary sources is evident and results in real time available data. Information dissemination takes place in the form of: emails used to distribute reports, newsletters or news items on competitors. In this regard the intranet is helpful but also limiting because of inadequate content management and accessibility. Communication of CI deemed important.	CI units are mainly located in the marketing department of an organisation. Managers, marketing and sales staff is main users of intelligence. From the study it was clear that there were only a few organisations with mechanisms in place to measure the value of CI.

Article		4Cs elements	CI
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
16	Viviers *et al.* (2002)	**Purpose:** To determine the level of CI practices and the development and deployment in SA. The planning and focus of CI operations of the SA firms were mainly directed towards competitors and customers. The main data collection process included employees inside and outside of the organisation, using electronic and published information. Their analysis technique used was a basic SWOT and competitor profiling analysis. Communication of intelligence was distributed to authorized persons, through intelligence products such as news bulletins and scenario planning.	SA firms are not well equipped to conduct good intelligence practices. Weaknesses are apparent in the process, structure and analysis functions. However, senior management believes in CI legitimacy and in the competitive advantage that it provides. Awareness and culture within the firms were good; however senior managers seldom use CI for strategic decision-making. Formal educational curricula are needed.
17	Wright *et al.* (2002)	**Purpose:** A pilot study was undertaken to gain a better understanding of how UK companies conduct CI. Furthermore, findings of the pilot study tested the appropriateness of a CI typology and used it to further develop the classification definitions. Main competitor analysis takes place through human interaction. Lack of time and too many projects are seen as employee barriers to gather info as well as a lack of CI understanding. Common problems include: inability to make info and the structure relevant to the CI users, as well as late and unread CI reports. CI is used for tactical decision-making.	Respondents misunderstand CI exists – as they think they think that only large companies implement it and that considerable finances and human resources are needed. There is a low occurrence of a long-term CI view. The primary influence on successful CI activities is linked to a certain management style, culture and structure which encourage trust, facilitate communication and encourage easy flow of info.
18	Du Toit and Sewdass (2014b)	**Purpose:** To determine the current state of CI with CI experts within Moroccan organisations. Formal CI functions do not exist in the majority of Moroccan companies; however, the use of primary and secondary sources of data is reported, together with various data analysis methods. The distribution and presentation of intelligence findings are evident.	The implementation of the CI process is evident although it is not used for decision-making. Stakeholders such as the government should assist in enhancing CI behaviour within Moroccan companies to enhance their competitiveness.
19	Tej Adidam *et al.* (2012)	**Purpose:** To explore the impact of CI practices on a firms' performance in the emerging market context of India. The location of activities in organization, personnel and budget allocation, frequency of analysis and supply, usage and dissemination, sources, use of analytical techniques, users, outcomes and perceived benefits were also investigated within the target organizational group.	Current level of CI activities in Indian firms are at a moderate level, suggesting an opportunity for using and implementing more sophisticated CI techniques. Indian firms who exhibited higher levels of CI activities achieved better financial performances.
20	Varol (2012b)	**Purpose:** To investigate club administrators and executive members of Professional Football clubs in Turkeys' use of CI. The majority of clubs have used the CI function for more than five years and the internet and web is used as the main source of information. The federation's database, experts and personal contacts where used as additional data sources.	The main use of CI activities was for tender and transfer leverage of players. Recommendations for CI implementation strategies for club managers are further specified.

Article		4Cs elements	CI
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
	Nasri (2011a)	**Purpose:** To investigate the degree of knowledge of CI in Tunisian companies. Internal sources are viewed as more valuable than external sources. Influence on successful implementation identified: management support, culture and structure – aimed to encourage trust, facilitate communication and encourage easy flow of information. CI is mostly not organised in a separate department and takes place from the marketing department.	Managers are conscious of the importance of CI in the management of companies. Organizations lack the investment in an internal infrastructure required for effective intelligence practices. CI as a tool is unknown and only a few managers implement it to be more competitive.
22	Rapp *et al.* (2011)	**Purpose:** The theoretical development of CI as an individual-level construct. For individual level CI, dynamic types of information are needed opposed to filtered, static public and secondary sources of information for organisational CI. A sales person could be an essential tool in the scanning effort and the alignment between sales person and organizations is essential for appropriate intelligence dissemination via the formal reporting process. Managers' challenge: decide on the performance metrics to be used as well as the appropriate use of intelligence.	Most of the CI processes are conducted without a formal guidance which suggests the potential of improved training and operational outcomes. Care should be taken in collection and use of intelligence – potential to lead to legal and ethical issues if not adhered to.
23	Du Toit and Sewdass (2014c)	**Purpose:** To provide an overview of the current state of CI in Brazil in numerous industries such as agriculture, mining, manufacturing, construction, tourism etc. Decision-making is not in top five uses of CI. Execution of CI activities is fragmented and focuses predominantly on internal environment information at the expense of the external competitive environment. The use of primary and secondary sources are apparent, however the inadequate use of sophisticated statistical techniques for data analysis is evident (mostly SWOT and competitor analysis is performed). A variety of ways are used to distribute CI findings	Less than half of the organizations cope with changes in the external environment. Practitioners do not realize the importance of the function of early warning tools in order to adapt their own strategies. The majority of participants agree that the CI function assist to quantify / qualify strategic choices.
24	Sewdass and Du Toit (2014)	**Purpose:** To examine the current situation of CI activities of CI experts in South African organisations. Industries such as financial, real estate, business services and agriculture sectors were included in the study. The main informational needs of managers are on regulatory bodies. The primary sources used include experts and direct customer feedback, while secondary sources refer to promotional material and internal financial information. Analysis techniques such as industry analysis and SWOT techniques were mostly employed. A variety of channels is used for information dissemination and decisions made are aimed at defeating legislation or regulations.	The predominant use of CI by the experts is to remain cognisant with government legislative trends. Organisations should enhance their CI culture by creating awareness among employees, provide training and by engaging senior management more with CI activities.

Article		4Cs elements	CI
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
25	Salvetat and Laarraf (2013)	**Purpose:** To identify the employees responsible for the CI process within high-technology European firms. The information analysis was not performed by experts with a mix of centralization and decentralization of CI practices. Experts allow development of structured and independent monitoring of activities.	The role of t op management is essential for the CI process; however, middle management and information experts heavily practice CI activities. Employees mainly remain as non-participants in the CI process. Most firms have formalized CI sections which employ experts. This CI process can bridge the gap between external and internal environment.
26	Fatti and Du Toit (2013)	**Purpose:** To determine the current CI situation and challenges faced by the South African Pharmaceutical industry. KIT needs of senior managers are available to CI practitioners. Most of the companies access primary sources on a daily, quarterly and monthly basis. Ethical data collection procedures are clear. Blind spot analysis is seldom used even though it is a necessary tool to this particular industry. Information sharing enhances decision-making, however the data basis are only available to CI unit professionals.	There is a sustainable commitment to principles and practices of the CI process evident, however the correct culture in organizations for the CI process to function properly, is inadequate. CI is used to generate profit and used positively in decision-making.
27	Franco *et al.* (2011)	**Purpose:** To evaluate the practices of economic intelligence used by CEO's of Portuguese firms and to identify the attributes that could increase these organisations' profitability. Variables related to the eco-logical dimension (partially accepted), teleo-logical, techno-logical, reti-logical and public policies dimensions are accepted to influence an organizations probability to engage in CI activities.	The probability of firms to adopt CI practices is influenced by orientations of the business policy and the strategy in public policies that improve business context from a CI perspective.
28	Dai *et al.* (2011)	**Purpose:** To establish the integration of two CI analysis methods with various text-mining technologies in a decision support model. This whole process includes text-mining and the collection of large quantities of data from the internet, the assessment of the source quality, processing of the data into an acceptable format, storing of information, information analysis and the decision-making itself.	The proposed model provides objectives and factors in the business environment and gives suggestions about strategies by combining different factors.
29	Strauss and Du Toit (2010)	**Purpose:** To identify the skills CI professionals need for CI to be used successfully in South Africa. The most prominent self-evaluation CI skills identified included: hardworking, determination and strategic orientation. These do not correspond with the skills indicated as being the most important for CI professionals namely: networking skills, analytical abilities and research skills. This is an indication that CI skills should be improved.	A gap exists between the most important CI skills needed and the practitioner's competency levels concerning identified skills. The knowledge on CI is limited and further contributing inhibitor factors may include inadequate training programmes and non-existence of active societies to foster CI.

Article		4Cs elements	CI
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
30	Wright *et al.* (2009)	**Purpose:** An empirical study of information gathering activities and the information sharing attitude within major UK retail banks. Different types of intelligence gathered included market share and market intelligence. The main sources utilized included public domains, internet, easy gathering. Methods of analysis referred to mainly elementary analysis. The dissemination of information happened in an interpersonal manner and triangulation of data is employed as accuracy mechanisms.	There is a lack in a common terms used for CI amongst firms. There is a common agreement on CI information use, and a lack in particular procedures and an ad-hoc location within organizations are evident. Senior executives actively support the process; however no standard mechanisms are in place for CI evaluation. Primarily intelligence is used to understand the competitive environment, competitors and customers. Good CI system leads to increased revenues and profitability and share value.
31	Fleisher (2008)	**Purpose:** To describe the current state of open source intelligence (OSINT) in businesses to examine the planning and execution challenges they are experiencing in using OSINT effectively. Real time intelligence is necessary and adds value to the business. Too much waste in intelligence efforts, especially on data collection and network development and the forging of partnerships between companies is the way forward.	There is a need for library and information specialists to closely collaborate with analyst experts to use OSINT in intelligence gathering and development. This need offers opportunities for industries to fulfil in and for academics to research.
32	Teo and Choo (2001)	**Purpose:** Evaluating the impact of Internet usage on both the CI and the organisation within the top 600 companies in Singapore. The importance of the internet as information gathering tool is evident and augmented through the availability of databases, web-sites and discussion groups as reliable sources. Low cost information gathering internet tools force CI professionals to transform data. Internal collaboration and dissemination of information and the quality of CI info are not positively correlated, however for external communication it is utilized effectively.	The quality of CI information is positively related to its organizational impact. The study delivered empirical evidence of collaborative intelligence and that team work enhances the quality of information gathered. The improved quality of CI information leads to more strategic benefits.
33	Begg and Du Toit (2007)	**Purpose:** To establish the level of importance attached to CI at a mass import retail organisation in SA. Within this organisation, the emphasis is placed on secondary sources as a means of data collection, with a SWOT analysis as the main analysis tool used. The dissemination of information is evident; however the manner and quality thereof may be deficient.	CI practices are done in an informal manner with the involvement of top management crucial in addressing some of the process weaknesses.

ADDENDUM 2.17: SYSTEMATIC LITERATURE REVIEW SUMMARY TABLES OF PA DOCUMENTS INCLUDED

Article		4Cs elements	PA
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
34	Schoeman *et al.* (2006)	**Purpose:** To consider the viability of using data mining tools and techniques in sports. Coaches and teams consider various statistics that are published on the internet as a data source and video footage specifically is applied in this regard. Data mining has the potential to uncover hidden information in large quantities of data, but it must be able to be used. This technique is mainly used for strategic decision-making purposes. The process requires people with specific skills and software, however it is simple to adopt and use.	There are various forms of data analysis in cricket available and currently conducted. Data mining techniques used in business could be implemented successfully to discover unknown information in sport. The process could be used for strategic scheduling of cricket matches, profiling of teams/players for selection, highlighting strengths and weaknesses and formulating a team strategy.
35	Wright *et al.* (2012a)	**Purpose:** To investigate how performance analysis tools are used by elite coaches in the UK. Elite coaches mainly receive a video, DVD, match report or edited clips of the game as sources of data. A large portion of elite coaches use a systematic approach to enhance their observation process and they rely on a number of systems and techniques to recall and analyse key events. Coaches use analysis for differentiated, timely and augmented feedback to their athletes. Live coding of matches minimises analysis time and allows analysts to provide feedback to coaches or players much sooner. Information received informs the coaches' short, medium and long term planning and influence their strategy for the following competition. Coaching philosophy also influence key performance indicators.	Not all coaches value the role of PA to enhance their coaching practice. For some coaches there is no systematic approach to PA. The use of videos for motivational feedback has also been reported and not just for strategic decision-making.
36	Bampouras *et al.* (2012)	**Purpose:** To explore the in-practice application of performance analysis by an international sport scientist, coach and athlete. Even though the athlete is the object and receiver of the PA process, he/she has limited access to the process. The coach acts as input gatekeeper between the athlete and PA process. The relationship between the coach and sport scientist in data collection and development of PA output is withheld from the athlete. The coach acts as a gate between the athlete and PA output.	Sport scientists are optional in the analysis process, whereas the coach and athlete are necessary. The integration of sport scientists and the development of specific performance systems are important for the enhancement of the PA process.

Article		4Cs elements	PA
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
37	James *et al.* (2007)	**Purpose:** To make recommendations about the use of a gold standard coding method and to compare analyst's codes against it. Different analysis techniques should be used to define analyst reliability and for this purpose Yule's Q statistical method was investigated. Inter-analyst reliability should be determined and the operational definition pertaining to different actions which must be coded, has to be clarified.	The paper proposed a method of analyst reliability checking.
38	Petersen *et al.* (2008b)	**Purpose:** An analysis of team, batting and bowling performances at the 2007 ICC Cricket World Cup to determine the magnitudes of differences between winning and losing teams. The internet scores and results were used as the main source of data. Cricket specific performance indicators highlighted differences between successful and less successful teams through specific statistical methods to obtain outcomes. The information could be used by coaches and a team to plan their match strategy and to select players.	The identification of performance indicators that correlates with successful match outcomes and successful teams provides the basis for strategy advancement and implementation by coaches. KPI's identified included taking wickets and run rate, with hitting sixes and bowling maiden overs was more important as the tournament progressed.
39	Petersen *et al.* (2008a)	**Purpose:** To analyse team batting and bowling performance at the 2008 Indian Premier League Twenty/20 Tournament by comparing the magnitudes of differences in key performance indicators between winning and losing teams. Study used the internet as source of data collection and the effect size statistic was generated to assess the magnitude of difference of cricket specific performance indicators between winning and losing teams.	The team strategy in cricket is influenced by the knowledge of the KPI's and the relative importance of team performance indicators. Specific team performance indicators were identified such as taking more wickets in the first 6 overs and having a higher run rate.
40	Bhattacharjee and Saikia (2014)	**Purpose:** To propose a composite index to measure the performance of cricketers in the Indian Premier League. In this study, website data was used as a source. Performance measures, normalization thereof and determination of weights were performed to achieve the proposed index. Computing of performance score and optimization model for ideal and balanced team selection.	The proposed way to enhance decision-making on team selection is through a composite index that measures the performance of cricketers.
41	Moore *et al.* (2012)	**Purpose:** To investigate batting and bowling performance indicators and to employ pitch level analysis to identify micro level variables related to successful outcomes of matches in English first class Twenty20 cricket. Live coding of matches was used for data collection with a cricket specific software package. Success in T20 cricket was linked to specific performance indicators such as taking wickets, especially in the last 6 overs and scoring runs quickly particularly through boundaries. These were calculated through using effect size statistics, with inter- and intra-reliability verified.	Successful teams have distinctive performance characteristics / indicators compared to losing teams. In plotting performance indicators across different T20 playing conditions, it may assist the coach with team preparation and tactical decision-making.

Article		4Cs elements	PA
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
42	O'Donoghue (2005)	**Purpose:** To propose a technique that not only represents a typical performance of a team or individual, but also the spread of prefaces. Internet websites on Grand Slam singles tennis matches were used as data source. A normative performance profile was established and individual player performance indicators measured against the normative profile. Various statistical techniques were utilized to compute KPI's. It is possible to create competitor comparative profiles regarding normative performance indicators.	Performances of individuals and teams will vary from match to match and the use of performance indicators alone is inadequate as the only PA analysis method. Performance profiles should be used as alternative technique that represents the typical performance of a team or individual as well as the variety of performances over time.
43	Hughes (2005)	**Purpose:** To propose mathematical and statistical techniques commonly used and required for the process of performance analysis. The following analysis steps must be followed by and analyst during the PA process: determine performance indicators, determine the importance of performance indicators, establish the reliability of data, use stable performance profiles, compare data sets and model performances. However, specific skills that an analyst need were also identified. A variety of statistical methods were used in order to attain performance prediction.	Paper established a process necessary for a notational analyst as consultant or researcher.
44	O'Donoghue (2006)	**Purpose:** To describe the process of using systems to gather performance data, analyse that data and how to provide feedback in the form of statistics and video footage. Best practise is to collect data through live match coding and the use of a video analysis software package. The focus is placed on coding performance indicators as feedback which is provided to athletes and coaches. There exists a variety of video feedback methods used with different purposes. Competitor analysis through video feedback focus on specific performance indicators and behaviours of the competitor.	A dynamic model of the PA process and a functional model of PA process are proposed.
45	Lames and McGarry (2007)	**Purpose:** To address the reliability of performance indicators in game sports. Data from previous studies were utilized to address the paper objective. The following aspects of a process emerged from the research undertaken: competition behaviour observed (data collected), software were utilized for analysis, the fact that information needs to be reliable and data was analysed and information used to indicate weaknesses or strengths of performance. There are certain factors influencing the analysis of team sport due to its structure. Better strategy development and implementation during training with the goal to perform better in competition should be the goal of performance analysis.	Dynamical systems theory provides a new perspective for the advancement of the structure of team sports and the analysis thereof.

Article		4Cs elements	PA
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
46	O'Donoghue (2007)	**Purpose:** The paper challenges the belief that precise operational definitions guarantees good reliability and that the absence thereof guarantees poor reliability. Data from a variety of other studies is used to achieve the purpose of the paper. Operational definitions are important within PA and intra-operator reliability does not indicate a systems' objectivity. Furthermore, the value of statistical reliability should be justified.	Authors recommends 7 steps that should be applied by PA operators: Identify performance indicators (PI), assign values of PI for different types of performance, select reliability of statistics, determine the level of acceptability of reliability of PI, train operators accordingly and determine inter-operator reliability.
47	O'Donoghue (2009)	**Purpose:** To describe the initial research on Interacting Performances Theory, using a series of 6 studies to provide evidence supporting the four key parts of the theory. Data was gathered from the official tournament websites for the 2007 and 2008 tennis French Opens. Competitors' style of play influences his/her own performance and therefore, using own strengths and by exploiting the weaknesses of the opponent is necessary for successful performance outcomes. Likewise, process and performance outcome indicators are needed to make an analysis. The evaluation of match data and different statistical methods are employed to calculate averages, percentages etc. on key performance indicators in order to achieve performance profiles.	Evidence is given that the Interacting Performance Theory could be applied to PA and to support a four part initial version of the theory. This could influence a players' own strategy followed based on the significant effects of the style of play from the opponent.
48	Lyons (2011)	**Purpose:** The paper identifies characteristics of Cloud computing and focus on the use of generic and open Cloud resources by coaches (canoeing in Australia). Software suppliers for sport offer Cloud capabilities and capacities for their services and coaches and athletes are accessing various software services. The Cloud delivers "convenient, on-demand network access to a shared pool of configurable computing resources". This platform is provided through subscription services and open access resources with the use of technology. Regarding the use of cloud computing and services, certain security and accessibility questions are raised.	Evidence suggests that sport coaches are increasingly using Cloud computing resources and offer opportunities to coaches to develop their own practices. Likewise, coaches can create rich learning environments for athletes, especially related to their communication and feedback. The use of these resources has instigated a transformation in the coach-athlete relationship.
49	Lorains *et al.* (2013)	**Purpose:** To design and test a reliable method of analysing decision-making and to use it to evaluate this aspect as well as the transfer of the information to intentional training for competition application of elite Australian football players. Key performance indicators of Australian football players were measured and the inter-observer reliability was calculated.	The decision-making accuracy of the players increased from early to late season even though the decision options did not differ between games. This indicates a reliable new platform to measure the cognitive skill of decision-making in a match situation. This effect will also imply an effective transfer of performance gains by off the field training interventions.

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No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
50	O'Donoghue (2008)	**Purpose:** To use Principal Components Analysis (PCA) to identify key performance indicators that addresses the criticism of other researchers. Through the observation of 146 women's singles events in the 2007 Australian and US Opens' matches together with the manual recording of action variables, 22 performance indicators were computed. The data of the PIs were then compared with data obtained from a website of the same tournament matches. The reliability of data was calculated with acceptable percentage error ranges. A PCA was performed and revealed that 13 of the original 24 PI's were significantly different between winning and losing performances within matches.	PCA could be used to reduce performance indicators to a set of independent KPI's. This finding aids the development of real-time analysis system in reducing action variables and is also important for coaches to understand patterns of play of opponents.
51	Sharma *et al.* (2012)	**Purpose:** To provide a way to evaluate and choose the best Twenty10 cricket batsmen using ordered weighted averaging (OWA) operator. Data that was collected from Indian Premier League matches related to 10 specific attributes of batsmen. The OWA statistical method was used whereby a minimax disparity OWA model was employed to rank the batsmen based on the 10 parameters. From this list the top batsmen can be chosen.	It is deemed to be a better practice to judge the performance of a player not only one attribute, but based on a few parameters. This OWA method applied to rank and select the best cricket team is flexible by considering multiple performance attributes.
52	Saikia *et al.* (2012)	**Purpose:** To analyse and predict the performances of bowlers in the 4th season of the Indian Premier League (IPL) through the application of Artificial Neural network (ANN). The external validity of the model is tested using their actual performance in the 5th IPL tournament. Data was collected from a website with a large number of cricket matches used to obtain a fair performance distribution. Nominal and continuous variables were used as input variables and the importance of independent variables were calculated.	The ANN model when applied for external validity was found to be 71.43 percent accurate in predicting the performances of cricket players. This ANN model could therefore help a franchisee to make better decisions on which players to contract.
53	Najdan *et al.* (2014)	**Purpose:** To investigate the determinants of success in English domestic Twenty20 cricket. Data was collected through coding of cricket matches using specific software which captured detailed information on pre-determined key performance aspects. Operational quality and cross-validation of data were performed by a qualified performance analyst. A statistical analysis was performed to determine the performance indicators which separate winning and losing teams. Decision-making is possible from the information.	The investigation identified key determinants of success in English domestic Twenty20 cricket. The top 5 indicators of success were losing fewer wickets in the power play overs, losing fewer wickets between overs 7 to 10, 50+ run partnerships, individual batsmen contributing to 75+ runs and 50 to 74 runs. These KPI's provide a coach with objective information to plan his team selection, strategy and tactics.

Article		4Cs elements	PA
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
54	Amin and Sharma (2014)	**Purpose:** To suggest a new method for cricket team selection using data envelopment analysis (DEA). Data from matches the IPL 4 was used and analysed. Nine performance indicators were identified and used in the DEA to determine efficient and inefficient cricket players and rank them on the basis of the DEA scores.	Study proposes multiple outputs DEA formulation to assess cricket players in different capabilities. This novel application of DEA method in considering multiple factors related to the performance of players with multiple capabilities is the first attempt to select a cricket team from players of different teams.
55	Lyons (2005)	**Purpose:** To discuss an approach to PA from applied context in Australia. Micro-technology is mainly used to gather rich information to provide augmented information for the coach and athletes. Data collection was obtained from sensors and cameras on and around athletes in training and competition with a specific software package that also analyse the data. The gathered data is used to describe the performance of the athlete and to adapt athlete technique in training.	The relationships between the sport scientist performing the analysis and coaches and athletes should be purposefully arranged to integrate insights into learning and performance enhancement of athletes and teams.
56	Baca (2006)	**Purpose:** To indicate specific systems which were developed for applied diagnostic purposes of for giving feedback to coaches and athletes immediately after exercises. Coaches and athletes are provided with innovative and efficient support as they identify and analyse performance indicators. Various sensors and devices (cameras) are incorporated into sport equipment or attached to the athlete for data collection. Mobile computers acquire and present the data recorded while other systems use telemetric methods to transmit the data to receiving computer stations. The accuracy of collected data, the collection process and the measurement system is satisfying and users are capable of comprehending the information presented. Portable devices for data collection are particularly needed.	Real time and rapid feedback systems as well as sophisticated systems for collecting and analysing sports-specific biomechanical data, provide innovative and effective support to coaches and athletes.
57	O'Donoghue and Cullinane (2011)	**Purpose:** To show that performance indicators should be evaluated addressing the quality of the opposition and to show how opposition effects can be modelled. Data on the men's singles matches at the 2010 and 2011 Australian Open tennis championships was accessed from a website. Statistical methods were employed to determine performance indicator values that interpret individual performances against the qualities of the opposition. A set of tennis specific performance indicators were used together with opposition variables to map residuals onto a percentage map. The practical difficulty with this analysis method lies in collecting enough meaningful data to perform the regression modelling.	This modelling technique was used to address the relative strengths and weaknesses of particular opponents rather than applying the same model to all players.

Article		4Cs elements	PA
No	**Author and Year**	**Data collection, conversion, information communication, countering, the CI process and elements thereof**	**Conclusion or findings**
58	Cooper *et al.* (2007)	**Purpose:** To present a method for assessing reliability based upon Bland and Altmans' suggestions for the non-parametric treatment of comparison data and the proposals of Nevill *et al.* Data were collected through the coding of recorded matches. In this process, performance indicators were chosen and analysts completed a coding process. Statistical methods were employed to calculate intra-observer reliability.	The method employed within the study is a simple method of measurement of absolute agreement that is sensitive enough to distinguish between the successes and errors made by expert, experienced and improving sport performance analysts.
59	Robinson and O'Donoghue (2007)	**Purpose:** To illustrate how the weighted kappa statistic can be used with performance analysis data. The notational analysis of matches was used for data collection through a sport specific software programme. Sport specific performance indicators were coded by different analysts.	The use of the weighted kappa statistic to assess inter-operator agreement in a notational analysis system is a promising reliability statistic as it is not overly stringent and recognises partial agreement between related values of nominal and ordinal scale performance indicators.
60	Lemmer (2008)	**Purpose:** To show how batting and bowling performance measures for one-day international cricket matches can be adapted for use in Twenty20 matches. Data was collected from an internet website with regard to specific performance indicators. Performance indicators were adapted for use in different competition formats. However, measurements used to rank players were difficult to substantiate because of a low number of matches and insufficient available data.	Using adjusted measures for performance indicators within different competition formats are not achievable since additional data is needed.
61	(Wright *et al.*, 2012a)	External companies were used for data collection with team analysts filtering irrelevant information. An experienced analyst with a high level of understanding of the game produced their own accurate analysis and established inter- and intra-reliability. An emphasis was placed on KPI's derived from coaching philosophy. Within the analysis and feedback process, communication between the coach and analysts is important, however this study claims there is little knowledge about the use of the intelligence by the coach.	The analyst plays an important role in concluding the analysis cycle by providing the most recent data and feedback to coaches and athletes. This analyst should deliver clear and knowledgeable information which is useful in generating an intervention strategy and plan by the coach or athletes.

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ADDENDUM 2.18: ACCEPTANCE OF TYPED INTERVIEW CONTENT

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1 April 2016

Mnr

ACCEPTANCE OF TYPED INTERVIEW CONTENT

PHD STUDY:
"Development of a competitive intelligence process framework and survey for cricket coaches".

ETHICS NUMBER: NWU-00185-15-S1

Dear ,

Thank you for your participation in the interview to finalize the interview questions for my above mentioned PhD study. I appreciate your inputs and value the time you set aside for it.

Would you please be so kind as to read the typed version of our conversation and sign off regarding the content accuracy? If there is any part of the conversation that you do not agree on, please indicate it via track changes on the Word document or in writing as per email.

I would appreciate your timeously reply.

Yours faithfully



Liandi van den Berg
PhD student

Declaration by participant

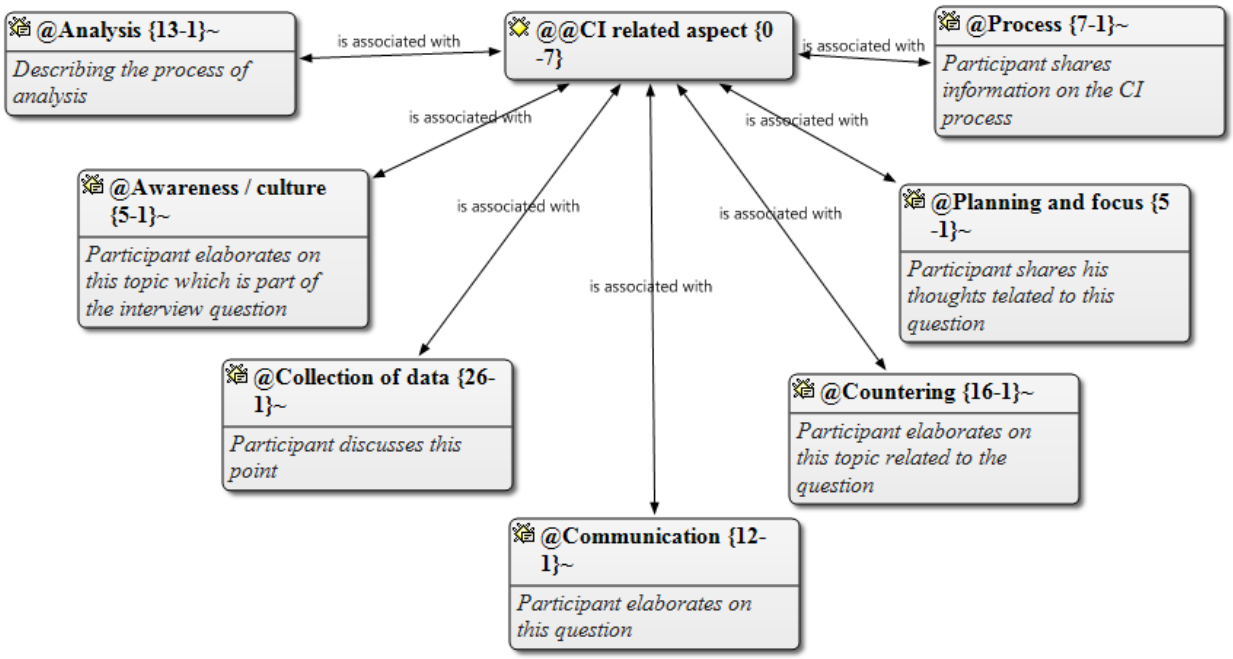
By signing below, I ……..……. agree to the acceptance and accuracy of the typed version of the interview held with the researcher on the study titled: **Sport Competitive Intelligence Project**

Signed at (*place*) .....….....…….. on (*date*) ……...…….. 20....

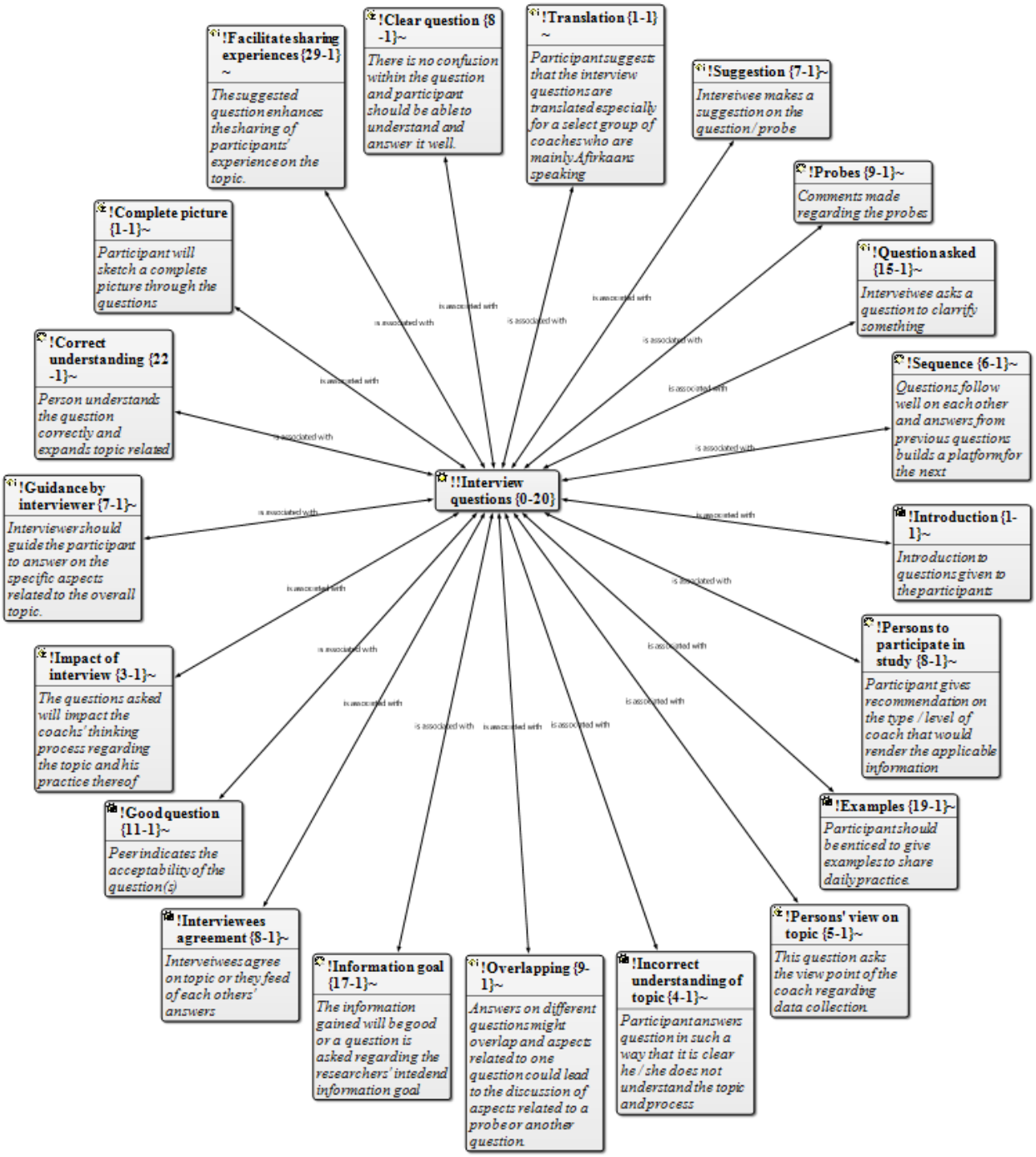
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Signature of participant

ADDENDUM 2.19: INTRA-UNIVERSITY PEERS INTERVIEW DATA ANALYSIS: CI RELATED ASPECTS ON CONTENT DATA NETWORK



ADDENDUM 2.20: INTRA-UNIVERSITY PEERS INTERVIEW DATA ANALYSIS: GENERAL SCHEDULE QUESTIONS, COMMENTS AND CODES - DATA NETWORK



ADDENDUM 2.21: PRELIMINARY INTERVIEW SCHEDULE

Introduction

A critical component of coaching success is to gain a competitive advantage by utilising all available information. This study focuses on the process followed by cricket coaches to gather, analyse and communicate information in order to counter competitors' actions. Such a process is utilized within the business realm for businesses to gain a competitive advantage and to counter environmental and competitor factors and is called Competitive Intelligence. CI is defined as: "a systematic and ethical program for gathering, analysing and managing external information that can affect your company's plans, decisions and operations" (Weiss, 2002:41). This study aims to develop a CI model and survey for cricket coaches.

You are at any time welcome to ask questions if you require more clarity concerning CI and what it involves.

Semi-structured interview questions:

A) CI awareness/culture

1. Tell me about your view on the importance of gathering information on competitors and the environment.

Probes for researcher:

- Tools used?
- Guidelines developed?
- Process followed?

B) Planning, identification and focus

2. Could you describe the most important aspects of key information topics that you think will give you as a coach an advantage over your competitors?

Probes for researcher:

- Communicate?
- Review these key topics?

- Key topics guide your decisions / strategy?

C) Collection of information

3. How, if at all do you collect relevant information on competitors and the playing environment?

Probes for researcher:

- Sources
- Who collects?
- Skills/experience?
- Tools used?

D) Collation/ conversion

4. Tell me how, if at all you go about to analyse the information on competitors?

Probes for researcher:

- Validation of information?
- Types of analysis (SWOT, competitor's profiles, video analyses? If you do use a certain method, explain how the method works.)
- Compare information
- System for storing and retrieving information?

E) Communication

5. Could you describe the communication of information that takes place, if at all and with whom?

Probes for researcher:

- When?
- How?

F) Countering

6. Can you explain how the information helps / guides you to make certain decisions / plan strategy?

Probes for researcher:

- Info used?
- Knowledge created?

ADDENDUM 2.22: INTERVIEW SCHEDULE

Introduction

A critical component of coaching success is to gain a competitive advantage by utilising all available information. This study focuses on the process that cricket coaches follow to gather, analyse and communicate information in order to counter competitors' actions. This process is utilized within the business realm for businesses to gain a competitive advantage and to counter environmental and competitor factors and is called "Competitive Intelligence" (CI). CI is defined as: "a systematic and ethical program for gathering, analysing and managing external information that can affect your company's plans, decisions and operations" (Weiss, 2002:41). This study aims to develop a CI model and survey for cricket coaches.

You are at any time welcome to ask questions if you require more clarity concerning CI and what it involves.

Semi-structured interview questions:

A) CI awareness/culture

1. Tell me about your view on the importance of gathering information on competitors and the environment.

Probes for researcher:

- Why is it important/ not important to you?
- Have this process in any way benefit your success as a cricket coach?

B) Planning, identification and focus

2. Could you describe the most important aspects of the sport that you think will give you an advantage over your competitors?

Probes for researcher:

- Communicate?
- Review these key topics?
- Key topics guide your decisions / strategy?
-

C) Collection of information

3. How, if at all do you collect relevant information on competitors and the playing environment?

Probes for researcher:

- Sources
- Who collects?
- Skills/experience?
- Tools used?

D) Collation/ conversion

4. Tell me how, if at all, you go about to analyse the information on competitors?

Probes for researcher:

- Steps of the analysis process
- Validation of information?
- Can you give an example?
- Types of analysis (SWOT, competitor's profiles, video analyses)? If you do use a certain method, explain how the method works.
- System for storing and retrieving information?

E) Communication

5. Could you describe the communication of information that takes place, if at all and with whom?

Probes for researcher:

- When?
- How?
- For example?

F) Countering

6. Can you explain how the information helps / guides you to make certain decisions / plan strategy?

Probes for researcher:

- Info used?
- Knowledge created?
- Example?

ADDENDUM 2.23: INTERVIEW SCHEDULE TO PARTICIPANTS

Introduction

A critical component of coaching success is to gain a competitive advantage by utilising all available information. This study focuses on the process that cricket coaches follow to gather, analyse and communicate information in order to counter competitors' actions. This process is utilized within the business realm for businesses to gain a competitive advantage and to counter environmental and competitor factors and is called "Competitive Intelligence" (CI). CI is defined as: "a systematic and ethical program for gathering, analysing and managing external information that can affect your company's plans, decisions and operations" (Weiss, 2002:41). This study aims to develop a CI model and survey for cricket coaches.

You are at any time welcome to ask questions if you require more clarity concerning CI and what it involves.

Semi-structured interview questions:

A) CI awareness/culture

1. Tell me about your view on the importance of gathering information on competitors and the environment.

B) Planning, identification and focus

2. Could you describe the most important aspects of the sport that you think will give you an advantage over your competitors?

C) Collection of information

3. How, if at all do you collect relevant information on competitors and the playing environment?

D) Collation/ conversion

4. Tell me how, if at all, you go about to analyse the information on competitors?

E) Communication

5. Could you describe the communication of information that takes place, if at all and with whom?

F) Countering

6. Can you explain how the information helps / guides you to make certain decisions / plan strategy?

ADDENDUM 2.24: INTER-RATER RELIABILITY FOR INTERVIEWS (COHEN'S KAPPA)

Data in table format

		Rater 1		Row	
		normal	abnormal	Marginals	
Rater 2	normal	182	2	184	rm^1
	abnormal	3	10	13	rm^2
Column Marginals		185	12	197	
		cm^1	cm^2		

$$Pr(a) = \frac{182 + 10}{197} = \frac{192}{197}$$

Pr(a) = 0.9746

$$Pr(e) = \frac{\left[\frac{185 \times 184}{197}\right] + \left[\frac{12 \times 13}{197}\right]}{197} = \frac{\left[\frac{34040}{197}\right] + \left[\frac{156}{197}\right]}{197}$$

$$= \frac{172.792 + 0.79188}{197} = \frac{173.584}{197}$$

Pr(e) = 0.88114

$$\kappa = \frac{0.9746 - 0.8811}{1 - 0.8811} = \frac{0.0935}{0.1189}$$

κ = 0.7865

ADDENDUM 2.25: INTRA-RATER RELIABILITY FOR INTERVIEWS (COHEN'S KAPPA)

Data in table format

		Rater 1		Row	
		normal	abnormal	Marginals	
Rater 2	normal	229	5	234	rm^1
	abnormal	6	23	29	rm^2
Column Marginals		235	28	263	
		cm^1	cm^2		

$$Pr(a) = \frac{229 + 23}{263} = \frac{252}{263}$$

Pr(a) = 0.95817

$$Pr(e) = \frac{\left[\frac{235 \times 234}{263}\right] + \left[\frac{28 \times 29}{263}\right]}{263} = \frac{\left[\frac{54990}{263}\right] + \left[\frac{812}{263}\right]}{263} = \frac{209.087 + 3.08745}{263} = \frac{212.175}{263}$$

Pr(e) = 0.80675

$$\kappa = \frac{0.95817 - 0.80675}{1 - 0.80675} = \frac{0.15143}{0.19325}$$

κ = 0.78357

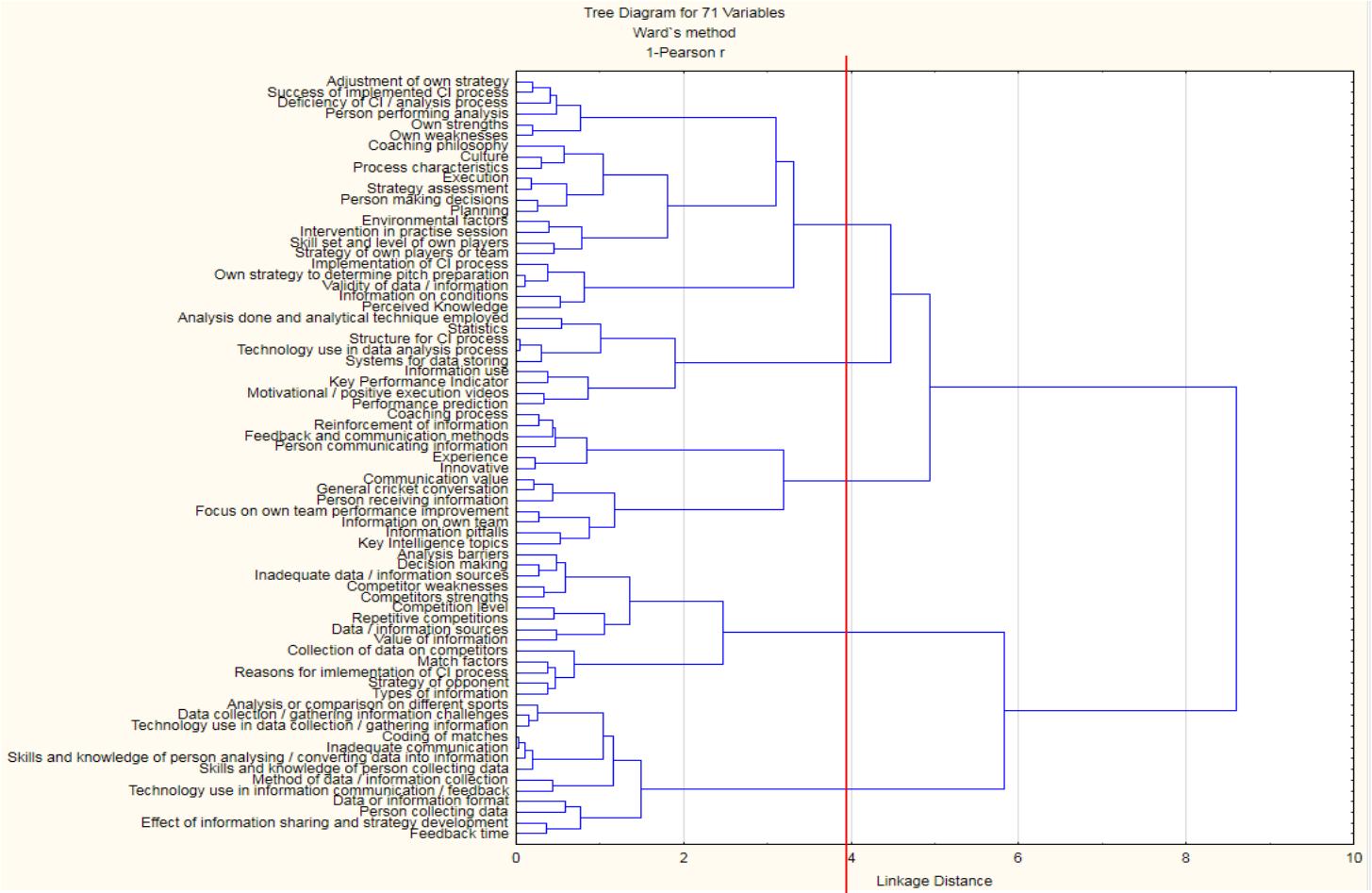
ADDENDUM 2.26: COACHES AND SUPPORT STAFF INTERVIEWS PRIMARY DOCUMENTS TABLE

Participants	Adjustment of own strategy	Analysis barriers	Analysis done and analytical technique employed	Analysis or comparison on different sports	Coaching philosophy	Coaching process	Coding of matches	Collection of data on competitors	Communication value	Competition level	Competitor weaknesses	Competitors strengths	Culture	Data / information sources	Data collection / gathering information challenges	Data or information format	Decision making	Deficiency of CI / analysis process	Effect of information sharing and strategy development	Environmental factors	Execution	Experience	Feedback and communication methods	Feedback time	Focus on own team performance improvement	General cricket conversation	Implementation of CI process	Inadequate communication	Inadequate data / information sources	Information on conditions	Information on own team	Information pitfalls	Information use	Innovative	Intervention in practise session
P 1: P1.docx	0	6	9	4	0	0	0	14	0	10	9	12	0	14	10	0	11	0	0	8	2	5	6	4	0	0	3	0	7	0	0	0	0	0	1
P 2: P2.docx	3	6	12	2	5	13	0	10	0	10	4	7	0	25	4	14	3	3	0	11	3	15	24	3	0	0	4	0	1	4	1	9	9	9	3
P 3: FG P3,4,5,6.docx	3	0	4	1	6	11	0	21	1	26	4	11	1	26	1	6	5	1	1	11	8	5	12	2	12	1	1	0	4	4	10	1	26	0	5
P 4: P7.docx	0	3	8	5	0	1	12	10	0	0	2	3	0	9	9	9	4	2	3	1	0	1	12	5	2	0	3	7	0	1	3	4	5	0	0
P 5: P8.docx	1	1	4	1	9	10	0	21	1	9	11	10	6	6	3	1	0	0	0	6	7	1	14	0	10	3	2	0	2	6	15	4	8	0	2
P 6: P9.docx	0	3	5	0	0	7	0	21	3	8	8	4	0	12	3	6	0	0	4	5	3	2	13	5	4	5	2	0	2	5	6	6	12	0	2
P 7: P10.docx	1	0	10	0	0	4	1	9	0	4	2	1	0	16	6	4	2	0	0	5	6	4	5	3	15	2	1	0	3	3	10	6	17	0	0
P 8: P11 and P12.docx	4	6	12	0	0	2	1	6	0	19	8	0	1	18	1	2	5	7	0	6	4	1	7	1	7	0	8	0	8	10	0	2	6	1	2
P 9: P13.docx	2	4	1	0	2	1	3	12	0	12	7	6	1	12	4	4	14	1	0	6	4	0	4	1	5	0	3	0	8	2	2	4	16	0	3
P10: P14.docx	4	3	1	1	2	2	0	2	0	7	7	7	0	9	1	4	6	4	0	5	1	2	1	1	1	0	0	0	4	3	0	2	4	0	0
P11: P15.docx	9	2	36	3	0	0	4	10	0	35	9	8	0	12	4	15	12	2	0	17	6	3	14	2	12	5	4	0	2	4	2	4	32	0	6
P12: P16.docx	11	0	8	0	4	3	1	8	0	5	4	3	0	10	0	13	7	7	1	9	12	1	11	5	6	0	1	0	0	0	0	2	18	0	2
P13: P17.docx	6	5	7	0	1	4	2	2	0	3	8	4	0	3	3	2	5	0	2	19	5	0	10	2	7	1	1	0	1	3	5	6	8	1	5
TOTALS:	44	39	117	17	29	58	24	146	5	148	83	76	9	172	49	80	74	27	11	109	61	40	133	34	81	17	33	7	42	45	54	50	161	11	31

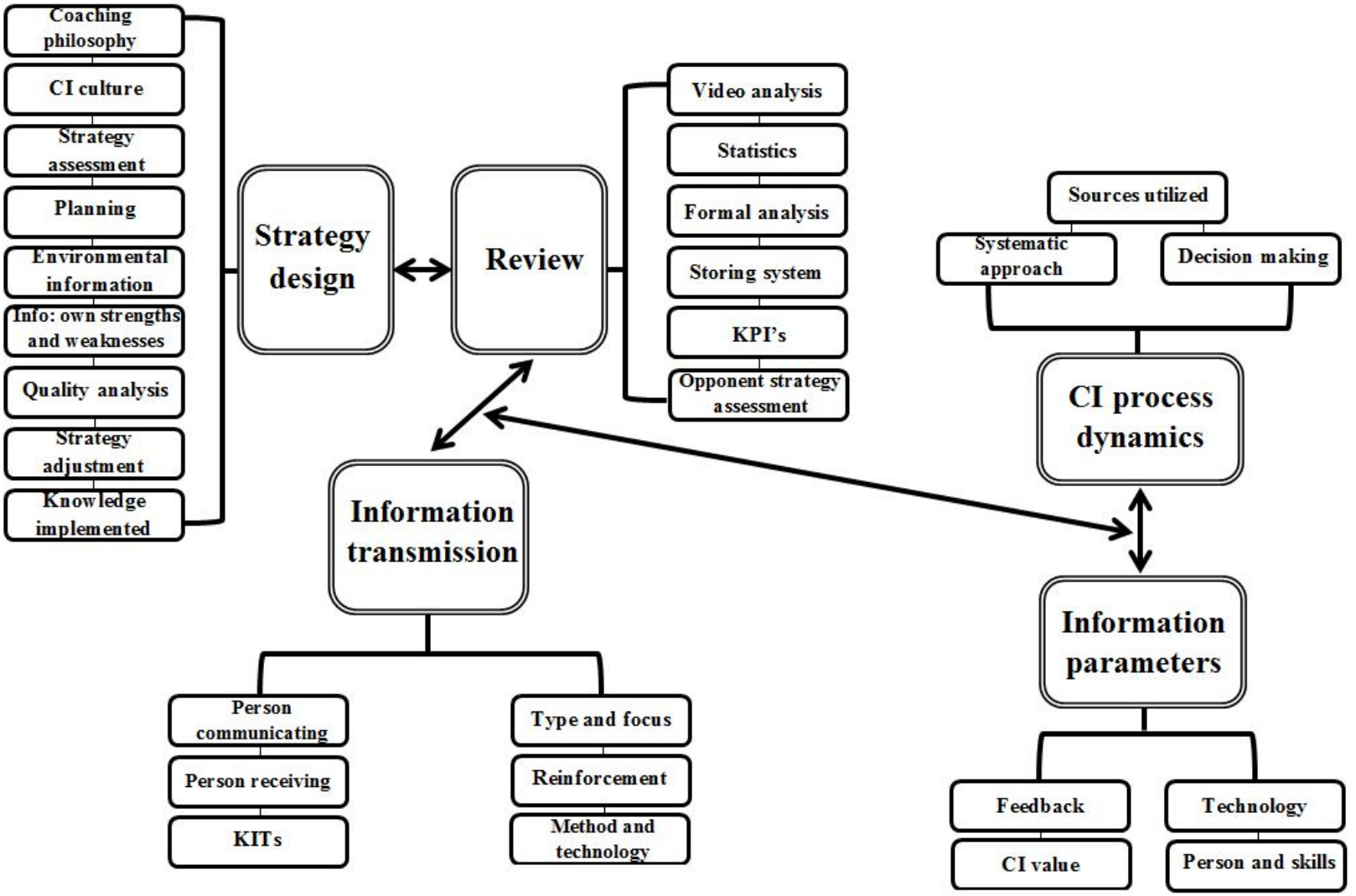
Continue..

Participants	Key Intelligence topics	Key Performance Indicator	Match factors	Method of data / information collection	Motivational / positive execution videos	Own strategy to determine pitch preparation	Own strengths	Own weaknesses	Perceived Knowledge	Performance prediction	Person collecting data	Person communicating information	Person making decisions	Person performing analysis	Person receiving information	Planning	Process characteristics	Reasons for imlementation of CI process	Reinforcement of information	Repetitive competitions	Skill set and level of own players	Skills and knowledge of person analysing / converting data into informa	Skills and knowledge of person collecting data	Statistics	Strategy assessment	Strategy of opponent	Strategy of own players or team	Structure for CI process	Success of implemented CI process	Systems for data storing	Technology use in data analysis process	Technology use in data collection / gathering information	Technology use in information communication / feedback	Types of information	Validity of data / information	Value of information	TOTALS:
P 1: P1.docx	7	4	12	3	0	0	3	2	0	0	8	3	4	1	1	0	0	2	0	0	0	0	0	0	0	9	17	0	0	2	0	10	0	10	0	4	**237**
P 2: P2.docx	15	8	4	1	1	0	3	0	11	0	17	18	3	15	8	0	0	0	7	0	0	5	4	4	2	1	17	0	0	0	3	5	1	0	0	7	**377**
P 3: FG P3,4,5,6.docx	24	21	8	2	0	0	0	1	12	0	9	14	11	15	7	13	0	1	5	3	11	0	0	5	4	8	33	0	1	0	0	2	1	0	0	10	**452**
P 4: P7.docx	9	8	0	3	0	0	2	1	1	1	10	9	2	2	5	1	0	0	1	0	0	16	5	2	1	0	3	0	0	3	1	12	5	0	0	6	**233**
P 5: P8.docx	19	10	2	7	0	0	4	3	4	0	10	15	17	10	7	19	8	0	2	0	9	4	1	0	10	4	32	0	2	1	0	3	6	3	0	6	**392**
P 6: P9.docx	22	5	1	1	0	1	6	4	6	0	15	20	5	10	12	10	2	2	2	0	0	4	0	5	2	4	6	0	0	3	0	5	0	4	0	6	**319**
P 7: P10.docx	15	9	9	2	0	0	3	1	2	0	6	3	3	10	7	5	2	1	0	0	7	1	0	7	5	2	9	0	0	2	1	5	0	0	0	5	**262**
P 8: P11 and P12.docx	9	0	2	0	0	3	5	3	14	1	4	10	10	11	3	15	1	0	3	1	7	7	0	6	4	3	37	0	2	2	1	6	1	5	1	8	**340**
P 9: P13.docx	19	8	2	3	4	0	1	2	13	7	10	2	2	2	2	2	0	0	0	4	9	0	1	0	1	8	18	0	0	4	0	10	3	2	0	5	**288**
P10: P14.docx	7	6	2	3	1	0	3	3	3	0	8	7	2	11	4	4	0	0	0	3	0	1	1	0	1	0	4	0	2	2	0	1	1	0	0	6	**170**
P12: P16.docx	23	37	8	6	9	1	3	6	8	5	13	5	8	26	17	8	2	0	0	6	9	2	2	8	4	7	25	5	1	17	21	15	10	0	0	8	**599**
P12: P16.docx	14	14	3	2	6	1	10	7	3	2	7	10	17	16	8	11	1	2	2	1	3	1	0	1	10	9	22	0	3	3	0	0	0	0	0	5	**346**
P13: P17.docx	18	7	0	2	0	0	6	6	11	1	6	14	11	7	6	21	4	0	1	0	11	0	0	5	3	5	25	1	3	7	3	4	0	0	0	4	**323**
TOTALS:	201	137	53	35	21	6	49	39	88	17	123	130	95	136	87	109	20	8	23	18	66	41	14	43	47	60	248	6	14	46	30	78	28	24	1	80	**4338**

ADDENDUM 2.27: DENDROGRAM (SINGLE-LINKAGE, TREE CLUSTER, 1-PEARSON CORRELATION COEFFICIENT, ANALYSIS RESULTS OF RECOVERY INDICATOR VARIABLES



2.28: CI FRAMEWORK FOR CRICKET COACHES



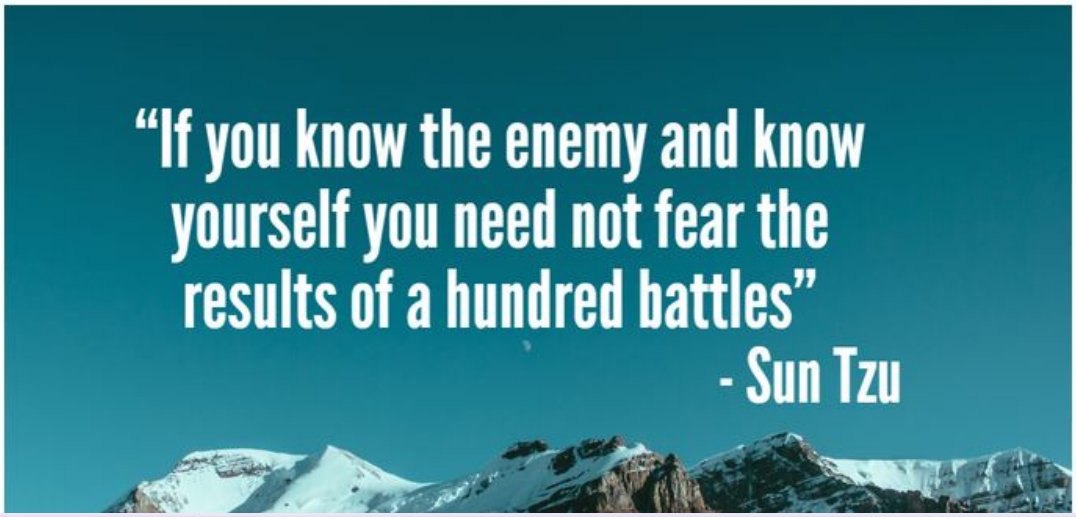
ADDENDUM 2.29: GOOGLE FORMS DOCUMENT AS ACCESSED PER URL LINK SENT TO INTER-UNIVERSITY PEERS AS PART OF EXPERT VALIDATION PROCESS

Section 1 of 9

Competitive intelligence survey for cricket coaches

Form description

Image title



Section 2 of 9

Expert review template

Thank you for agreeing to participate as an expert in reviewing the items on the CI survey for cricket coaches that I am developing for my PhD in Human Movement Sciences. Below is a description of what CI is, how it is applied within the sport context, the construct definitions and a list of questions on the items of the survey. Please begin by familiarizing yourself with this background information and then review the specific instructions for validating the content.

Section 3 of 9

Research project: PhD – Development of a Competitive Intelligence framework and survey for cricket coaches

A critical component of coaching success is to gain a competitive advantage by utilising all available information. This study focused on the process that cricket coaches follow to gather, analyse and communicate information in order to counter competitors' actions. Within the business domain this process is utilized by organisations to gain a competitive advantage and to counter environmental and competitor factors. This process is called "Competitive Intelligence" (CI) and is defined as: "a systematic and ethical program for gathering, analysing and managing external information that can affect your company's plans, decisions and operations" (Weiss, 2002:41).
Elite level cricket coaches and support staff such as assistant coaches and performance analysts were included in this study and were interviewed on how they gather, analyse, communicate and counter opposition strategies. Participants mainly coached on professional level (domestic or national level), with a few coaches that coached on provincial and university level. The 5 constructs and the 28 items in the survey were derived from interview data analysis.

Image title



Section 4 of 9

Instructions

Instructions for rating items
This measure is designed to evaluate the content validity of this survey. Please rate each item as follows:

i) On a scale of 1-4, please rate how much each item represents the construct that is being tested. Four means that the item represents the construct whereas 1 means that the item does not represent the construct at all. Space is provided for your comments on the item or suggested revisions.

Representativeness:
1=item is not representative of the construct
2=item needs major revision to be representative
3=item needs minor revisions to be representative
4=item is representative

ii) On a four-point scale please indicate if the meaning of each item is clear. Four means that the item is very clear whereas 1 means the item is not clear at all. Also make comments about each item's clarity if necessary.

Clarity
1=item is not clear
2=item needs major revision to be clear
3=item needs minor revisions to be clear
4=item is clear

Section 5 of 9

Construct A: Strategy design

Definition: Factors and aspects that contribute to coaches' design of teams' match strategies

Item 1: My coaching philosophy is the guiding principal for my team strategy development

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 1

Long answer text

Item 2: A team culture is created whereby players and coaching staff consistently collect and analyse information on competitors in a formal and systematic manner

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 2

Long answer text

Item 3: The execution of the team strategy is assessed after every match

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 3

Long answer text

Item 4: Me as the coach, plan and decide on the team strategy to be followed

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 4

Long answer text

Item 5: Environmental information (such as pitch and weather conditions) are gathered and analysed in a prescribed and structured manner before each match

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 5

Long answer text

Item 6: I need continuous information on my own team players' strengths and weaknesses for strategic decision making

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 6

Long answer text

Item 7: High quality analysed information is used to determine the intervention training sessions before matches

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 7

Long answer text

Item 8: I adjust my team's strategy if new information is gained before matches

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 8

Long answer text

Item 9: I have enough knowledge on competitors and the environment to guide a structured information collection and competitor analysis

	1 = Not at all	2 = Major revisions	3 = Minor revisions	4 = Very much (Representative / clear)
Representative	○	○	○	○
Clarity	○	○	○	○

Comment on item 9

Long answer text

Section 6 of 9

Construct B: Review

Definition: The manner and method used by the coach to review information to evaluate and confirm his strategy design

Item 10: After every match I will look at video footage and video analysis of that specific match

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 10

Short answer text

Item 11: I evaluate statistical data and information after each match

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 11

Long answer text

Item 12: At the onset of each season, we perform a SWOT analysis of opposition players.

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 12

Long answer text

Item 13: I have an established, well-functioning system for storing and retrieving previously analysed competitor and environmental information

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 13

Long answer text

Item 14: The Key Performance Indicators (such as runs scored for batters and runs conceded for bowlers) that I evaluate for match strategy assessment and new strategy development, differs from match to match.

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 14

Long answer text

Item 15: The competitor information collected and analysed is primarily used for opponent strategy assessment and prediction

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 15

Long answer text

Section 7 of 9

Construct C: Information transmission

Definition: The manner and method that the coach uses to communicate information on team strategy to specific persons

Item 16: As the coach I am primarily responsible to communicate information on the opposition, environment and team strategy to my team

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 16

Long answer text

Item 17: I tailor my communication method on competitor and environmental information to suit the preferences of my individual players

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 17

Long answer text

Item 18: I distribute competitor information to anyone in the team who is interested in it

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 18

Long answer text

Item 19: I communicate information on competitors and the environment to my players before each match

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 19

Long answer text

Item 20: I emphasize selected competitor information to my players

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 20

Long answer text

Item 21: My key intelligence needs are communicated to a person who performs the information collection and competitor analysis

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 21

Long answer text

Section 8 of 9

Construct D: CI process dynamics

Definition: The forces or properties which could stimulate growth, development, or change within a system or process. These are factors that the coach has to manage to ensure a successful CI process.

Item 22: Our coaching management team follows a systematic, continuous process to collect and analyse competitor strengths and weaknesses

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (Representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 22

Long answer text

Item 23: I access and utilize a number of sources (websites, video footage, coded video clips) to collect and analyse information on competitors and the environment

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (Representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 23

Long answer text

Item 24: I continuously utilize analysed and high quality information to guide my decisions

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (Representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 24

Long answer text

Section 9 of 9

Construct E: Information parameters

Definition: Limitations coaches perceive or experience which negatively influence the implementation of the CI process

Item 25: We use highly sophisticated technology to code and analyse videos and data

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 25

Long answer text

Item 26: The person, who performs competitor and environmental analysis for our team is skilled and trained in using technology driven analysis techniques

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 26

Long answer text

Item 27: Feedback on own performance and strategy execution is performed shortly after each match

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 27

Long answer text

Item 28: I value technologic-derived competitor and environmental information above information gained from my own players

	1 = not at all	2 = major revisions	3 = minor revisions	4 = Very much (representative / clear)
Representativeness	○	○	○	○
Clarity	○	○	○	○

Comment on item 28

Long answer text

ADDENDUM 2.30: INTER-UNIVERSITY PEERS DATA ANALYSIS ON CI SURVEY FOR CRICKET COACHES

Scale and items	Expert feedback										CVI						IRA			IRA		
Strategy design	Expert 1		Expert 2		Exppert 3		Expert 4		Expert 5		Representativeness			Clarity			Representativeness			Clarity		
Item	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Experts	Total	Value	Experts	Total	Value	Items agree	Total	Value	Items agree	Total	Value
1	4	4	4	4	4	3	4	4	4	4	5	5	100	5	5	100	7	9	78	6	9	67
2	4	4	4	4	1	2	4	4	3	3	4	5	80	4	5	80						
3	3	3	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
4	1	3	3	4	4	3	4	4	4	3	4	5	80	5	5	100						
5	3	3	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
6	4	4	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
7	3	3	4	4	3	1	4	4	4	4	5	5	100	4	5	80						
8	4	4	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
9	3	3	4	4	3	2	4	4	3	3	5	5	100	4	5	80						
Sub total													96			93						
Review	Expert 1		Expert 2		Exppert 3		Expert 4		Expert 5		Representativeness			Clarity			IRA Representativeness			IRA Clarity		
Item	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Experts	Total	Value	Experts	Total	Value	Items agree	Total	Value	Items agree	Total	Value
10	3	3	4	4	3	4	4	4	4	4	5	5	100	5	5	100	6	6	100	4	6	67
11	3	3	4	4	3	2	4	4	4	4	5	5	100	4	5	80						
12	4	4	4	4	4	3	4	4	4	3	5	5	100	5	5	100						
13	4	4	4	4	4	4	4	4	4	4	5	5	100	5	5	100						
14	4	4	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
15	3	3	4	4	3	1	4	4	4	4	5	5	100	4	5	80						
Sub total													99			93						
Info transmission	Expert 1		Expert 2		Exppert 3		Expert 4		Expert 5		Representativeness			Clarity			IRA Representativeness			IRA Clarity		
Item	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Experts	Total	Value	Experts	Total	Value	Items agree	Total	Value	Items agree	Total	Value
16	4	4	4	4	4	4	4	4	4	4	5	5	100	5	5	100	6	6	100	5	6	83
17	4	4	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
18	3	3	4	4	4	3	4	4	3	4	5	5	100	5	5	100						
19	4	4	4	4	4	4	4	4	4	4	5	5	100	5	5	100						
20	3	3	3	3	4	3	4	4	4	4	5	5	100	5	5	100						
21	4	4	3	3	4	2	4	4	4	4	5	5	100	4	5	80						
Sub total													100			97						
CI process dynamics	Expert 1		Expert 2		Exppert 3		Expert 4		Expert 5		Representativeness			Clarity			IRA Representativeness			IRA Clarity		
Item	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Experts	Total	Value	Experts	Total	Value	Items agree	Total	Value	Items agree	Total	Value
22	4	4	4	4	4	4	4	4	4	4	5	5	100	5	5	100	3	3	100	3	3	100
23	3	4	4	4	4	4	4	4	4	4	5	5	100	5	5	100						
24	4	4	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
Sub total													100			100						
Info parameters	Expert 1		Expert 2		Exppert 3		Expert 4		Expert 5		Representativeness			Clarity			IRA Representativeness			IRA Clarity		
Item	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Represent	Clarity	Experts	Total	Value	Experts	Total	Value	Items agree	Total	Value	Items agree	Total	Value
25	4	4	4	4	4	3	4	4	4	3	5	5	100	5	5	100	4	4	100	3	4	75
26	4	4	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
27	4	4	4	3	4	2	4	4	3	3	5	5	100	4	5	80						
28	3	3	4	4	4	3	4	4	4	4	5	5	100	5	5	100						
Sub total													100			93	**26**	**28**	**93**	**21**	**28**	**75**
																			IRA			IRA
																			Represent			Clarity

ADDENDUM 2.31: REVISED CI SURVEY FOR CRICKET COACHES

No	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
A	**Strategy design**	**1**	**2**	**3**	**4**	**5**
1	My coaching philosophy guides the development of my team strategy					
2	A team culture is created whereby players and coaching staff consistently collect and analyse information on competitors in a systematic manner					
3	The execution of the team strategy is assessed after every match					
4	As coach, I primarily plan and decide on the team strategy to be followed for matches					
5	Environmental information (such as pitch and weather conditions) are gathered and analysed in a structured manner before each match					
6	I need continuous information on my own team players' strengths and weaknesses for strategic decision-making					
7	High quality analysed information is used during planning and strategy design before matches					
8	I adjust my teams' strategy if new information is gained before matches					
9	I have sufficient knowledge on competitors and the environment to direct a structured information collection and analysis					

No	Item	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
B	**Review**	**1**	**2**	**3**	**4**	**5**
10	After every match I look at specific video footage and analysis of that specific match					
11	I evaluate statistical data after each match					
12	At the onset of each season, a SWOT analysis of opposition players are performed					
13	I have an established, well-functioning system for storing and retrieving previously analysed competitor and environmental information					
14	The Key Performance Indicators (such as runs scored for batters and runs conceded for bowlers) that I evaluate to assess and develop new match strategies, differs from one match to another					
15	The competitor information collected and analysed is primarily used for opponent strategy assessment					
C	**Information transmission**	**1**	**2**	**3**	**4**	**5**
16	As the coach I am primarily responsible to communicate information on the opposition, environment and team strategy to my team					
17	I tailor my communication method regarding competitor and environmental information to suit the preferences of my individual players					
18	I share information about our competitors and environment mainly collectively to the whole team					
19	I communicate information on competitors and the environment to my players before each match					
20	I re-accentuate selected competitor information to individual players					
21	I communicate my key intelligence needs to a person who collects and analyse the competitor and environmental					

	information					
No	**Item**	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
D	**CI process dynamics**	**1**	**2**	**3**	**4**	**5**
22	Our coaching management team follows a systematic, continuous process to collect and analyse competitor strengths and weaknesses					
23	I access and utilize a number of sources (websites, video footage, coded video clips) to collect and analyse information on competitors and the environment					
24	I continuously utilize analysed and high quality information to guide my decisions					
E	**Data / Information parameters**	**1**	**2**	**3**	**4**	**5**
25	We use highly sophisticated technology to capture, code and analyse videos and data					
26	The person who performs the analysis on competitors and the environment is skilled and trained in using technology driven analysis techniques					
27	Feedback on own team performance and strategy execution is performed shortly after each match					
28	I value technology-derived competitor and environmental information highly influential on my coaching practise					

ADDENDUM 2.32: CODEBOOK FOR CRICKET COACH AND SUPPORT STAFF INTERVIEW CODES CREATED

No	Code	Definition	Example
1	**Adjustment of own strategy**	A situation where factors forced the coach or support staff to adjust his/her own or team strategy	"...in a cricket match because it is very dependent on what the pitch does. If the pitch is slow, and if you don't adjust to conditions you're going to struggle..."
2	**Analysis barriers**	Factors inhibiting the analysis process	"No not at all. The technology is just too expensive...and you have to have a full time person doing it. On the Dartfish and those programmes, you can do that, but the price of it – it is just too much money." "And there is not breakdown of the 15 overs batting power play etc. It's normally just the game results and the best three batsmen, three bowlers. That kind of stuff. You can see the bowlers' bowling figures for the game, batsmen that kind of stuff, but it's difficult to see really how they did on that."
3	**Analysis or reference to different sports**	Person refers to the process of analysis or comparison between different sports	"Whereas in rugby, you can see exactly where are they strong – doesn't matter how the field looks...line outs are strong, backline they're strong, this player is weak at tackling, another one doesn't like being under the high ball. That's much easier, but cricket, that is difficult."

No	Code	Definition	Example
4	**Analysis done and analytical techniques employed**	The process of using specific methods of analysis such as SWOT analysis, pattern recognition and statistics.	"...so there is a lot of database that happens behind the scenes, try and pick up *patterns*." "But there is a *trend*, like out of 100 innings for example, in the Champions League, I think we looked at about 30 to 40 games just to pick up a trend." "So those type of *statistics*, if the bowler at the death he bowls 70% Yorkers, you have a high % change of getting a Yorker." "...got a full print out *averages*, *strike rate*, *how many* fours I hit in the season, how many sixes..."
6	**Coaching philosophy**	The philosophy of the coach that drives his actions, how he coaches, communicates and develops his/her team.	"One of the biggest things for me is that, yes results were important, but growing the individual is even more important."
7	**Coaching process**	Behaviour and activities the coach performs as part of his job.	"...I use his admin, I try and pull that in, I don't use much of what he told me out on the field, but from an organising, getting plans ready for nets and running training sessions..."
8	**Coding of matches**	A process whereby every ball in a match is recorded and categorized according to specific topics, actions and outcomes.	"Then we will also code where the ball was bowled, short, back of a length, length, half volley, Yorker or full toss. And then we will go onto once the ball has been hit, we say where the ball landed, so we split the field into different fielding positions."

No	Code	Definition	Example
9	**Collection of data on competitors**	The activity of gathering information specifically on competitors	"I think observing them and that is where with professionals you can find videos of teams playing and it helps a lot observing a team is as I find it the easiest." "At the level that I was at (English Club cricket), gathering information about competitors ...you can't really..."
10	**Collection of data on own team / individuals**	The activity of gathering information specific to own individual athlete and or team and their performance	"I actually went on the internet the other day and I went into when I played in England and all the years and I actually got a full print out averages, strike rate, how many fours I hit in the season, how many sixes, all that kind of stuff you can find. So that is available there and also all the newspaper articles as well."
11	**Communication value**	The importance of good communication is highlighted	"Cricket still lies with my interacting with them and communicating, getting them to understand what they must do and the technology and the fancy stuff are the-add on rather than me being the add-on to that."
12	**Competition level**	The person refers to competition of cricket on a specific level.	"...especially at *amateur* level, *club* level or *university* level."
13	**Competitors strengths**	A referral to information on the general or cricket specific strengths of competitor players or teams.	"... a batsman and you can exactly see where he scored his runs..." "We noticed that they are a better team when batting first."
14	**Competitors weaknesses**	The person refers to general or cricket specific aspects of a competitor player or team which is seen as a weakness.	"There were a few things like one player is weak on the back foot, or he is weak on the off side"

No	Code	Definition	Example
15	**Culture**	The culture created mainly by the coach and driven within the team. It may or may not support the CI process or aspects thereof.	"Otherwise the coach would be standing on the outside and players are looking to him for answers, so we want to create environments where players can be independent from the coach."
16	**Data / information analysis**	The process or activity whereby time is taken to perform and interpret the how and what of information that was produced.	"So often I go and watch the game with them and I am sitting next to them while they are busy video analysing saying look at this, just put a highlight out there..." "We would analyse the game quickly afterwards, especially to trying to harpen positive stuff rather than on the negative stuff..."
17	**Data / Information Sources**	Specific references to resources and sources used for data and information collection	"Normally Gauteng Cricket board updates it, you have to send the information on the match to them and they put it in. The whole score sheet." "I actually went on the internet the other day and I went into when I played in England and all the years and I actually got a full print out..." "Each league has its own person who handles just that, all the results all the score sheets, the stats. And it is also available on a data base."
18	**Decision-making**	The action of making a decision based on specific information available	"Because we thought that if we get the chance that we would bat first..." "...and that's how I feel he started to select his team or make decision."
19	**Deficiency of CI/ analysis process**	Process of gathering and analysing information used inadequately	"OK, at university, I think it is an area which is probably not done enough."

No	Code	Definition	Example
20	**Environmental factors**	Factors from the environment influencing decisions and strategies	"Look in the cricket environment, you can only see on the day according to what pitch you are going to be playing on. I think a pitch, neutralizes the advantages and disadvantages of teams."
21	**Experience**	The coach or support staff is sharing information out of his / her own cricket playing experience	"And when I was at Worcestershire, during the game, when you were batting and you were out..."
22	**Execution**	Physical performance of players and implementation and accomplishment of the strategy or plan within a match environment	"...whether you execute that plan or don't, that is up to your skills, but you have a plan."
23	**Feedback and communication methods**	The method used to provide feedback or communicate the analysis performed or the results and performance of a match or performance indicators	"I wrote down the notes and typed out the notes and gave it to each bowler..." "...so we'll have the visual up, showing the slower ball..."
24	**Feedback time**	The interval in time from when the match / analysis took place until the analysed results are available and communicated	"And the thing overseas is everything is on the computer straight away, and here in SA it is done on paper, and it first have to be copied onto the computer."

No	Code	Definition	Example
25	**Inadequate communication**	Person highlights inadequate communication process	"To be honest, that is the one thing I have been a little bit frustrated with because I was always the intern and Adrian was the head analyst. I would have liked to have sat before going to the tournament with the coach to find out that the stuff that we are coding is it really what the coach wants? And I really want to have a sit down afterwards and have a de-brief of what we did right and where we went wrong or what we can add or change."
26	**Implementation of CI process**	Coach or support staff would use the process of gathering information and analysis for specific reasons and situations	"For USSA we did obviously with playing against Pukke, our enemies."
27	**Inadequate data / information sources**	Sources not available or not in a specific, usable format	"...you can't really because you can't get videos on the other teams." "The stats they give you, you don't really get a lot of information from it."
28	**Information pitfalls**	Negative aspects or difficulties with information	"What we found is that in the first year we probably overloaded the players a little bit. We probably gave too much information..."
29	**Information use**	Referring to information used / applied	"As to how you are going to use the information and when is the right time to use it. From a week to week thing, we try and keep it simple, we don't try and over analyse."

No	Code	Definition	Example
30	**Information on own team / players**	Coach focus and use a lot on the information of his own team	"Again you could be looking at your own players' techniques when they are batting, the head is falling over, where they are scoring their runs, so there's many variables." "So we always finished with positive and always their good shots, the boundary shots, were the guys hit sixes or fours, we should like a quick 2 minutes of just us batting, us bowling, getting wickets, the celebrations, that sort of thing."
31	**Information on conditions**	Coach has or gathers information on the conditions	"...so I have 12 years of league experience so every ground in the province, I have been at, I have played at, I know it."
32	**Innovative**	Person shows original and creative way of thinking and does ground breaking work within the field of analysis and incorporating it into his coaching	"Another thing that I do sometimes use is where I have come up with an excel spread sheet which shows, during our week matches, we have 14 players and I have 3 players on the side of the field." "That is where the conditions and the environment and that is where you have just got to plan a little bit in advance and maybe speak to a few people who you know around there and get the information, whatever you can."

No	Code	Definition	Example
33	**Intervention in practise session**	Coach applies knowledge on gathered data and analysed information within a practise session to prepare his / her individual players or team for the upcoming competition	"...you set up nets where guys only throw spin at you, throw slower balls at you. Do funny kind of stuff, but you also don't tell the batsmen you are going mix it up or I am going to throw this or this. It has got to be like he is facing a completely new bowler." "Where at Varsity sport or even USSA, you play five fifty over games in a row, so you don't have the time to have a net in between were you say the next guy is actually good, he bowls a lot of bouncers, he is quite quick, let's go practice it."
34	**Key Intelligence Topics (KITs)**	Initial information need of the CI user (coach) related to general or specific cricket aspects on competitors, the environment or own team in order to provide intelligence inputs for team strategic plans to be formulated	"What I want on opposition is about their character. I am always about their character. What are they like..."
35	**Key Performance Indicators (KPI)**	Cricket specific aspects related to batting, bowling and fielding that coaches / analysts use to evaluate performance either of their own team or that of the opposition	"...*averages, strike rate, how many* fours I hit in the season, how many sixes, all that kind of stuff you can find." "...the results are always printed out, who did what – top *run scorer*, *top wicket* taker."

No	Code	Definition	Example
36	**Perceived Knowledge**	Knowledge gained on pitches, cricket grounds, certain players and coaches through many years of playing or coaching	"Yes, you do really know, if you are going to a pitch you will know this is a slow wicket, you know what the good scores are and you are not going to say ok, we are going to get 400 here, 200 might be enough, that sort of thing."
37	**Match factors**	Factors and aspects that neither the coach nor the players have any control over that influence the match / competition that could possibly influence their strategy taken.	"So we tried, but obviously if you don't win the toss you can't really (determine it)." "And at a few times we really had them under pressure. On the verge of winning the game and then *certain things* didn't go our way."
38	**Method of data / information collection**	Referring to specific activities / actions performed by a person to collect data and information	"I think *observing* them and that is where with professionals you can find *videos* of teams playing and it helps a lot observing a team is as I find it the easiest."
39	**Motivational / good performance and execution videos**	Situation where coach or support staff use videos of players' good performances / execution of skills to motivate them or reinforce information.	"And we always finish a video session with our own batting and bowling. So we always finished with positive and always their good shots, the boundary shots, were the guys hit sixes or fours, we should like a quick 2 minutes of just us batting, us bowling, getting wickets, the celebrations, that sort of thing. So we always left the room with a positive reinforcement that we know what we are doing."

No	Code	Definition	Example
40	**Own strategy to determine pitch preparation**	Coach or support staff indicate their own strategy is decided on, and then communicates to the grounds man to prepare a specific cricket pitch that would benefit their strategy	"Let's say for example we are playing two spinners, so I will talk to him on a Monday and say, Ross, I am going to play two spinners, please try to prepare a pitch that is going to spin. That is the first thing I do."
41	**Own strengths**	The coach or support staff refers to their own individual players or teams' strengths in general and cricket specific	"If you know that your strengths are playing forward..." "With our own team, we were also a better team defending than chasing."
42	**Own Weaknesses**	The coach or support staff refers to their own individual players or teams' weaknesses in general and cricket specific	"...this is where you were struggling..."
43	**Pattern identification**	Analysis involves looking and identifying patterns of performance, behaviour, activities or strategy	"...He will log, single, one, and if he picks up a pattern example in"

No	Code	Definition	Example
44	**Performance prediction**	The use of information to predict specific players' or teams' performances	Want hy glo, die ou doen dit – die ou is soos ’n robot, en ek was al saam met die span in Indië dat hy letterlik die hele batting line-up reguleer op grond van sy video materiaal en dit voel vir my of ’n ou op die ou einde ’n robot is en of coaches glo daar is ’n knoppie agter die ou se kop, jy druk hom en dan is hy aan en dan is hy af.” ENGLISH TRANSLATION (*Because he believes that the guy does this, as if he is a robot and I have been with the team to India where he literally regulated the whole batting line-up based on his video material and it made me feel the guy is a robot and it was as if the coaches believed the player had a button behind his head which you press and then he is on and then he is off.”)*
45	**Person collecting data**	This refers to the person performing the activity of collecting data, either regarding own individuals / team or data on competitors	“The person who is in charge of the league. Each league has its own person who handles just that, all the results all the score sheets, the stats and it is also available on a data base.” “...so we had a few days where we on weekends *we* would go through, sit there in the corner and not really video analyse but seeing their strong points, which combinations they bowl with, that kind of stuff.”
46	**Person communicating information**	The person responsible for communicating the information gathered and analysed to the information users.	“And when I was at Worcester, during the game, when you were batting and you were out, *the guy* would sit with you and show you, this is where you scored your runs...”

No	Code	Definition	Example
47	**Person making decisions**	The person who makes decisions based on the information gathered and analysed.	"That was more really the coach's job. I didn't really do that with him. He was the one to make the decisions."
48	**Person performing analysis**	Persons involved in evaluating the data and information and performing the analysis.	"So anyway, the three hours before the TUKS game, I spoke to the analyst who said ok, what do we need to do here?"
49	**Person receiving information**	Refers to the main person who needs and receives the information but not necessarily have to make decisions	"I wrote down the notes and typed out the notes and gave it to each *bowler...*" "From my side, I think it is really necessary and I do notice that the *coaches*, if I supply it in an easy and functional way, then they will definitely make use of it..."
50	**Planning**	Process of putting a strategy together from data or information / preparation for competition	"So there will be various variables that you need to consider as a coach in terms of your planning, in terms of how you are going to execute your plan to win games."
51	**Data collection / gathering information challenges**	Problems and barriers in collecting or gathering data and information such as inadequate sources, resources or technology	"...gathering information about competitors - you can't really because you can't get videos on the other teams – you have to go where they are playing and record them."
52	**Process barriers**	Factors inhibiting the process of data collection and analysis to take place.	"...unfortunately from a finance point of view, it isn't always possible, but we took video analysts with us to Varsity Sport but we have video analyst who are employed by the university, buy they obviously are for all the sporting codes."

No	Code	Definition	Example
53	**Process characteristics**	Participants explain the process or parts thereof implemented.	"I think so, but I think a lot of them get caught up in it (the process)."
54	**Reasons for implementation of CI process**	Coach or support staff indicate a specific situation where they implement the CI process with a specific reason given	"Because we played in the North-West league and it was always us or them to win the league, so it was important."
55	**Reinforcement of information**	A situation whereby a person re-communicates the information or reminds another person about it.	"Where we could just reinforce the message out to the bowler, and say listen, remember our plans, we don't want to bowl short at this guy, pitch the ball up and it worked for us."
56	**Repetitive competition**	Coach or support staff indicates that teams play numerous times against each other within a season or successive years against the same opposition within the different competitions.	"...maar ons speel maar redelik teen mekaar, jy speel baie teen dieselfde spanne en 'n mens het daai basis gebou." (but we play fairly a lot against each other, you play a lot against the same teams and one then have that base built).

No	Code	Definition	Example
57	**Skills and knowledge of person analysing / converting data into information**	The person responsible for converting or analysing data into information needs specific skills and knowledge regarding cricket and performance indicators as well as the operating system or a systematic process	"So for instance in the national team there is an analyst who has a strong background staff in India who analyse a lot of games and provide a hell of a lot of information to provide a point of difference or cutting edge advantage."
58	**Skills and knowledge of person collecting data**	The person responsible for collecting data needs specific skills and knowledge regarding cricket and performance indicators as well as the operating system or a systematic process	"I have Abraham who is my video guy – he is the video analyst and he doesn't just clip our stuff..." "Not any more. I did it for a year or two, which was to be honest a bit boring in a way. It becomes so easy to do it is not even funny, you do it almost with your eyes closed."
59	**Skill set and level of own players**	The coach or support staff refers to the various skills and abilities as well as the skill levels of their own players or that of the opposition.	"I think it is very important especially when you get to a high performance level where the teams have their skill levels at a certain point."
60	**Strategy of opponent**	Person identifies the strategy implemented by die opposition; the coach may or may not pick up on it and may or may not react to it.	"...which combinations they bowl with..." "...what kind of fields they like, what kind of set field placing they like, how they target you, let's say the bowler will bowl three short balls in a row and then a Yorker..."

No	Code	Definition	Example
61	**Strategy of own players or team**	The coach or support staff refers to their own individual players or teams' strategy that was formulated	"...but we straight away thought that it doesn't matter how the pitch looks, if we can we will bat first and put them under pressure."
62	**Statistics**	Percentages, averages etc. of batting, bowling and fielding used for information	"Mainly videos and then they will show the visual, and they might have what is called a pitch map, where for the bowlers it will show where the guys bowled so they will have that percentage of where their balls are bowled and landed, so out of their two or three games that we watched, 60% are short balls, full balls or whatever. So we get that."

No	Code	Definition	Example
63	**Structure for CI process**	Structures in place with analysts, technology and the availability of data and info for use within the CI process	"Ek dink omdat alles so mooi saam werk, ek dink ons is die enigste ouens wat goed centralise, en as jy 'n ding nie centralized nie, gaan dit nie werk nie want dan is elke ou op sy eie. So as ons dit nie gedoen het nie sou die Cobras hulle eie ding gedoen het, en die Lions hulle eie – nie dat dit verkeerd is nie, maar wat jy nou het, is jy het 'n standaard en die standaard gaan altyd dieselfde wees. Dit raak nie deurmekaar nie, maar in die begin was dit baie moeilik – jy het 6 verskillende analiste gehad, nou kry jy die data in 6 verskillende tipe sagteware, 6 verskillende maniere om dit te doen, hierdie ou doen dit deur die universiteit van PE, iemand doen dit vir hulle, dit was Dr Stretch, hy is van PE universiteit wat dit vir die Warriors se analises gedoen het. Dis ook maar moeilik, maar omdat die strukture in plek is en sekere maniere wat die goed gedoen word, werk dit goed. Dis is interessant hoe die goed werk." ENGLISH TRANSLATION *(I think because everything works together so well, we are the only country that does it this way. If you do not centralize it, then it doesn't work because then everyone is on their own. So if we didn't do it, then the Cobras would do their own thing, the Lions their own thing – not that it is wrong, but what you have a standard and the standard stays the same. It can get mixed up – in the beginning there were six different ways to do this and one person from PE university, did their analysis for them. Dr Stretch, he is from PE university and did the Worriers' analysis. It is still difficult, but because these structures are in place and there are certain was that things are done, it works well. It is interesting how*

No	Code	Definition	Example
			well it actually works.")
64	**Success of implemented CI process**	Coach or support staff express ideas regarding the success achieved or failed attempts when implementing CI in a match.	"These things are on an up and down curve, and sometimes you will get the one right and the other one you might not."
65	**Systems for storing data**	Data that is stored and administrated	"...all the results all the score sheets, the stats. And it is also available on a data base." "So all the information that we need on certain players, the data coming through, maybe of a player that you have not seen much off. You can always go to Cricket South Africa just to get the video footage of a certain player..."
66	**Technology use in data analysis process**	The use of sport specific tools and software for the process of data conversion / analysis.	"On the Dartfish and those programmes, you can do that..." "Yes, we use Sports code analysis software."
67	**Technology use in data collection / gathering information**	The use of technology to collect data in a digital format, either on own individual players / team or on the opposition	"...get videos on the other teams." "Not all the teams did it but it is like video analysing..."

No	Code	Definition	Example
68	**Technology use in information communication / feedback**	The use of technology specifically to communicate analysis results, KIT's and KPI and strategy.	"Team talks and show *videos* and use certain things to incorporate it." "...*power points* and where he would incorporate visuals and that..."
69	**Types of information**	Different types of data used or information gathered such as written data, results, stats, video footage and knowledge of players.	"They may know something I don't know, because the player can come to me and say coach, I was with this guy in Australia, he prepares like this, he looks to do this and that, so I have more info on that certain player then I can share it with my team. You don't get this info anywhere, it is close and personal." "...videos on the other teams." "But you can always find results and that kinds of stuff."
70	**Validity of data / information**	Coach / support staff mentions the validity / credibility of data.	"So for me, I think we need to be careful about understanding what does the information say and is there enough to be credible?"
71	**Value of information**	Person expresses the value or lack thereof regarding gathering and analysing information and often refers to an example of a situation where it aided in their success.	"So for me the information on competitors is vital."

ADDENDUM A: ETHICAL APPROVAL FOR PHD THESIS

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Ethics Office
Tel: 018-299 2092
Fax: 018-299 2088
Email: Minrie.Greeff@nwu.ac.za

26 January 2016

Prof B Coetzee
Human Movement Science

Dear Prof Coetzee

HREC APPROVAL OF YOUR APPLICATION

Ethics number: NWU-00185-15-S1

Kindly use the ethics reference number provided above in all correspondence or documents submitted to the Health Research Ethics Committee (HREC) secretariat.

Project title: Development of a competitive intelligence process model and survey for cricket coaches

Project leader/supervisor: Prof B Coetzee

Student: -

Application type: Full Umbrella

Risk level descriptor: Minimal

You are kindly informed that at the meeting held on 21/10/2015 of the HREC, Faculty of Health Sciences, the aforementioned was approved.

The period of approval for this project is from 26/01/2016 to 25/01/2017.

After ethical review:

Translation of the informed consent document to the languages applicable to the study participants should be submitted to the HREC (if applicable).

The HREC requires immediate reporting of any aspects that warrants a change of ethical approval. Any amendments, extensions or other modifications to the protocol or other associated documentation must be submitted to the HREC prior to implementing these changes. Any adverse/unexpected/unforeseen events or incidents must be reported on either an adverse event report form or incident report form.

A progress report should be submitted within one year of approval of this study and before the year has expired, to ensure timely renewal of the study. A final report must be provided at completion of the study or the HREC must be notified if the study is temporarily suspended or terminated. The progress report template is obtainable from Carolien van Zyl at

Carolien.VanZyl@nwu.ac.za. Annually a number of projects may be randomly selected for an external audit.

Please note that the HREC has the prerogative and authority to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process.

Please note that for any research at governmental or private institutions, permission must still be obtained from relevant authorities and provided to the HREC. Ethics approval is required BEFORE approval can be obtained from these authorities.

The HREC complies with the South African National Health Act 61 (2003), the regulations on Research with Human Participants of 2014 of the Department of Health and Principles, the Declaration of Helsinki, 2013, the Belmont Report and the Ethics in Health Research: Principles, Structures and Processes (SANS document).

We wish you the best as you conduct your research. If you have any questions or need further assistance, please contact the Ethics Office at Carolien.VanZyl@nwu.ac.za or 018 299 1206.

Yours sincerely



Prof Minrie Greeff
HREC Chairperson

Current details: (13210572) C:\Users\13210572\Documents\HREC\HREC - Applications\2015 Applications\Applications 09 - 21 October 2015\NWU-00185-15-S1 (B Coetzee)\NWU-00185-15-S1 (B Coetzee) - AL\NWU-00185-15-S1 (B Coetzee) - AL.docm
27 January 2016

File reference: 9.1.5.3

NORTH-WEST UNIVERSITY
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South Africa 2520

Tel: (018) 299-4900
Faks: (018) 299-4910
Web: http://www.nwu.ac.za

Institutional Research Ethics Regulatory Committee
Tel +27 18 299 4849
Email Ethics@nwu.ac.za

ETHICS APPROVAL CERTIFICATE OF PROJECT

Based on approval by **Health Research Ethics Committee (HREC)**, the North-West University Institutional Research Ethics Regulatory Committee (NWU-IRERC) hereby approves your project as indicated below. This implies that the NWU-IRERC grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the project may be initiated, using the ethics number below.

Project title: Development of a competitive intelligence process model and survey for cricket coaches.

Project Leader: Prof B Coetzee

Ethics number: N W U - 0 0 1 8 5 - 1 5 - A 1
(Institution | Project Number | Year | Status)

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Approval date: 2015-01-26 **Expiry date:** 2017-01-25 **Risk** Minimal

Special conditions of the approval (if any): None

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, please note the following:

- *The project leader (principle investigator) must report in the prescribed format to the NWU-IRERC:*
  - *annually (or as otherwise requested) on the progress of the project,*
  - *without any delay in case of any adverse event (or any matter that interrupts sound ethical principles) during the course of the project.*
- *The approval applies strictly to the protocol as stipulated in the application form. Would any changes to the protocol be deemed necessary during the course of the project, the project leader must apply for approval of these changes at the NWU-RERC. Would there be deviated from the project protocol without the necessary approval of such changes, the ethics approval is immediately and automatically forfeited.*
- *The date of approval indicates the first date that the project may be started. Would the project have to continue after the expiry date, a new application must be made to the NWU-IRERC and new approval received before or on the expiry date.*
- *In the interest of ethical responsibility the NWU-IRERC retains the right to:*
  - *request access to any information or data at any time during the course or after completion of the project;*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the project are revealed or suspected,*
    - *it becomes apparent that any relevant information was withheld from the NWU-IRERC or that information has been false or misrepresented,*
    - *the required annual report and reporting of adverse events was not done timely and accurately,*
    - *new institutional rules, national legislation or international conventions deem it necessary.*

The IRERC would like to remain at your service as scientist and researcher, and wishes you well with your project. Please do not hesitate to contact the IRERC for any further enquiries or requests for assistance.

Yours sincerely

Prof LA Du Plessis

Digitally signed by Prof LA Du Plessis
DN: cn=Prof LA Du Plessis, o=North-West University, ou=Campus Rector, email=Linda.DuPlessis@nwu.ac.za, c=ZA
Date: 2015.01.28 07:50:10 +02'00'

Prof Linda du Plessis
Chair NWU Institutional Research Ethics Regulatory Committee (IRERC)

NORTH-WEST UNIVERSITY
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Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Faculty of Health Sciences Ethics Office for Research, Training and Support
Tel: 018 299 2092
Email: minrie.greeff@nwu.ac.za

30 November 2017

Dear Prof Coetzee

FEEDBACK ON HREC ANNUAL MONITORING REPORT: NWU-00185-15-A1

We would like to thank you for submitting the annual monitoring report for your project entitled, ***"Development of a competitive intelligence process model and survey for cricket coaches"*** to the Health Research Ethics Committee (HREC) in a timely manner. Please find below the decision of the HREC regarding the continuation of your project.

Classification	Mark with X	Comment	
Clarification			
Completion (Final report)			
Suspended			
Continuation	X	**Date of next monitoring report:**	30 November 2018
Termination			

Should you have any further queries, please feel free to contact Ms Leanie van Ronge at your earliest convenience (E-mail: Ethics-HRECMonitoring@nwu.ac.za; Tel: 018 299 2197). We wish you well in your future endeavours.

Yours sincerely

Prof Minrie Greeff
Head of Health Sciences Ethics
Office for Research, Training and Support

Dr Wayne Towers
Chairperson: HREC

Original details: (23239522) C:\Users\NWUUSER\Google Drive\HREC Monitoring\Templates\Feedback Letter Template.docm
15 November 2017

ADDENDUM B: LETTER OF PERMISSION AND ACKNOWLEDGEMENT OF STUDY AND CONTACT DETAILS OF HIGH-LEVEL CRICKET COACHES FROM CRICKET SOUTH AFRICA COACHES EDUCATION MANAGER

NORTH-WEST UNIVERSITY
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Tel: (018) 299-1111/2222
Web: http://www.nwu.ac.za
North-West University
Potchefstroom Campus
Potchefstroom
Tel: 0823959291
Email: liandi.vandenberg@nwu.ac.za

Anton Ferreira

November 2015

Permission to conduct a PhD study

I, Liandi van den Berg, am enrolled for a PhD-study at the Faculty of Health Sciences, Potchefstroom Campus of the North-West University. I am in the process of conducting research on competitive intelligence in cricket. The title of my thesis is: *Development of a competitive intelligence process model and survey for cricket coaches*.

I hereby apply for permission to conduct this study with a sample consisting of registered CSA cricket coach(es) and his / her support staff. Study participants who will be included are cricket coaches with more than 5 years' experience and support staff with at least 3 years' experience. Coaches will be subjected to a one-on-one interview or in the case of coaches who also have support staff available, a focus group interview will be conducted to collect data for the study. The interviews will take more or less an hour to complete. Interviews will focus on methods (processes) that coaches and support staff use to collect and analyse information with regard to competitors and playing environment, among others, in order to make the correct decisions.

I commit myself to the professional code of ethics for researchers and other aspects of respectful research:

- This research project is approved by the Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00185-15-S1)
- Participation of all research respondents is voluntary and they will be allowed to withdraw from the study at any time during the study without fear of discrimination against them.
- Anonymity and confidentiality of research respondents are guaranteed.
- The study will not interfere with the general and sport programme of the relevant individuals.
- Research results will be disseminated to the coach and support staff, as well as to you as the coaching manager of CSA. However, respondents will need to give permission for data to be disseminated to other parties involved.

The undersigned plan to conduct the research from February to April 2016. If you require more information about this project, you are welcome to contact me or my supervisors, Prof. B. Coetzee or Prof. A.S. Blignaut. Prof. Coetzee is available at 0182991803 or Ben.Coetzee@nwu.ac.za and Prof Blignaut at Seugnet.Blignaut@nwu.ac.za or 0182994566.

Yours sincerely



Liandi van den Berg
PhD Candidate, North-West University
Student number: 11692294
Mobile number: 0823959291
Email: liandi.vandenberg@nwu.ac.za

Hi Liandi

Further to our conversation and as discussed earlier this morning, herewith the names and contact details of the relevant coaches that may be of assistance to you with your PhD Study:

Franchise Coaches

***Coaches' names were concealed for confidentiality purposes**

Senior Provincial

***Coaches and analyst names were concealed for confidentiality purposes**

SA 'A'

***Coaches and analyst names were concealed for confidentiality purposes**

National Academy

***Coaches' names were concealed for confidentiality purposes**

Please note that while I do have contact with these coaches on a reasonably regular basis and work with one or more in a mentoring role during the season, I do not 'manage' them in any way; my responsibility is more the Coach Education programme but you are welcome to let them know that I referred you to them to assist with the study.

I trust you find the above in order.

Regards – Anton



ADDENDUM C: LETTER OF GOODWILL FROM SCHOOL DIRECTOR FOR INTRA-UNIVERSITY PEER PARTICIPATION

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
MAFIKENG CAMPUS

Private Bag X2046, Mmabatho
South Africa, 2735

Tel: (018) 389-2523
Fax: (018) 389-2432
Web: http://www.nwu.ac.za

11 February 2016

Dear Ms van den Berg

RE: "Development of a competitive intelligence process model and survey for cricket coaches"

Mr P. Boer and Mrs M. Van Aswegen have expressed their willingness to participate in the study "DEVELOPMENT OF A COMPETITIVE INTELLIGENCE PROCESS MODEL AND SURVEY FOR CRICKET COACHES", as requested in your letter of 08 February 2016.

Permission for them to be of assistance to you has therefore been granted.

Yours sincerely,

Prof T. Monaheng – Director: School of Social Sciences

CC. Prof Ben Coetzee

ADDENDUM D: LETTER OF GOODWILL FROM SCHOOL DIRECTOR FOR INTRA-UNIVERSITY PEERS PARTICIPATION

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOMKAMPUS

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: (018) 299-1111/2222
Web: http://www.nwu.ac.za
School for Biokinetics, Sport Science and Recreation (BRS)
North-West University (NWU)
Potchefstroom Campus
Potchefstroom
Tel: (018) +27 18 2991800
Fax (018) +27 18 2991825
Email: hand.deridder@nwu.ac.za

19 February 2016

Whom it concerns

LETTER OF GOODWILL
PHD STUDY: "DEVELOPMENT OF A COMPETITIVE INTELLIGENCE PROCESS MODEL AND SURVEY FOR CRICKET COACHES"
(ETHICS NUMBER: NWU-00185-15-S1)

Dear Me Van den Berg and Prof Coetzee.

I, hereby grant you permission to contact and possibly include the following personnel of the School for BRS as part of the intra-university peer-group: Dr. [redacted], Prof. [redacted], Me. [redacted], Dr. [redacted], Dr. [redacted], Mr. [redacted], Prof. [redacted] and Dr. [redacted].

Kind regards

Prof Hans de Ridder
Director of the School for BRS

Names concealed for anonymity purposes

ADDENDUM E: LETTER OF GOODWILL FROM UNIVERSITY SPORT BUREAU MANAGER TO CONTACT COACHES AND SUPPORT STAFF

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: (018) 299-1111/2222
Web: http://www.nwu.ac.za
Physical Activity, Sport and Recreation Research Focus Area (PhASRec)
North-West University (NWU)
Potchefstroom Campus
Potchefstroom
Tel: (018) +27 18 2991803
Fax (018) +27 18 2992022
Email: ben.coetzee@nwu.ac.za
Liandi.vandenberg@nwu.ac.za

24 May 2016

Kalli Mouton

UJ Cricket Club Manager

LETTER OF GOODWILL

PHD STUDY: "DEVELOPMENT OF A COMPETITIVE INTELLIGENCE PROCESS MODEL AND SURVEY FOR CRICKET COACHES"
(ETHICS NUMBER: NWU-00185-15-S1)

Dear Kalli,

I, Liandi van den Berg, am busy with a PhD study at the Faculty of Health Sciences, Potchefstroom Campus of the North-West University. I am in the process of conducting research on competitive intelligence in cricket. The title of my thesis is: *A competitive intelligence process model and survey for cricket coaches.*

I hereby apply for permission to conduct this research with a sample consisting of the university cricket coache(s) and his / her support staff. I am mainly seeking for cricket coaches with more than 5 years' experience and support staff with at least 3 years' experience. The method of data collection involves a one-on-one interview or in the case if a coach has support staff, a focus group interview. The interview would take more or less an hour to complete and is related to aspects on how the coach and staff collect data on the competitors / environment, the analysis thereof and the decisions they make with the information at hand.

I plan to conduct this research during April 2016 and if you require more information about my project, you are welcome to contact me or my supervisor, Professor B. Coetzee or Professor A.S. Blignaut. Prof Coetzee is available at 0182991803 or Ben.Coetzee@nwu.ac.za and Prof Blignaut at Seugnet.Blignaut@nwu.ac.za or 0182994566.

1

Yours faithfully



Liandi van den Berg

NWU PhD student

-------- Original message --------
From: Karel Mouton <kalli.mouton@gmail.com>
Date: 2016/05/26 10:19 (GMT+02:00)
To: Fanie Roos <Fanie.Roos@nwu.ac.za>, R
<dassie-9@hotmail.com>
Subject: Re: PHD studie Noordwes-Universiteit

Name concealed for confidentiality purposes

Hi Fanie,

Yes it is fine. I am copying the coach, Mr. R
regarding your request.

Name concealed for confidentiality purposes

Regards,

Karel Mouton
Manager: Cricket

2016-05-26 9:55 GMT+02:00 Fanie Roos Fanie.Roos@nwu.ac.za:

Dear Kalli Mouton

Please see the attached document regarding a colleague's PhD study. She is asking permission to contact the university cricket coaches and support staff reporting to you. The document explains the request. Please answer to your soonest convenience.

Kind regards

Fanie Roos
Lecturer Diploma Sport Science
Faculty of Economic Sciences
Vaal Triangle Campus

ADDENDUM F: LETTER OF GOODWILL FROM UNIVERSITY SPORT BUREAU MANAGER TO CONTACT COACHES AND SUPPORT STAFF

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: (018) 299-1111/2222
Web: http://www.nwu.ac.za
Physical Activity, Sport and Recreation Research Focus Area (PhASRec)
North-West University (NWU)
Potchefstroom Campus
Potchefstroom
Tel: (018) +27 18 2991803
Fax (018) +27 18 2992022
Email: ben.coetzee@nwu.ac.za
Liandi.vandenberg@nwu.ac.za

18 April 2016

Sean McCallaghan

Manager: NWU Vaal sport

LETTER OF GOODWILL

PHD STUDY: "DEVELOPMENT OF A COMPETITIVE INTELLIGENCE PROCESS MODEL AND SURVEY FOR CRICKET COACHES"
(ETHICS NUMBER: NWU-00185-15-S1)

Dear Sean,

I, Liandi van den Berg, am busy with a PhD study at the Faculty of Health Sciences, Potchefstroom Campus of the North-West University. I am in the process of conducting research on competitive intelligence in cricket. The title of my thesis is: *A competitive intelligence process model and survey for cricket coaches.*

I hereby apply for permission to conduct this research with a sample consisting of the university cricket coache(s) and his / her support staff. I am mainly seeking for cricket coaches with more than 5 years' experience and support staff with at least 3 years' experience. The method of data collection involves a one-on-one interview or in the case if a coach has support staff, a focus group interview. The interview would take more or less an hour to complete and is related to aspects on how the coach and staff collect data on the competitors / environment, the analysis thereof and the decisions they make with the information at hand.

I plan to conduct this research during April 2016 and if you require more information about my project, you are welcome to contact me or my supervisor, Professor B. Coetzee or Professor A.S. Blignaut. Prof Coetzee is available at 0182991803 or Ben.Coetzee@nwu.ac.za and Prof Blignaut at Seugnet.Blignaut@nwu.ac.za or 0182994566.

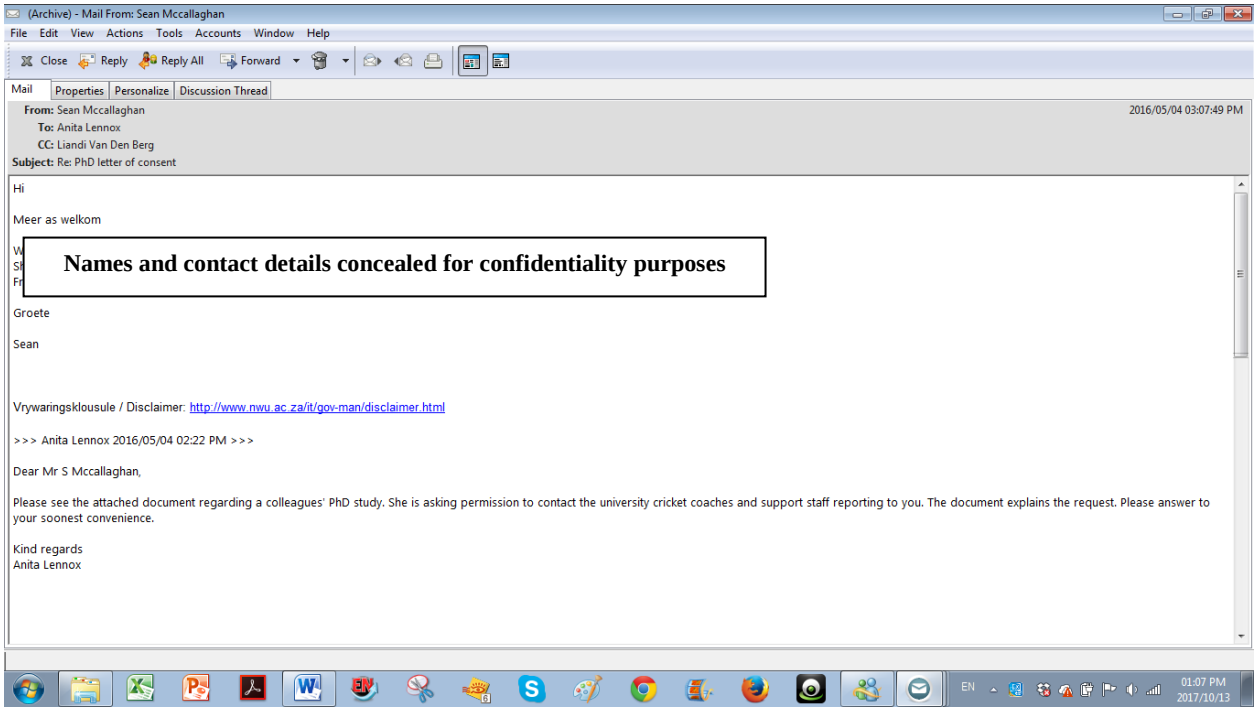
1

Yours faithfully



Liandi van den Berg

PhD student



ADDENDUM G: PARTICIPATION LEAFLET AND CONSENT FORM FOR INTRA-UNIVERSITY PEERS



NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS



PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR PARTICIPANTS OF THE SPORT COMPETITIVE INTELLIGENCE PROJECT
(Intra-university academic peers)

TITLE OF THE RESEARCH PROJECT:
Development of a competitive intelligence process model and survey for cricket coaches

REFERENCE NUMBERS: NWU-0199-14-A1

PRINCIPAL INVESTIGATOR:
Prof. Ben Coetzee

ADDRESS:
Physical Activity, Sport and Recreation
Faculty of Health Sciences
Building K21
North-West University
Potchefstroom
2522

CONTACT NUMBER:
0182991803

You are being invited to take part in the **Sport Competitive Intelligence Project** that forms part of a post graduate, PhD-study. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00185-15-S1) and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki and the ethical guidelines of the National Health Research Ethics Council. It might be necessary for the research ethics committee members or relevant authorities to inspect the research records.

What is this research study all about?

- *The research will involve one-on-one, group, telephonic or Skype interviews with a researcher who has been trained thoroughly by an experienced qualitative researcher. The size of these focus groups will vary between 3 to 5 participants.*
- *The objectives of this research are to determine the information collection processes that South African cricket coaches follow, the topics that coaches regard to be important under the information collection process as well as the key elements of the process model.*

Why have you been invited to participate?

- *You have been invited to participate in this project because you are a lecturer and researcher in sport science and management and from the same university as the researcher, who works on a different campus than that of the researcher. Furthermore you also have at least three years of academic and research experience within the sport scientific and sport management domains.*
- *As a participant you have also complied with the following inclusion criteria: You provided a signed and scanned copy of the voluntary consent that you received electronically and have agreed to a date and time for the interview to take place. You have also agreed to be voice recorded.*
- *You will be excluded if: you become ill at any time or are unable to adhere to the agreed dates and times for the scheduled interviews within a two-week period. Academic peers who do not want to be voice recorded during the interview will also be excluded from the study.*

What will your responsibilities be?

- *Firstly, you will be expected to complete an informed consent form, which will be sent to you electronically via email. This will take you more or less 15 minutes to complete. However, you will have a week to complete the consent form that you have received electronically. After completion you will be requested to scan the signed document and return it to the researchers' colleague. This will take you about 1-2 minutes to do.*
- *Secondly, you will be requested to work through a list of interview questions that have been developed to determine the competitive intelligence (CI) processes that cricket coaches and support staff members follow. In this regard CI is seen as the systematic program for gathering, analysing and managing external information that can affect a cricket union's or club's plans, decisions and operations. You will receive the questions electronically via email after which it will probably take you more or less an hour to work through the questions and note certain changes that you would like to make.*
- *Thirdly, you will be requested to undergo a focus group or individual interview via Skype or telephonically (depending on what suites you) or face to face, during which time you will provide feedback on the questions that you have evaluated. Focus group interviews will be scheduled for 60 minutes whereas telephonic or*

Skype one-to-one interviews will be scheduled for 30 minutes so that you have enough time to provide thorough feedback.

Will you benefit from taking part in this research?

- *Among the direct benefits are that you as an academic peer will also benefit through exposure to the interview questions, validation process and the opportunity to collaborate with the researcher regarding this topic.*
- *An indirect benefit of the study is the expansion of existing expert knowledge in the field of applied sport science, which can be transferred to the wider sporting community. Knowledge could also aid coaches and support staff to improve their players' performances.*

Are there risks involved in your taking part in this research?

- *Foreseen risks are minimal but academic peers may find it uncomfortable to talk about their questions' feedback while being recorded.*
- *You can only be assured of partial confidentiality as co-interviewees will be able to hear your comments and feedback.*
- *There is a chance that some of the interviewees may experience negative emotions due to the interview process.*

What will happen in the unlikely event of some form of discomfort occurring as a direct result of your taking part in this research study?

- *The interviewer will set the interviewee at ease by providing him/her with a short introduction of what the interview is going to entail and also by allowing him/her to ask any questions that are related to concerns about the interview. The interviewer will maintain a demeanour of friendliness, openness and genuineness. Furthermore, the interview will be conducted in a comfortable, good sized, quiet and private meeting room.*
- *The interviewer will make sure that her questions are clear, well-phrased and as jargon-free as possible to help avoid any confusion.*
- *In order to protect your confidentiality during especially focus group interviews, your name will be replaced with an alphabetical letter according to which you will be addressed in order to protect your identity. These letters will also be used in all correspondence with participants.*
- *In the unlikely event of negative emotional consequences resulting from the interviews, one of the researchers who have received training in conducting interviews and debriefing interviewees will be available for debriefing purposes.*

Who will have access to the data?

- *Anonymity will be partial due to the fact that some interviewees' responses are going to be shared with other interviewees during focus group interviews. However, researchers will respect the decision of each participant in order to protect his anonymity. Data will be coded to ensure that no link can be made to a specific participant. Confidentiality will be ensured by deleting audio records of interviews after data has been captured. Reporting of findings will be anonymous by only authorising the project leader to have control over the distribution of these findings. Only the project leader and project co-workers will have access to the data and will also sign a confidentiality agreement to protect participants. Data will be kept safe and secure by locking hard copies in locked cupboards in the project leader's office and for electronic data it will be password protected. Data will be stored for 7 years after which the information will be shredded and e-copies deleted according to the policy of the North-West University.*

What will happen with the data/samples?

- *This is a once off collection and data will be kept at the North-West University and analysed at the North-West University.*

Will you be paid to take part in this study and are there any costs involved?

- No, you will not be paid to take part in the study. There will also be no costs involved for you if you do take part.

Is there anything else that you should know or do?

- You can contact Ben Coetzee at 018 2991803 if you have any further queries or encounter any problems.
- You can contact the Health Research Ethics Committee via Mrs Carolien van Zyl at 018 299 2089; carolien.vanzyl@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher.
- You will receive a copy of this information and consent form for your own records.

How will you know about the findings?

- *The results of the study will be made available to you via email as soon as it is completed and the researcher will endeavour to discuss and explain any further information you may require regarding the CI process and the application to a sport context. This could be achieved through a mutually agreed meeting that would take place should you require more information.*

Declaration by participant

By signing below, I ..... agree to take part in a research study titled: **Sport Competitive Intelligence Project**

I declare that:

- I have read this information and consent form and it is written in a language *with which I am fluent and comfortable.
- I have had a chance to ask questions to both the person obtaining consent, as well as the researcher and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... on (*date*) ..... 20....

....

Signature of participant Signature of witness

Declaration by person obtaining consent

I *(name)* ..... declare that:

- I explained the information in this document to .....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (*place*) ..... on (*date*) ..... 20....***

....

Signature of person obtaining consent Signature of witness

Declaration by researcher

I *(name)* ..... declare that:

- I explained the information in this document to .....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (*place*) ..... on (*date*) ..... 20....

....

Signature of researcher **Signature of witness**

ADDENDUM H: PARTICIPATION LEAFLET AND CONSENT FORM FOR CRICKET COACHES AND SUPPORT STAFF

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Health Research Ethics Committee
Faculty of Health Sciences
NORTH-WEST University
(Potchefstroom Campus)
2016 -01- 2 9

HREC Stamp

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR PARTICIPANTS OF THE SPORT COMPETITIVE INTELLIGENCE PROJECT
(Cricket coaches and support staff)

TITLE OF THE RESEARCH PROJECT:
Development of a competitive intelligence process model and survey for cricket coaches

REFERENCE NUMBERS:

PRINCIPAL INVESTIGATOR:
Prof. Ben Coetzee

ADDRESS:
Physical Activity, Sport and Recreation
Faculty of Health Sciences
Building K21
North-West University
Potchefstroom
2522

CONTACT NUMBER:
0182991803

You are being invited to take part in the **Sport Competitive Intelligence Project** that forms part of a post graduate, PhD-study. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way

whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00185-15-S1) and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki and the ethical guidelines of the National Health Research Ethics Council. It might be necessary for the research ethics committee members or relevant authorities to inspect the research records.

What is this research study all about?

- *This study will be conducted at the offices of the respective universities' sport bureaus or at the provincial/professional coaches' team offices. The research will involve one-to-one, group, telephonic or Skype interviews with a researcher who has been trained thoroughly by an experienced qualitative researcher. The size of these focus groups will vary between 6 to 8 participants.*
- *The objectives of this research are to determine the information collection processes that South African cricket coaches follow, the topics that coaches regard to be important under the information collection process as well as the key elements of the process model.*

Why have you been invited to participate?

- *You have been invited to participate in this project because you are a university, district, provincial and/or national level cricket coach or a support staff member to one of the last-mentioned cricket coaches. As a coach you also have at least ten years' experience in cricket coaching or as a support staff member you have three years' experience. Furthermore, as a coach you obtained a coaching certification from the national governing body. As a support staff member, you also have a tertiary degree in human movement science or are certified in strength and conditioning or other applicable field. You will also be included as a support staff member if you are a psychologists, nutritionists, biokineticists, performance analysts or assistant coach.*
- *Your manager signed a permission form that allows you to participate in this study.*
- *As a participant you have also complied with the following inclusion criteria: You provided a signed and scanned copy of the voluntary consent that you received electronically and have agreed to a date and time for the interview to take place. You have also agreed to be voice recorded.*
- *You will be excluded if: you become ill at any time or are unable to adhere to the agreed dates and times for the scheduled interviews within a two-month period. Coaches or support staff who do not want to be voice recorded during the interview will also be excluded from the study.*

What will your responsibilities be?

- *Firstly, you will be expected to complete an informed consent form, which will be sent to you electronically via email. This will take you more or less 15 minutes to complete. However, you will have a week to complete the consent form that you have received electronically. After completion you will be requested to scan the signed document and return it to the researchers' colleague. This will take you about 1-2 minutes to do.*
- *Secondly, you may be requested to undergo a one-on-one individual interview, face to face, via Skype or telephonically (depending on what suites you) if you are from*

immediate surrounding universities in provinces such as Gauteng, North-West and Free State. You may form part of a focus group interview if you have support staff is willing to participate. The interview will take more or less an hour to complete and questions regarding the information collection, conversion, dissemination and countering processes that you follow.

- *Thirdly, you will also complete a demographic information section, which will be used to obtain the relevant information.*
- *The researchers will begin the interview by asking broad and general questions on your back ground and coaching experience. The researcher will then pose questions regarding individual roles of each coach and support staff member, management and the involvement of each. Thereafter questions that are more specific to competitive intelligence (CI) will be posed. In this regard CI is seen as the systematic program for gathering, analysing and managing external information that can affect your cricket union's or club's plans, decisions and operations.*
- *Lastly, you may be requested to check the interview feedback that was obtained from the above-mentioned interviews. Validation of the information will take more or less 30 minutes and participants will be allowed to provide feedback telephonically, via email or via Skype after they received it electronically via email.*

Will you benefit from taking part in this research?

- *Among the direct benefits are that you as a coach or support staff member will be able to use the newly developed sport Competitive Intelligence survey and through feedback from the researcher gain insight into your current CI activities and areas of the process that you can improve on to gain a competitive advantage. You will be contacted telephonically by the researcher to schedule a suitable meeting time in order to receive feedback on the interview and study results. This will be done as soon as the CI process model and survey for cricket is complete and validated for content and face validity. The newly developed survey will be made available to you via email as soon as it is completed. The researcher will also support you in the completion and interpretation of the results. You will also be afforded the opportunity to communicate telephonically or via email with the researcher about any CI advice. An indirect benefit of the study is the expansion of existing expert knowledge in the field of applied sport science, which can be transferred to the wider sporting community. Knowledge could also aid coaches and support staff to improve their players' performances.*

Are there risks involved in your taking part in this research?

- *Foreseen risks are minimal but some coaches and support staff members may find it uncomfortable to talk about their coaching, management and decision-making processes while being recorded.*
- *There may be a chance that some of the interviewees may be dishonest and provide inaccurate feedback concerning the interview questions.*
- *There is a risk that participants may find some of the interview questions difficult to understand and answer.*
- *You can only be assured of full confidentiality, as co-interviewees will be your own support staff members as identified by yourself to collectively participate.*
- *There is a chance that some of the interviewees may experience negative emotions due to the interview process.*

What will happen in the unlikely event of some form of discomfort occurring as a direct result of your taking part in this research study?

- *The interviewer will set the interviewee at ease by providing him/her with a short introduction of what the interview is going to entail and also by allowing him/her to ask any questions that are related to concerns about the interview. The interviewer will maintain a demeanour of friendliness, openness and genuineness. Furthermore, the interview will be conducted in a comfortable, good sized, quiet and private meeting room.*
- *The importance of honest, accurate and detailed feedback by each of the participants will be accentuated before the interviews.*
- *The interviewer will make sure that her questions are clear, well-phrased and as jargon-free as possible to help avoid any confusion.*
- *In order to protect your confidentiality during especially focus group interviews, your name will be replaced with an alphabetical letter according to which you will be addressed in order to protect your identity. These letters will also be used in all correspondence with participants.*
- *In the unlikely event of negative emotional consequences resulting from the interviews, one of the researchers who have received training in conducting interviews and debriefing interviewees will be available for debriefing purposes.*

Who will have access to the data?

- *Anonymity will be partial due to the fact that some interviewees' responses are going to be shared with other interviewees (you as a coach with your support staff) during focus group interviews. However, you are in a working relationship with these persons and identified by yourself to participate. Researchers will respect the decision of each participant in order to protect his anonymity. Data will be coded to ensure that no link can be made to a specific participant. Confidentiality will be ensured by deleting audio records of interviews after data has been captured. Reporting of findings will be anonymous by only authorising the project leader to have control over the distribution of these findings. Only the project leader and project co-workers will have access to the data and will also sign a confidentiality agreement to protect participants. Data will be kept safe and secure by locking hard copies in locked cupboards in the project leader's office and for electronic data it will be password protected. Data will be stored for 7 years after which the information will be shredded and e-copies deleted according to the policy of the North-West University.*
- *Should you agree to make the information available, the researcher would send it to the management of your organization (person who granted permission for you to take part in the study).*

What will happen with the data/samples?

- *This is a once off collection and data will be kept at the North-West University and analysed at the North-West University.*

Will you be paid to take part in this study and are there any costs involved?

- No, you will not be paid to take part in the study. There will also be no costs involved for you, if you do take part.

Is there anything else that you should know or do?

- You can contact Ben Coetzee at 018 2991803 if you have any further queries or encounter any problems.

- You can contact the Health Research Ethics Committee via Mrs Carolien van Zyl at 018 299 2089; carolien.vanzyl@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher.
- You will receive a copy of this information and consent form for your own records.

How will you know about the findings?

- *As been mentioned before the newly developed survey will be made available to you via email as soon as it is completed. The researcher will assist you in the completion and analysis thereof – giving you insight in your or your teams' current CI activities and areas of improvement identified. You will also be afforded the opportunity to communicate telephonically or via email with the researcher about any CI advice.*

Declaration by participant

By signing below, I ..... agree to take part in a research study titled: **Sport Competitive Intelligence Project**

I declare that:

- I have read this information and consent form and it is written in a language *with which I am fluent and comfortable.
- I have had a chance to ask questions to both the person obtaining consent, as well as the researcher and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... on (*date*) ..... 20....

....

Signature of participant Signature of witness

Declaration by person obtaining consent

I *(name)* ..... declare that:

- I explained the information in this document to .....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (*place*) ..... on (*date*) ..... 20....***

....
Signature of person obtaining consent Signature of witness

Declaration by researcher

I *(name)* ..... declare that:

- I explained the information in this document to .....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (*place*) ..... on (*date*) ..... 20....

....
Signature of researcher **Signature of witness**

ADDENDUM I: PARTICIPATION LEAFLET AND CONSENT FORM FOR INTER-UNIVERSITY PEERS

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT
POTCHEFSTROOM CAMPUS

Health Research Ethics Committee
Faculty of Health Sciences
NORTH-WEST University
(Potchefstroom Campus)
2016 -01- 29

HREC Stamp

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR PARTICIPANTS OF THE SPORT COMPETITIVE INTELLIGENCE PROJECT
(Inter-university academic peers)

TITLE OF THE RESEARCH PROJECT:
Development of a competitive intelligence process model and survey for cricket coaches

REFERENCE NUMBERS: NWU-0199-14-A1

PRINCIPAL INVESTIGATOR:
Prof. Ben Coetzee

ADDRESS:
Physical Activity, Sport and Recreation
Faculty of Health Sciences
Building K21
North-West University
Potchefstroom
2522

CONTACT NUMBER:
0182991803

You are being invited to take part in the **Sport Competitive Intelligence Project** that forms part of a post graduate, PhD-study. Please take some time to read the information presented here, which will explain the details of this project. Please ask the researcher any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how

you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the Health Research Ethics Committee of the Faculty of Health Sciences of the North-West University (NWU-00185-15-S1) and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki and the ethical guidelines of the National Health Research Ethics Council. It might be necessary for the research ethics committee members or relevant authorities to inspect the research records.

What is this research study all about?

- *The research will involve that you must determine the face and content validity of a newly developed Competitive Intelligence (CI) survey for cricket coaches.*
- *The objectives of this research are to determine the information collection processes that South African cricket coaches follow, the topics that coaches regard to be important under the information collection process as well as the key elements of the process model.*

Why have you been invited to participate?

- *You have been invited to participate in this project because you are a lecturer and researcher within sport science and management from a different university as the researcher. Furthermore, you also have at least three years of academic and research experience within the sport scientific and sport management domains.*
- *As a participant you have also complied with the following inclusion criteria: You provided a signed and scanned copy of the voluntary consent that you received electronically and have agreed to evaluate the newly developed survey using the track changes function in MS word.*
- *You will be excluded if: you become ill at any time or are unable to adhere to the agreed dates and times for the feedback to be given within a two-week period.*

What will your responsibilities be?

- *Firstly, you will be expected to complete an informed consent form, which will be sent to you electronically via email. This will take you more or less 15 minutes to complete. However, you will have a week to complete the consent form that you have received electronically. After completion you will be requested to scan the signed document and return it to the researchers' colleague. This will take you about 1-2 minutes to do.*
- *Secondly, you will be requested to work through a newly developed sport CI survey that you will receive electronically via email in order to determine the face and content validity of this survey. After evaluating the validity you will then have to provide comments and feedback via track changes on the document itself. This task will probably take you more or less an hour to fulfil.*
- *Lastly, you will have to send you electronic feedback to one of the researchers via email. This will probably take you another 1-2 minutes to perform.*

Will you benefit from taking part in this research?

- *Among the direct benefits are, that you as an academic peer results of the study will be made available to you via email as soon as it is completed. You will*

also benefit through exposure to the validation process and the opportunity to collaborate with the researcher.

- *An indirect benefit of the study is the expansion of existing expert knowledge in the field of applied sport science, which can be transferred to the wider sporting community. Research collaboration regarding this new sport performance analysis topic is possible.*

Are there risks involved in your taking part in this research?

- *Foreseen risks are minimal but academic peers may find it difficult to evaluate and criticize a newly developed survey electronically.*

What will happen in the unlikely event of some form of discomfort occurring as a direct result of your taking part in this research study?

- *Researchers will provide the academic peers with a document that will thoroughly describe each of the processes that are necessary to evaluate and determine the content and face validity of a survey.*

Who will have access to the data?

- *Data will be coded to ensure that no link can be made to a specific participant. Reporting of findings will be anonymous by only authorising the project leader to have control over the distribution of these findings. Only the project leader and project co-workers will have access to the data and will also sign a confidentiality agreement to protect participants. Data will be kept safe and secure by locking hard copies in locked cupboards in the project leader's office and for electronic data it will be password protected. Data will be stored for 7 years after which the information will be shredded and e-copies deleted according to the policy of the North-West University.*

What will happen with the data/samples?

- *This is a once off collection and data will be kept at the North-West University and analysed at the North-West University.*

Will you be paid to take part in this study and are there any costs involved?

- *No, you will not be paid to take part in the study. There will also be no costs involved for you, if you do take part.*

Is there anything else that you should know or do?

- You can contact Ben Coetzee at 018 2991803 if you have any further queries or encounter any problems.
- You can contact the Health Research Ethics Committee via Mrs Carolien van Zyl at 018 299 2089; carolien.vanzyl@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher.
- You will receive a copy of this information and consent form for your own records.

How will you know about the findings?

- *As been mentioned before the newly developed survey will be made available to you via email as soon as it is completed. You will also be afforded the opportunity to communicate telephonically or via email with the researcher about any CI advice.*

also benefit through exposure to the validation process and the opportunity to collaborate with the researcher.

- *An indirect benefit of the study is the expansion of existing expert knowledge in the field of applied sport science, which can be transferred to the wider sporting community. Research collaboration regarding this new sport performance analysis topic is possible.*

Are there risks involved in your taking part in this research?

- *Foreseen risks are minimal but academic peers may find it difficult to evaluate and criticize a newly developed survey electronically.*

What will happen in the unlikely event of some form of discomfort occurring as a direct result of your taking part in this research study?

- *Researchers will provide the academic peers with a document that will thoroughly describe each of the processes that are necessary to evaluate and determine the content and face validity of a survey.*

Who will have access to the data?

- *Data will be coded to ensure that no link can be made to a specific participant. Reporting of findings will be anonymous by only authorising the project leader to have control over the distribution of these findings. Only the project leader and project co-workers will have access to the data and will also sign a confidentiality agreement to protect participants. Data will be kept safe and secure by locking hard copies in locked cupboards in the project leader's office and for electronic data it will be password protected. Data will be stored for 7 years after which the information will be shredded and e-copies deleted according to the policy of the North-West University.*

What will happen with the data/samples?

- *This is a once off collection and data will be kept at the North-West University and analysed at the North-West University.*

Will you be paid to take part in this study and are there any costs involved?

- *No, you will not be paid to take part in the study. There will also be no costs involved for you, if you do take part.*

Is there anything else that you should know or do?

- You can contact Ben Coetzee at 018 2991803 if you have any further queries or encounter any problems.
- You can contact the Health Research Ethics Committee via Mrs Carolien van Zyl at 018 299 2089; carolien.vanzyl@nwu.ac.za if you have any concerns or complaints that have not been adequately addressed by the researcher.
- You will receive a copy of this information and consent form for your own records.

How will you know about the findings?

- *As been mentioned before the newly developed survey will be made available to you via email as soon as it is completed. You will also be afforded the opportunity to communicate telephonically or via email with the researcher about any CI advice.*

Declaration by researcher

I *(name)* ..... declare that:

- I explained the information in this document to .....
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did/did not use an interpreter.

Signed at (*place*) ..... on (*date*) ..... 20....

....

Signature of researcher **Signature of witness**

ADDENDUM J: GENERAL INFORMATION QUESTIONNAIRES

General Information for Competitive Intelligence in Sport project: Coaches

Please write clearly.

1. DEMOGRAPHICAL INFORMATION

1.1 Surname	**Initials:**	**First Name**

1.2 Date of interview:

1.3 Birth date:

Year:	Month:	Day:

1.4 Permanent residential address:

_____
_____
_____
_____
_____
_____
_____

1.5 Contact details:

Home:	Work:
Fax:	Cell:
E-mail:	

1.6 Gender (mark with a cross):

Male:	Female:

1.7 Race:

African	Indian
White	Other
Coloured	

2. COACHING BACKGROUND

2.1 How many years coaching experience do you have?

2.2 What is your coaching qualification(s)?

2.3 Which team are you currently coaching?

2.4 Are you coaching a male or female team?

Male:	Female:

2.5 For how many years have you been coaching this current team?

2.6 In what league(s)/tournaments does your team compete?

2.7 Indicate the results your team has achieved over the past two years.

2.8 What was your previous team that you coached and for how long did you coach them?

2.9 Explain the role of each of the team management individuals.

2.10 Explain how is management involved in your coaching process?

General Information for Competitive Intelligence in Sport project: Support staff

Please write clearly.

1. DEMOGRAPHICAL INFORMATION

1.1 Surname:	Initials	First Name

1.2 Date of interview:

1.3 Birth date:

Year:	Month:	Day:

1.4 Permanent postal address:

_____
_____
_____
_____
_____
_____

1.5 Contact details:

Home:	Work:
Fax:	Cell:
E-mail:	

1.6 Gender (mark with a cross):

Male:	Female:

1.7 Race:

African	Indian
White	Other
Coloured	

2. BACKGROUND

2.1 Indicate your tertiary qualification or other sport related qualification obtained and the year completed.

Qualification:
Year:
Qualification:
Year:

2.2 Do you have a coaching qualification?

Yes:	No:

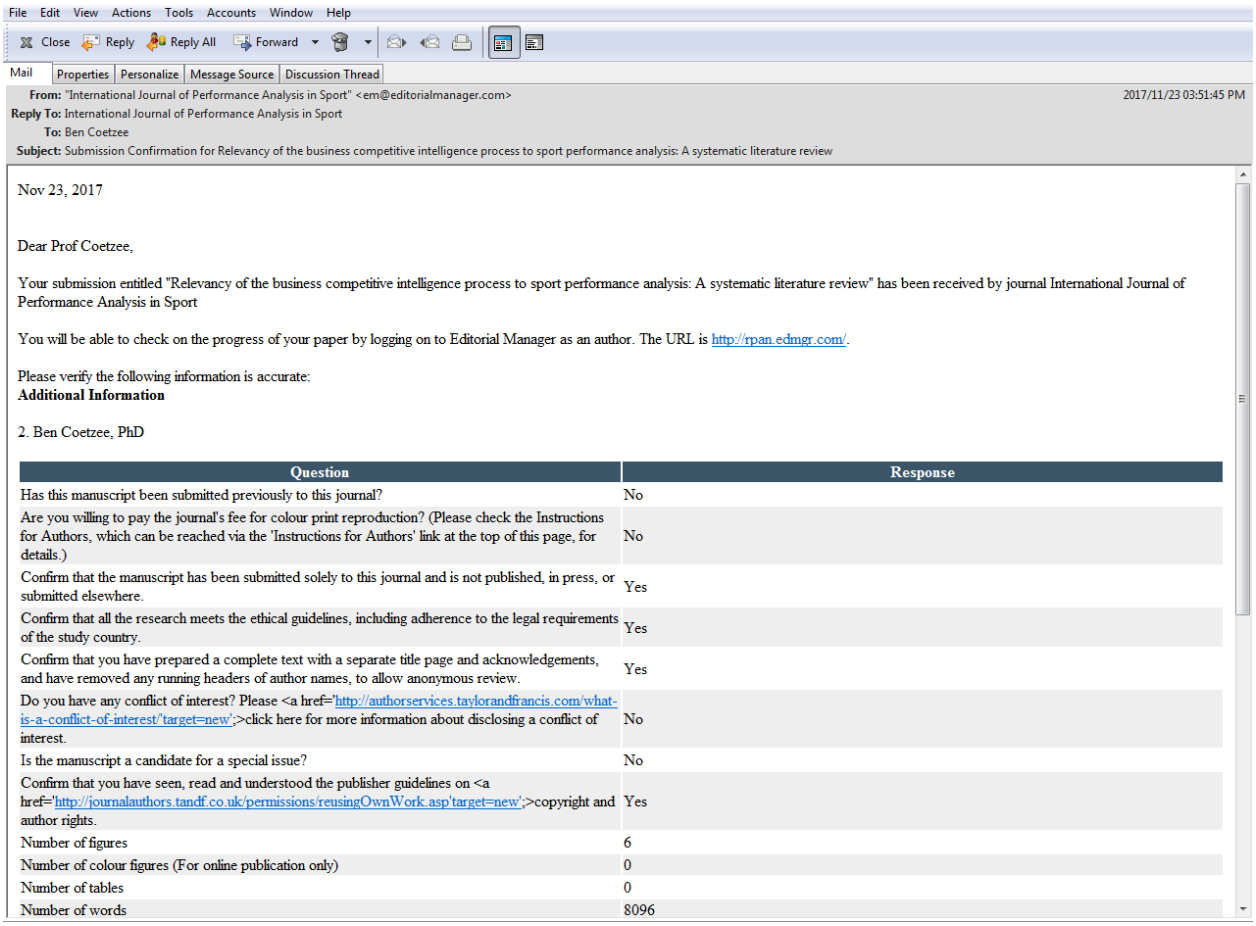
2.3 If you answered "YES" in 2.2 – indicate the coaching qualification you obtained.

2.4 Indicate your years of experience involved with team performance preparation and competition as a support staff member.

2.5 Explain the role of each of the team management individuals.

2.6 Explain how is management involved in your coaching process?

ADDENDUM K: PROOF OF ARTICLE 1 SUBMISSION TO THE INTERNATIONAL JOURNAL OF PERFORMANCE ANALYSIS IN SPORT



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From: "International Journal of Performance Analysis in Sport" <em@editorialmanager.com> 2017/11/23 03:51:45 PM
Reply To: International Journal of Performance Analysis in Sport
To: Ben Coetzee
Subject: Submission Confirmation for Relevancy of the business competitive intelligence process to sport performance analysis: A systematic literature review

Nov 23, 2017

Dear Prof Coetzee,

Your submission entitled "Relevancy of the business competitive intelligence process to sport performance analysis: A systematic literature review" has been received by journal International Journal of Performance Analysis in Sport

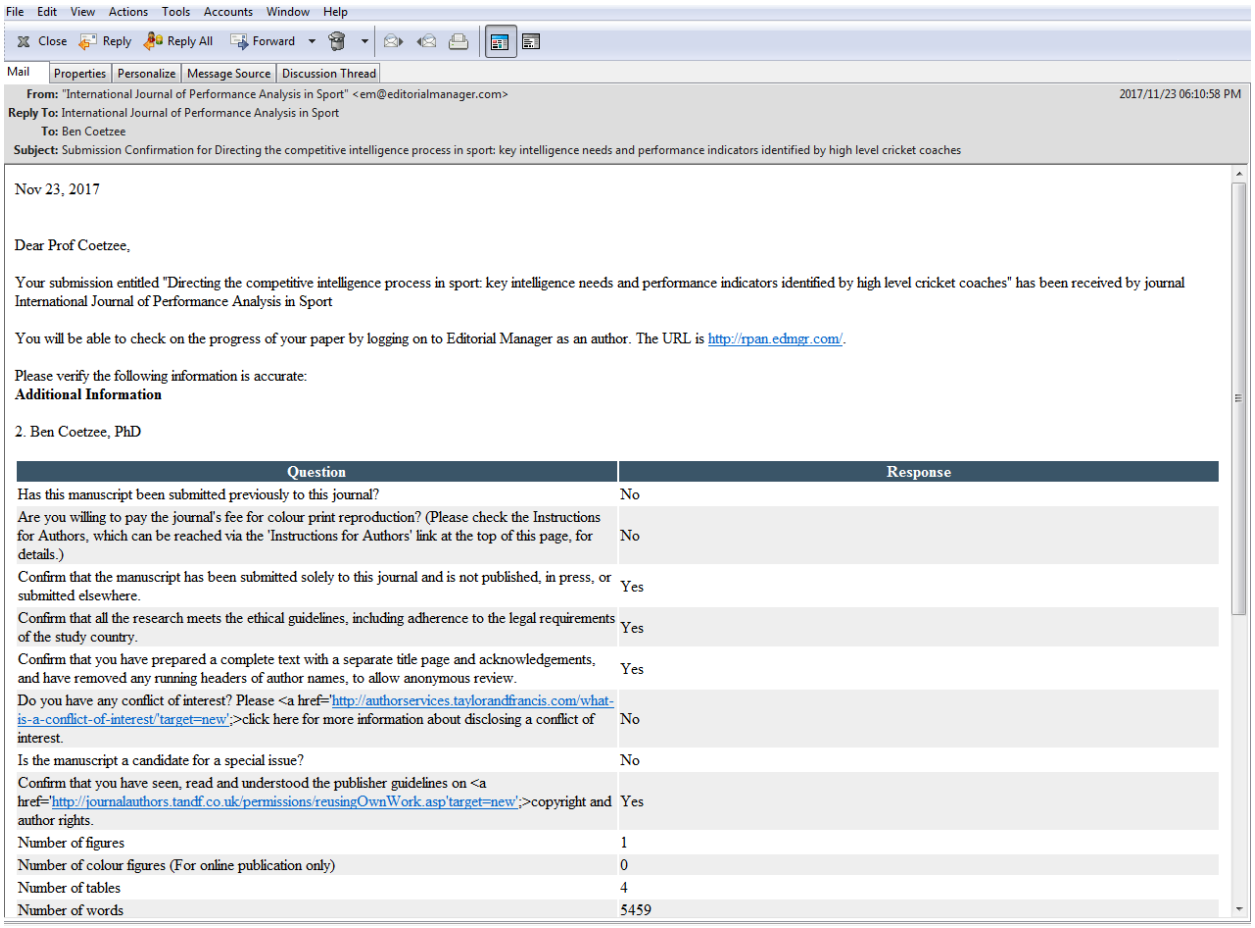
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Number of words	8096

ADDENDUM L: PROOF OF ARTICLE 2 SUBMISSION TO THE INTERNATIONAL JOURNAL OF PERFORMANCE ANALYSIS IN SPORT



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Nov 23, 2017

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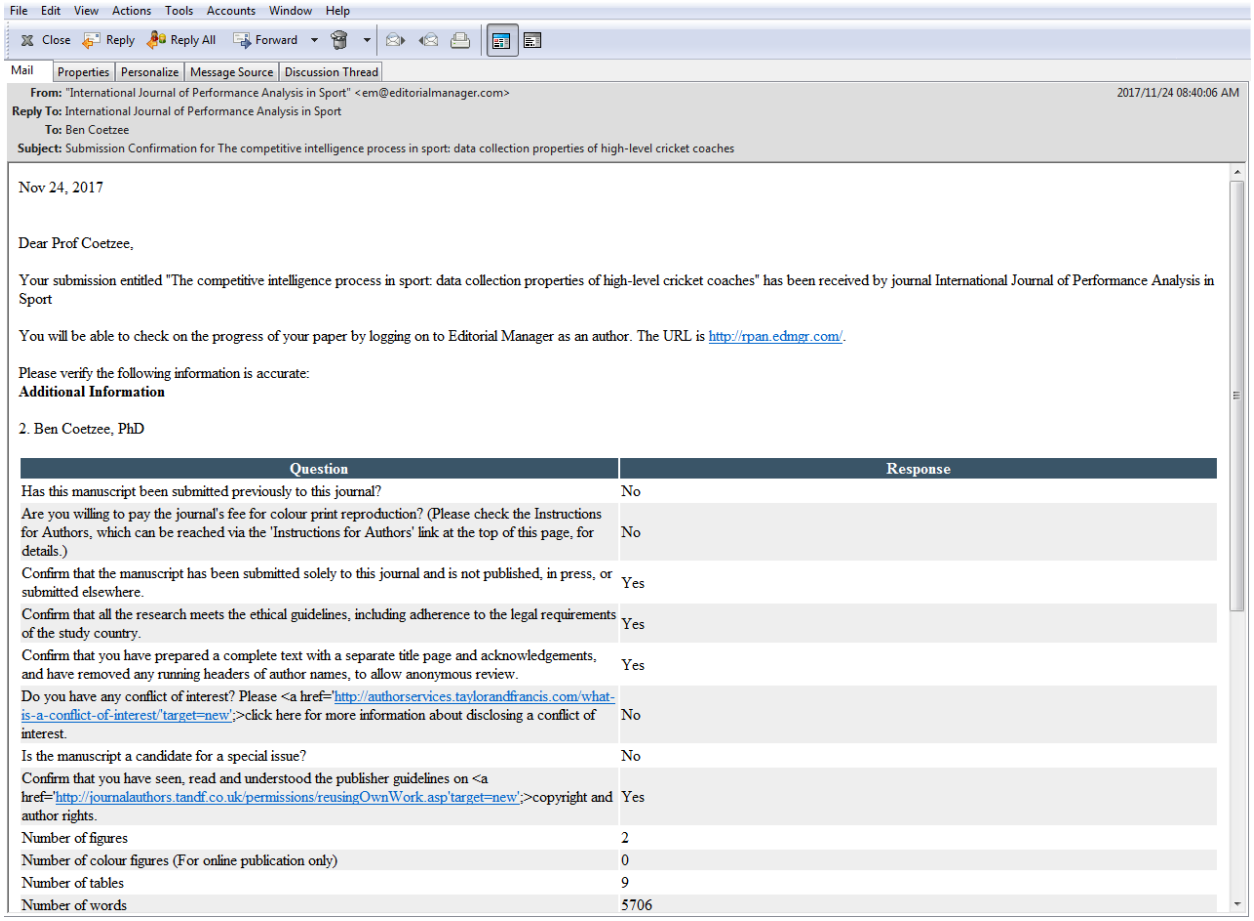
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Number of tables	4
Number of words	5459

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Number of words	5706

ADDENDUM N: INSTRUCTIONS FOR AUTHORS FOR INTERNATIONAL JOURNAL OF PERFORMANCE ANALYSIS IN SPORT



Journal

International Journal of Performance Analysis in Sport ›

Instructions for Authors

1. Scope

The International Journal of Performance Analysis in Sport is published on behalf of the Centre for Performance Analysis, Cardiff School of Sport at Cardiff Metropolitan University and in association with the International Society of Performance Analysis in Sport. The emphasis is on the analysis of actual performance in sport and exercise. Studies using observational methods, biomechanical analysis, self-report emanating from actual sports performance, qualitative observation and measurements such as heart rate response during actual sports performance are all within the scope of the journal. Laboratory studies of key techniques within sports are also of interest where such techniques are clearly important and cannot be analysed in detail during actual competition. Such techniques include tennis serves and golf swings. There may be other contributions that do not analyse sports performance at all that are within the scope of the journal. For example, interview studies or meta-analyses may lead to theoretical contributions explaining the nature of sports performance, tactics used and factors influencing performance. Review articles relevant to sports performance are also welcome. Other topics covered include technologies such as design of analysis systems, sports equipment, research into training, and modelling and predicting performance. Contributors wishing to clarify whether papers they are writing are within the scope of the journal are welcome to contact the general editor.

The volume of papers published by the journal has increased from 40 in 2008 to 68 in 2013 and as a consequence the quality of accepted papers has also increased. Authors should use the most recent issues of the journal to understand the required quality. Authors should ask themselves the following questions when preparing a paper.

(a) Does the paper report on a substantive research exercise? If the data could be gathered and analysed over a single weekend, the authors should consider submitting the work for poster presentation at a conference.
(b) Is the research sufficiently original? Will the paper have impact? Does the paper make a contribution to our knowledge of something important about sports performance?
(c) Does the research warrant the number of authors listed on the paper? This has become a problem with a lot of recent submissions where the nature and volume of the work certainly does not warrant the number of authors included. In cases like this, the paper has not been sent for review and has been rejected by the editor.
(d) Is the analysis sufficiently rigorous? Authors should consider the reliability of methods used, the units of analysis used, the choice of independent and dependent variables and the assumptions of any statistical tests used. In saying this, there is nothing wrong with original descriptive research and authors should avoid complex predictive modelling designs where these are not appropriate.
(e) Does the paper fit within the scope of the journal? Sports performance analysis does involve a more expanded array of methods and types of study these days. However, there have been papers submitted to the journal that are clearly not performance analysis papers. Some of these papers are of a very high quality in all other respects, but they are simply not within the scope of the journal.

2. Submission

Authors must submit an original article in electronic form, (preferably by e-mail) in Microsoft Word, to the General Editor (podonoghue@cardiffmet.ac.uk). Papers submitted to the Journal will be refereed blind by acknowledged experts in the subject. The General Editor has the final decision on publication. No word limits are specified for papers, but discursive treatments of the subject matter are discouraged. The Journal does not normally publish letters to the editor.

Due to the volume of papers submitted, we now require authors to provide the names of three potential expert independent reviewers for their paper.

3. Originality

All material submitted for publication in the journal must be accompanied by a statement by the lead author, with the authority of all of the authors, that: the material submitted is original and unpublished, and is not under consideration for publication elsewhere and that the material will not be submitted for publication elsewhere while it is under consideration by the journal.

4. Format

Papers consist of a title page, blind title page and the main text of the paper. Figures and tables should be included in the text rather than following the text. Typical sections of the text are Introduction, Methods, Results, Discussion, Conclusions, any acknowledgements, References and author correspondence details. However, it is acceptable to have a conclusions paragraph at the end of the discussion. Further variation is possible for review articles or where papers report on a series of studies which are best reported in a study by study order.

Page Layout
Pages must be A4 using margins of 3cm at the top, bottom, left and right. Portrait orientation is used except where landscaped orientation clearly assists the presentation of tables and / or figures. Paragraph text should be single spaced.

Title Page
The title page should contain the title (Times Roman, size 18, bold), author names using first names, other initials and surnames and affiliations of authors, the abstract and key words. All text other than the abstract should use Times Roman size 12 font. The abstract should be bold and in italics not exceeding 200 words. It should be inserted in the article after the authors' affiliations and indented by 1 cm at the left and right. The abstract should not contain figures or tables.

Blind Title Page
This should include all of the information on the title page except the author names and affiliations. Where acknowledgements or information in the methods about ethical clearance may compromise the blind reviewing process, the General Editor will temporarily remove this information while the paper is being reviewed.

Headings
Headings and subheadings should all be in Times Roman font, bold and size 12. Headings should be numbered 1., 2., 3., etc with any subheadings being 1.1., 1.2., for example.

Tables

Tables should normally only include horizontal lines to mark the top and bottom and separate column headings from the main body of tables. Tables must be created in word to facilitate any necessary editing by the journal. There are occasions, where correlation tables, for example, require vertical lines and this is acceptable. Table captions should appear above the table.

Figures

Illustrations, photographs, screen dumps, charts, plates and any other artwork should be included in the electronic submission. Authors must have permission to use any photographs within the paper and copyrighted material from published sources must not be included as Figures in the paper. Figure headings should be placed below figures.

Symbols, units and abbreviations

Symbols, units and abbreviations in papers must conform to the Système International d'Unités (SI Units). Authors are advised to consult the National Physical Laboratory publication (R.J. Bell (ed.), 1993, SI: The International System of Units. London: HMSO). For all abbreviations other than units, write the word or words to be abbreviated in full on the first mention followed by the abbreviation in parentheses. If at all possible, group these definitions together near the beginning of the article. As indicated earlier, avoid use of nonstandard abbreviations, especially fabricated ones, within the text; words are much easier to read and follow than abbreviations.

References

References in the text are cited as follows: Smith (1985) ... or (Brown and Green, 1996) ... or, if there are more than two authors, as Jones *et al*. (1993) ... or (Jones *et al*., 1993). Citations of different publications by the same author(s) in the same year are differentiated as Green (1993a) ... (Brown *et al*., 1995b); the a, b, c, etc. , are normally in order of citation in the text. Multiple citations are listed in ascending chronological order. Multiple publications by the same authors are treated in lists: Smith (1991, 1995), Brown and Green (1992, 1993), Jones *et al*. (1993, 1996a,b); or (Smith, 1991, 1995; Brown and Green, 1992, 1993; Jones *et al*., 1993, 1996a,b). A list of all cited references should be collected at the end of the paper in alphabetical order by, in the first instant, the first author's surname. Where the name of the first author appears more than once, the order is determined by: first, the number of co-authors (zero, one, or more than one); secondly, for one co-author, the first co-author's surname then the year; for two or more co-authors, year then order as dictated by the use of 1990a,b,c (for example) in the citations. The following is an example of how references would be ordered in the reference list: Brown (1980), Brown (1990), Brown and Jones (1977), Brown and Smith (1973), Brown and Smith (1975), Brown *et al*. (1990a), Brown *et al*. (1990b), Brown *et al*. (1990c). Note that the last three examples would all have been cited as Brown et al. in the text, with the a, b and c relating to the order of citation. The names and initials of all authors should be given in the list of references. The style should follow the examples below:

Journal Papers

Newton, P.K. and Keller, J.B. (2005), The probability of winning at tennis, Theory and Data, **Studies in Applied Mathematics**, 114, 214-269.

Books

Ashe, A. (1981), **Arthur Ashe's Tennis Clinic**. London: Heinemann.

Chapters of Edited Books (including conference proceedings published as books)

Hughes, M. and Clarke, S. (1995), Surface effect on elite tennis strategy. In Reilly, T., Hughes, M. and Lees, A. (Eds.) **Science and Racket Sports** (pp. 272-277). London: E & FN Spon.

Conference abstracts published in journals

O'Donoghue, P.G. (2003), The effect of scoreline on elite tennis strategy: a cluster analysis. **Journal of Sports Sciences**, 21, 284-285.

5. Proofs

Once accepted papers have been edited, the PDF versions will be sent to the authors for final checking and final editing.

6. Copyright

Submission of a paper to the International Journal of Performance Analysis in Sport is taken to imply that it represents original, unpublished research and that authors agree that the International Journal of Performance Analysis will have copyright to the material.

ADDENDUM O: EXAMPLE OF ARTICLE PUBLISHED IN THE INTERNATIONAL JOURNAL OF PERFORMANCE ANALYSIS IN SPORT



Journal
International Journal of Performance Analysis in Sport ›

7. An example of a published paper

Break points in Grand Slam men's singles tennis

Peter O'Donoghue

Cardiff School of Sport, Cardiff Metropolitan University, Cyncoed Campus, Cardiff, Wales, CF23 6XD, UK.

Abstract

The current investigation was composed of two related studies. The aim of the first study was to compare the proportion of break points and non-break points won by players receiving serve in matches of the 2011 US Open men's singles tournament. Match statistics were recorded from the official tournament website for the 92 matches where both players had at least 5 break points. Wilcoxon signed ranks tests revealed that winning players won a significantly greater proportion of break points than non-break points ($p = 0.004$) while losing players won a similar proportion of break points to non-break points ($p = 0.994$).

The aim of the second study was to compare the proportion of break points and non-break points won by the World's top 4 tennis players. There were 27 to 39 singles matches for each of these players within Grand Slam tournaments between 2008 and 2011 where the players and their opponents had at least 5 break points each. A series of 95% confidence intervals of the mean revealed different scoreline effects for these players. The findings of these two studies challenge the assumption of stationarity used in models of winning games of tennis.

Key words: performance analysis, stationarity, probability, modelling.

1. Introduction

Models of tennis games have been developed based on the assumptions of stationarity and independence of points (Hsi and Burych, 1971; Carter and Crews, 1974; Morris, 1977; Pollard, 1983; Croucher, 1986; Newton and Keller, 2005). Stationarity is the assumption that the probability of winning a tennis point is not influenced by the game score at the beginning of the point. Independence is the assumption that the probability of winning a tennis point is not influenced by the outcome of preceding tennis points. These assumptions are made by the model of winning tennis points shown in equation (1) where p is the probability that the server wins a point and q is the probability that the receiver wins a point ($q = 1 - p$). This model has been used to determine the importance of different points in tennis games with 30-40 being the most important point where p is 0.6 (Morris, 1977).

$$P(\text{Hold serve}) = p^4(1+4q+10q^2) + 20p^5q^3 / (1-2pq) \quad (1)$$

Male players won a significantly greater percentage of break-points than other receiving points in Grand Slam singles matches in 2008 and 2009 (Knight and O'Donoghue, 2012 In Press). Klaassen and Magnus (2001) found that the probability of the receiving player winning a point increases during important points. This challenges the assumption of stationarity and lead to the alternative model shown in equation (2) that distinguished between break points and non-break points (Knight and O'Donoghue, 2012, In Press). In equation (2), the probability of the server winning a point is p_A during non-break points and p_B during a break point, with the probability of the receiving player winning points in these situations being $q_A = 1 - p_A$, and $q_B = 1 - p_B$ respectively.

$$P(\text{Hold}) = p_A^4(1+4q_A+10q_A^2)+p_A^2q_A^3(10p_A^3+p_B^3+3p_Ap_B^2+6p_A^2p_B)/(1-q_A(p_A+p_B)) \quad (2)$$

However, Knight and O'Donoghue's (2012 In Press) study can be criticised on two grounds. Firstly, they included any matches where both players had break points. This meant that some matches were included where a player may have had a single break point. This would give a value for q_B of 0 or 1 depending on whether this single point was won or lost. Such matches were given an equal weighting to matches where both players had many more break points. The second limitation of the study was that average results were reported for each tournament and men's singles Grand Slam singles tennis in general without distinguishing between the performances of winning and losing players within matches. In recent years, four players have dominated the men's singles game; Novak Djokovic, Roger Federer, Rafael Nadal and Andy Murray. It would be interesting to look at the receiving performance of these players.

Therefore, the current paper describes two related studies of receiving performance during Grand Slam men's singles tennis. The purpose of the first study was to compare the receiving performance of winning and losing players within matches of the 2011 US Open men's singles during break points and non-break-points. The purpose of the second study was to compare performance during break-points and non-break points for the World's top 4 male players during all 16 Grand Slam tournaments from the Australian Open in 2008 to the US Open in 2011.

2. Study 1: Winning and losing performances at the US Open

2.1. Methods

Data for the first study were gathered from the official website of the US Open (www.usopen.org, accessed 13th December 2011). The data were recorded onto a specifically designed data collection form before being entered into Microsoft Excel for processing. The criteria for matches to be included in the study were that the match had to be a completed match where both players had at least 5 break points. There were 92 men's singles matches in the 2011 US Open that satisfied these criteria. The following data for each match were compiled into a spreadsheet.

- The tournament.
- The winning and losing players.
- The number of receiving points played and won by each player.
- The number of break points played won by each player.
- The number of games where each player returned serve. If the total number of non-tiebreak games played in the match was even, an equal number of return games was played by each player. If the total number of games was odd then the player who served first was determined using the number of service breaks within the first set that had an odd number of games.

The spreadsheet of player performances was programmed to calculate the retrospective probability of each player winning a point when receiving serve (q) and the retrospective probability of the opponent winning a point on serve ($p = 1 - q$). The expected number of break points created per receiving game and the probability of breaking the opponent's serve were computed using equations (3) and (4) respectively.

$$E(\text{BREAK POINTS PER GAME}) = q^3(1+4p+10p^2) + 20q^4p^3 / (1-2pq) \quad (3)$$

$$P(\text{BREAK}) = q^4(1+4p+10p^2) + 20q^5p^3 / (1-2pq) \quad (4)$$

The observed number of break points created and number of break points converted were divided by the number of receiving games in each performance to compute the actual number of break points per game and breaks per game. The number of service breaks was divided by the number of break points played to determine a value for q during break points, q_B. The break points won and break points played were also subtracted from the number of points won and played respectively when receiving serve to determine a value for q during non-break points, q_A.

Mean and SEM values were computed for the observed and expected number of breakpoints as well as the retrospective probabilities of winning receiving points during break points and non-break points. A series of Kolmogorov-Smirnov tests revealed that 5 of the 8 variables (3 out of 4 for the winning players and 2 out of 4 for the losing players) were not normally distributed and therefore pairs of conditions were compared using nonparametric Wilcoxon signed ranks tests. Where the Wilcoxon signed ranks tests produced p values of less than 0.05, statistical significance was concluded for the difference between related samples.

2.2. Results

Table 1 shows that there was no significant difference between the expected and observed break points per receiving game for the winning or losing players within matches of the 2011 US Open ($p > 0.05$).

Table 1. Expected and observed break points per receiving game in the 2011 US Open men's singles (mean±SEM).

Player	Break points played per receiving game		Wilcoxon signed rank test	
	Expected	Observed	z	p
Winner	0.75±0.021	0.73±0.032	-1.6	0.108
Loser	0.45±0.016	0.47±0.021	-0.8	0.416

Figure 1 shows the mean±SEM for the retrospective probability of winning break points and non-break points for the winning and losing players within receiving games of these matches. There was no significant difference between the proportion of break points and non-break points won by losing players ($z = -0.0$, $p = 0.994$). However, winning players won a significantly greater proportion of break points than non-break points ($z = -2.9$, $p = 0.004$).

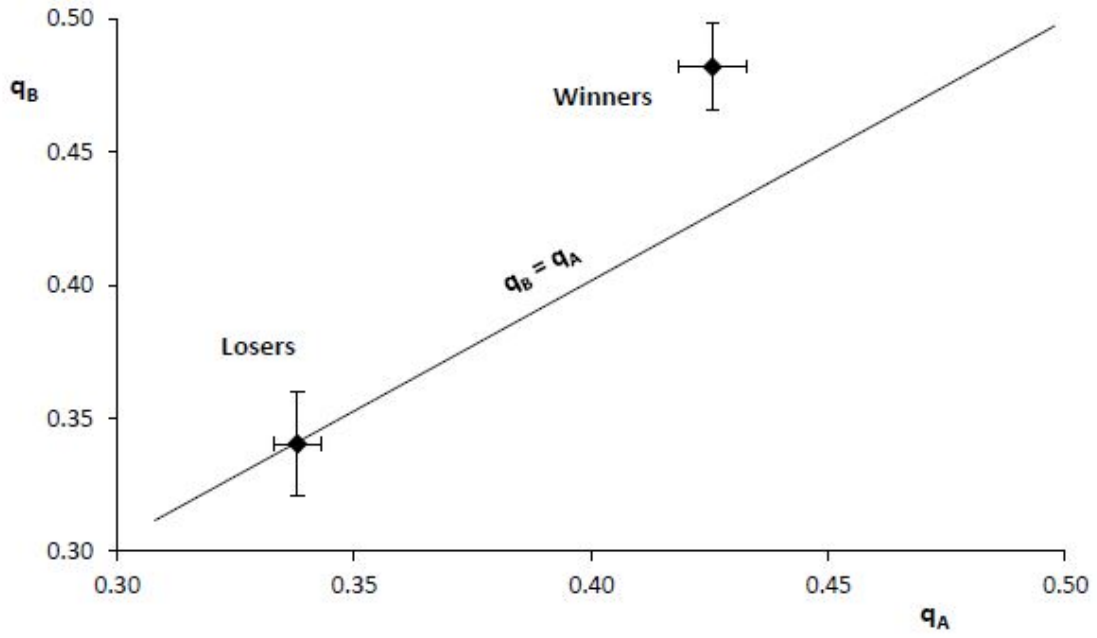


Figure 1. Retrospective probability of winning points during receiving games of the 2011 US Open men's singles during break points (q_B) and non-break points (q_A). Mean values are plotted and error bars represent SEM values.

3. Study 2: The World's Top Four Players

3.1. Methods

The criteria for a match to be included in the second study were that the match involved at least one of the World's top four players, was played in a men's singles event of a Grand Slam tournament between 2008 and 2011 inclusive and each player within the match had at least 5 break points. These data were recorded from the official internet sites of the four Grand Slam tournaments (www.ausopen.org accessed 29th December 2008, 2nd February 2009, 15th September 2010, 7th February 2012, www.fropen.org accessed 29th December 2008, 24th July 2009, 15th September 2010, 7th February 2012 www.wimbledon.org accessed29th December 2008, 24th July 2009, 15th September 2010, 7th February 2012, www.usopen.org accessed 29th December 2008, 16th September 2009, 15th September 2010, 13th December 2011). Table 2 shows the volume of data recorded for the second study. The lower volume of data recorded from Wimbledon was due to greater server dominance leading to fewer break points being played at this tournament than at the other tournaments.

Table 2. Matches from each Grand Slam tournaments included in the second study.

Player	Australian Open	French Open	Wimbledon	US Open	Total
Djokovic	9	12	10	8	39
Federer	7	8	2	10	27
Murray	10	13	4	9	36
Nadal	10	15	3	7	35

The same variables were used for the second study as the first study and a second spreadsheet was programmed to produce the q_A and q_B values for each player performance. The data for

the second study were summarised using the means and 95% confidence intervals for the means for the World's top 4 players.

3.2. Results

Figure 2 summarises the results of the second study, showing that only Rafael Nadal won a greater proportion of break points than non-break points (above the $q_B = q_A$ line). There are three results based on 95% confidence intervals for player means. Firstly, Nadal won a significantly greater proportion of break points than the other three. Secondly, Murray won significantly more non-break points than Djokovic. Thirdly, all of the players except Novak Djokovic perform significantly differently to a hypothesised performance where stationarity can be assumed (on the $q_B = q_A$ line).

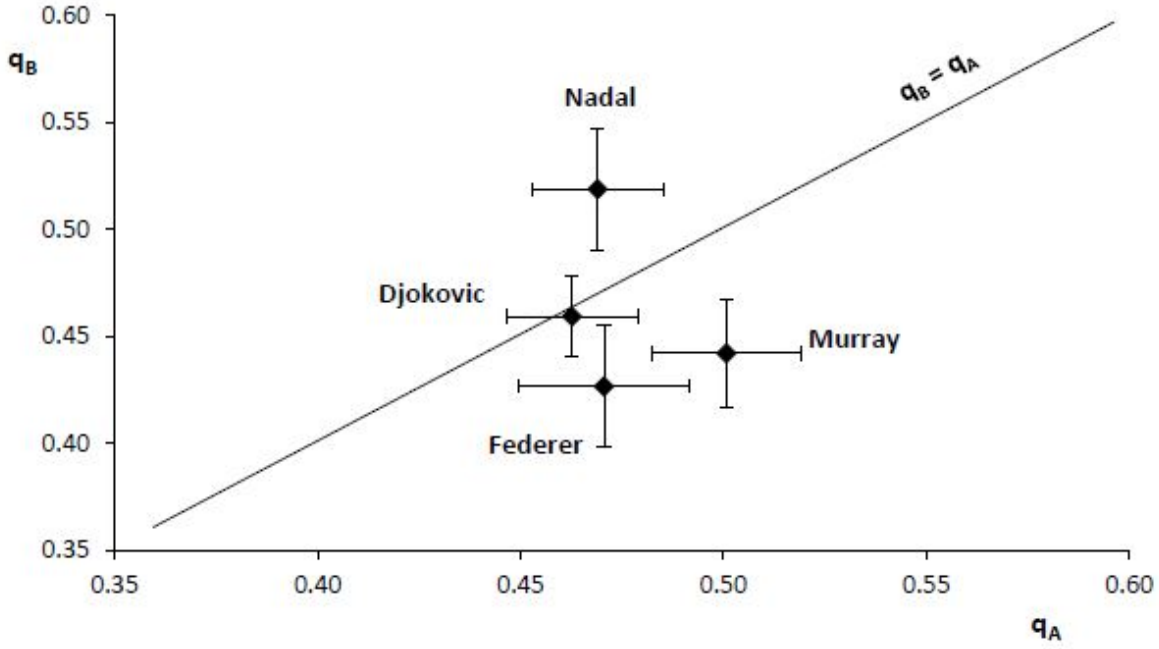


Figure 2. Retrospective probability of the World's top 4 players winning points during receiving games of Grand Slam men's singles tournaments from 2008 to 2011; break points (q_B) and non-break points (q_A). Mean values are plotted and error bars represent SEM values.

4. Discussion

Some results of the first study disagreed with Knight and O'Donoghue (2012 In Press) who found players generated more break points than would be expected given the number of points won when receiving. This may be explained by methodological differences between Knight and O'Donoghue's study and the current investigation. Matches where one or both player had fewer break points were excluded from the current investigation while matches with relatively high numbers of break points were still included. Some players achieving a low number of break points may still be earning more break points than expected given the proportion of points they win when receiving serve. A further issue is that matches where both players earn at least 5 break points may involve higher ranked players than those involved in Knight and O'Donoghue's study. Figure 1 partially agrees with the finding of O'Donoghue (2001) that score-line does not influence the probability of winning a point and

partially agrees the contradicting research by Knight and O'Donoghue that score-line within games does influence the probability of winning a point. The losing players won a similar percentage of break points and non-break points while the winning players won a significantly greater percentage of break points than non-break-points.

Figure 2 illustrates the result of the second study that the receiving performances of the World's top four players are influenced in different ways by score-line. Rafael Nadal converts a greater percentage of break-points than non-break points, Novak Djokovic is unaffected by score-line, while Roger Federer and Andy Murray convert a lower percentage of break points than non-break points. This is explained by individual differences in performers which has been recognised in sports performance for some time (McGarry and Franks, 1994; Grehaigne *et al*., 1996). In particular, there are different types of tennis player with respect to how game score influences strategy (O'Donoghue, 2003). Where a player wins a greater proportion of break points than non-break points, it is possible that the players make less effort on the non-break points than break-points rather than more effort on the break points. It would be most likely that the serving opponent would also make their best effort to win such a critical point. Therefore, this result may be explained by a player such as Nadal not making the same effort in points such as 40-15, 30-0 and 40-0 as he does on other points when receiving serve. Serve return may differ between players and have more impact on some points than others. For example, Ashe (1981) recommended that at a score of 40-0, the server should "try the cannonball". Where a returning player is not as effective as returning such a serve as other players might be, it may lead to lower numbers of points being won against the serve at 40-0 than at other score-lines.

Andy Murray and Roger Federer win a lower proportion of break-points than other points and yet are among the World's top four players. This may be explained by such players breaking serve by generating more break points that higher numbers of service breaks will be achieved even with a lower conversion rate. Consider the match between Andy Murray and Viktor Troicki in the 4th Round of the 2011 French Open. Murray won 9 out of 23 break points (39%) while Troicki won 7 out of 13 break points (54%). Troicki's superior conversion of break points needs to be considered along with the number of break points earned when comparing with Murray's performance in this match.

The differences between the World's top four players challenge the assumption of stationarity used in models of winning tennis games (Morris, 1977; Croucher, 1986). Only Novak Djokovic won a similar proportion of break points as non-break points. However, the models have been shown to be robust to violations of the assumption of independence (Newton and Aslam, 2006). It is, therefore, worth considering the impact of violations of stationarity based on the performances observed for Rafael Nadal ($q_A = 0.9q_B$) and Roger Federer ($q_B = 0.9q_A$). Figure 3 shows that the probability of the serving player winning the game is robust then playing against opponents with such violations of stationarity.

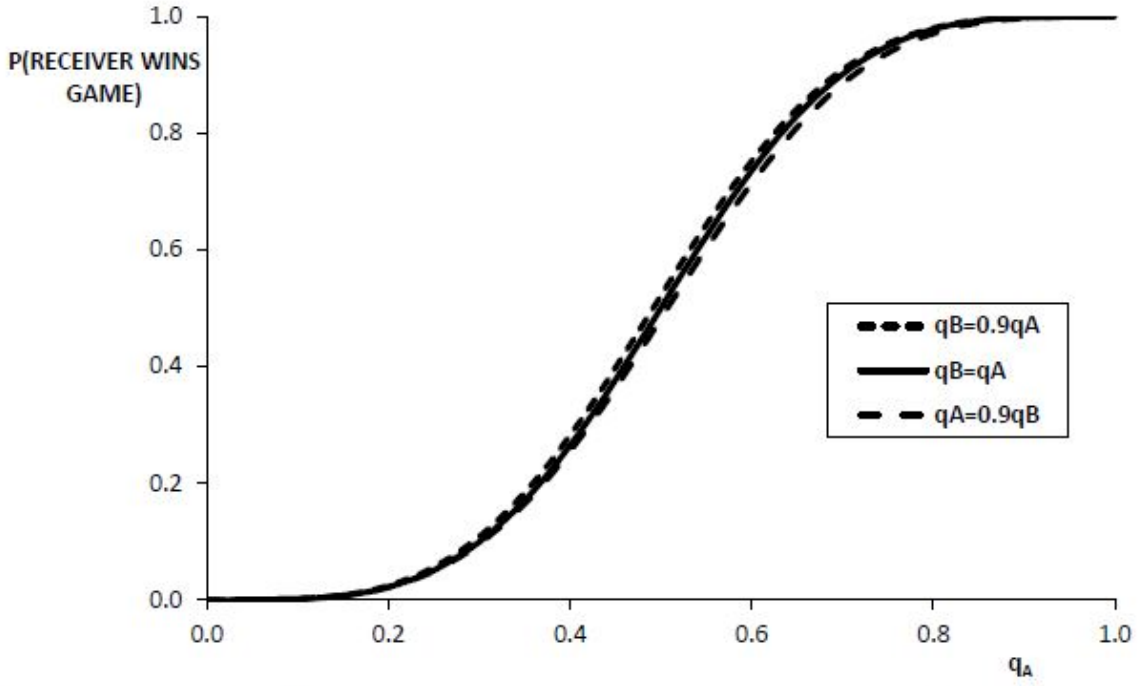


Figure 3. Probability of holding serve when stationarity can be assumed and in two cases of when it is violated.

In the case of a player such as Federer who wins a lower proportion of break points than non-break points, the maximum difference in the probability of breaking serve over when stationarity is assumed is 0.021. In the case of a player such as Nadal who wins a higher proportion of break points than non-break points, the maximum difference in the probability of breaking serve over when stationarity is assumed is 0.022. These differences are equivalent 1 break of service in 45 or 46 receiving games which is one extra break of serve in three 6-4, 6-4, 6-4 matches. While the models of winning tennis games may be robust, there are implications for tennis players when playing break points. There is a general concept of opposition effect on sports performance (McGarry and Franks, 1994; Grehaigne *et al*., 1996; Tenga et al., 2010a, 2010b). Therefore, a serving player's performance will be effected by the play of the receiving player which may be of a higher or lower quality during break points than during non-break points.

The current investigation does have some imitations that the author acknowledges. The study used matches for the 2011 US Open and the results cannot be generalised to the French Open where there are more breaks of serve or to Wimbledon where there are fewer breaks of serve (Knight and O'Donoghue, 2012 In Press). The criteria of at least 5 break points for each player in a match has excluded performances where players do not achieve break points. These are legitimate tennis performances and their exclusion may have resulted in the proportion of points win when returning being over-estimated.

The different scoreline effects found in the two studies reported in this paper relate to point outcomes. Future research is required to examine scoreline effects on tactical aspects of play. Aspects of play that could be considered in future studies of break points and non-break points include net play (Brown and O'Donoghue, 2008), serve direction (Unierzyski and Wieczorek, 2004) and shot placement (Hughes and Clarke, 1995). As well as looking at break-points, future research into scoreline effects should look at game points for the server as well as those points shown to be the most important according to mathematical models (Morris, 1977; Croucher, 1986; Klaasen and Magnus, 2001; Pollard, 2004). Future research should also distinguish between receiving points played where matches are in different set scores (games won by each player) and match scores (sets won by each player).

5. Conclusions

In men's singles tennis at the US Open, winning players win a significantly greater proportion of break points than non-break points when receiving serve. Those players who lose these matches win a similar proportion of break points as non-break points. A study of the World's top four men's singles players revealed scoreline had different effects on different players. Novak Djokovic won a similar proportion of break points to non-break points. However, Rafael Nadal won a greater proportion of break points than non-break points while Andy Murray and Roger Federer won a lower proportion of break points than non-break points. The findings of these two studies challenge the assumption of stationarity used in models of winning games of tennis.

6. Practical application

Players who win different proportions of points in different scoreline states may not be performing as well as they could in all situations. This can be viewed from the server's point of view or from the receiver's point of view. Where receiving players win a lower proportion of non-break points than break points, it may be that they are less motivated at game scores of 40-0, 40-15 and 30-0. If these players focussed equally on all points it could lead to more break point opportunities. Where a player wins a lower proportion of break points than non-break points there may be psychological factors that need to be addressed. These critical points are high pressure situations and the conversion of break points can lead to sets being won in tennis. Similarly, a break point is a critical situation for the serving player. Where serving players win a lower proportion of break points against their serve than other service points, they could lose sets as a result. There may be psychological aspects of critical points on serve that need be addressed. When a player wins a higher proportion of break points against his serve than other serving points, serving games may be longer than they need to be. Preventing breaks of serve is clearly important but if players are facing many break points then they could be winning fewer points earlier within service games. This could lead to fatigue within individual matches as well as tournament situations. Coaches and other support staff should help players perform equally on all service points and all receiving points.

7. Acknowledgement

The author wishes to thank Zsófia Csomor who gathered the internet data used in the current investigation.

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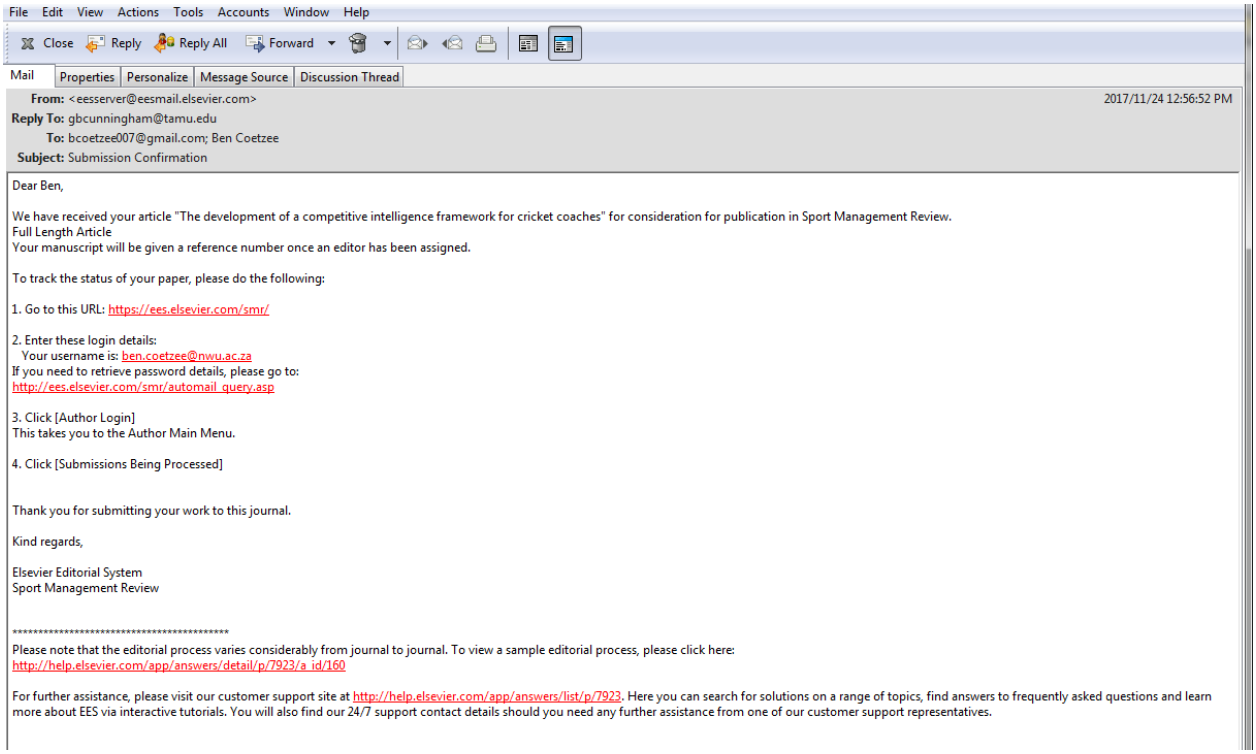
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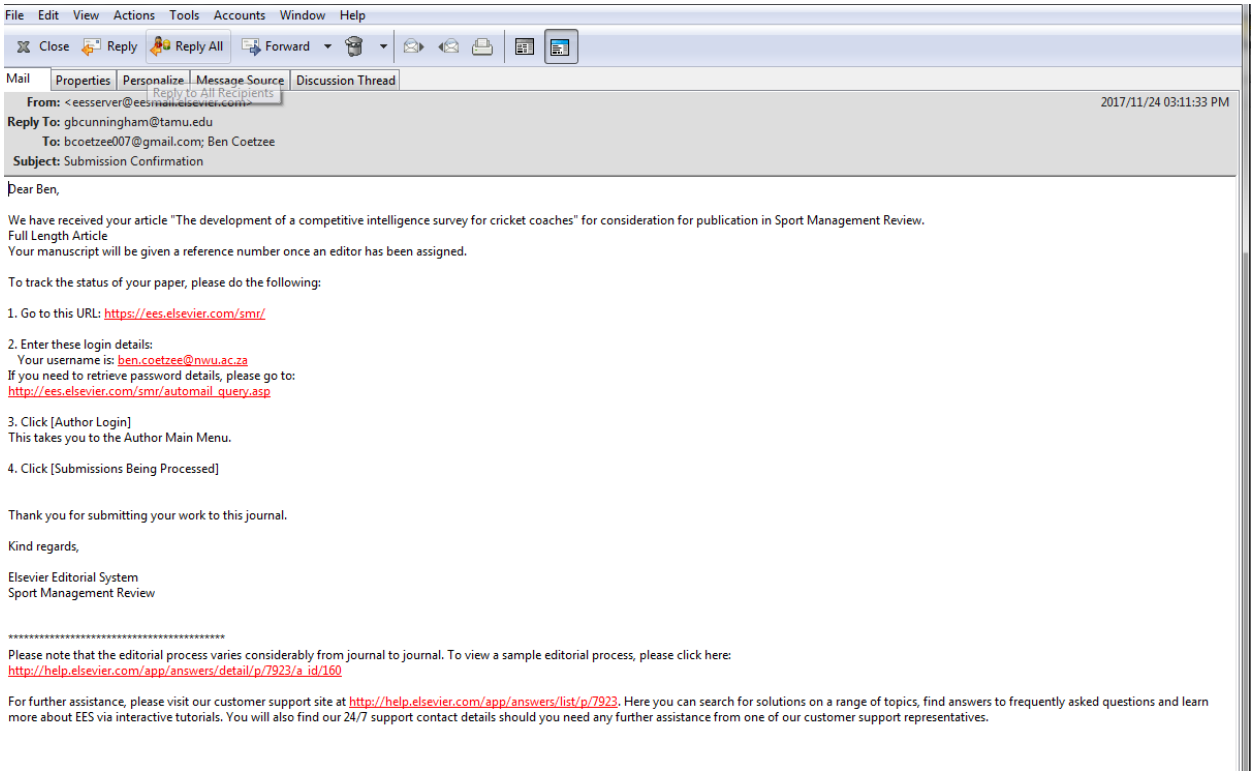
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SPORT MANAGEMENT REVIEW

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INTRODUCTION

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- Double-space all entries. Use only one space after a punctuation mark.
- Use hanging indent format. See Section Reference List Creation for Word for word processing instructions.
- Use the official, two-letter U.S. Postal Service abbreviations for all states.
- See the last 2 pages of the sample paper at the end of this Guide.

Tables, Figures, Appendices

- Some papers necessitate additional explanatory information that fits better at the end of the paper rather than in the paper. These are arranged as follows, immediately after the References page.
    - Tables – start each on a new page; caption is above the table.
    - Figures – start each on a new page; caption is below the figure.
    - Appendices – Start each on a new page.
- Label each item sequentially, e.g. Table 1; Table 2 or Figure 1, Figure 2 or Appendix A, Appendix B, etc.
- In a shorter paper or per instruction from your faculty, you may want to insert figures in the body of your paper where the information is discussed rather than at the end of the paper.
- Formatting for tables and figures is discussed in Section General Paper Formatting, Formatting Tables and Figures.

In Text Citations

- Quoting a source is when you take the words exactly as they appear in the original source.
    - Set off with quotation marks (less than 40 words)
    - Use an indented block quote (40 or more words) [See sample paper at the end of this Guide].
    - In text citation for a quoted source should include author (or title if no author), copyright date, page number(s)/paragraph number(s) or section title.
        - "Sentence of quoting from a source" (Wilson, 2010, p. 34).
        - Wilson (2010) emphasizes "sentence of quoting from a source" (p. 34).
    - The first time the source is used within a paragraph the author, date, and location information is given. If that same source is repeated within the same paragraph with no other intervening source used, the date can be omitted *if* the format for the in text citation is as follows: Almay and Lockerby (2007) pointed out ….. Almay and Lockerby speculated…. If the parenthetical format for an in text citation is used, the author and date information should be repeated for all in text citations. Example: (Almay & Lockerby, 2007).

- Paraphrasing a source is when you take an idea, concept, etc., and restate it using your own words.
    - It is not set off with quotation marks.
    - In text citation for a paraphrase should include the author (or title if no author), and copyright date.
        - Wilson (2010) recounted that information should be documented in a writing style.
        - Information is documented in a writing style (Wilson, 2010).
    - A good method of knowing for sure you are paraphrasing is to read the material until you understand it. Place the material aside and write out your paraphrase from memory. It is not likely that you will write it down word for word. Then give the appropriate citation per below!

- Quoting in text citation for one and multiple authors. Always cite what is in the first position of the References entry.
    - One author
        - (Jones, 2010, p. 456).
        - Jones (2010) noted "…" (p. 456).
    - Two authors
        - (Smith & Jones, 2009, para. 7).
        - Smith and Jones, (2009) acknowledged "…" (para.7).
    - Three authors to five authors
        - (Smith, Jones, & Brown, 2009, Section Company History), for the first time the source is cited. Thereafter, for that source, use (Smith et al., 2009, section Company History).
        - Smith, Jones, and Brown (2009) maintained"…" (p. 16). The next time that source is used it would be, Smith et al. (2009) writes "…" (p. 16).
    - Six or more authors
        - The first time the source is used, note the first author with et al. White et al. (2010) proposed….
        - Any citation with more than seven authors also has a certain way to cite in the References list. The first six authors are all written out in the order they appear in the original source. Then use three ellipses and list the last author listed. So if the source you are citing as 12 authors, write out the first six listed on the source and the 12th author. Authors in the seventh through eleventh positions are completely omitted. Here is an example of an article that has 10 authors:

Logan, L., Harley, W. B., Pastor, J., Wing, L. S., Glasman, N., Hanson, L., . . . Hegedahl, P. (1996). Observations on the state of empowerment in today's organization. *Empowerment in Organizations, 4*(1), 6-11. http://dx.doi.org/10.1108/09684899610111025

    - No author

        - Use the first few words of the title, since the title has now moved to the first position in the References entry.
        - For articles from periodicals, use quotation marks around the title and capitalize all significant words. ("Fun Learning APA," 2010, p. 23)
        - For books, online technical reports, use italics just like the title displays in the References list, but the significant words are capitalized, unlike the corresponding References entry. (*Using APA to Write Scholarly,* 2013, p. 277).
    - Corporate author
        - Corporate author that is readily recognized by their acronym. (United Nations [UN], 2008, section History).
        - Corporate author with no acronym or an acronym that is not easily recognized or is used by multiple organizations/companies. (Lawrence North High School, 2000, p. 5).
- Paraphrasing in text citation for one and multiple authors.
    - One author
        - (Jones, 2010).
        - Jones (2010) noted ….
    - Two authors
        - (Smith & Jones, 2009).
        - Smith and Jones, (2009) acknowledged ….

Headings

- Headings help break the paper into sections.
- Generally, a small paper will only need a couple of heading divisions.
- For a large paper, you can use up to 5 headings.
- Headings are used in the body of the paper. The abstract, title, chapter divisions or References are not part of the heading structure.
- Do not use Introduction as a heading right under the title on page 2 as it is assumed that the first couple of paragraphs of the paper are the introduction.
- A note about the headings shown in this document. They are not per APA. The shading and bold type were used to emphasize and facilitate navigation of the document.
- Example of headings in APA:

Level 1 – Centered, Boldface, Upper and Lowercase

Start paragraph with normal paragraph indent, double-spaced.

Level 2 -- Flush Left, Boldface, Uppercase and Lowercase

Start paragraph with normal paragraph indent, double-spaced.

Level 3 -- Indented, boldface, lowercase paragraph heading ending with a period. Sentence starts immediately after the period.

Level 4 -- Indented, boldface, italicized, lowercase ending with a period. Start paragraph with normal double-spacing, in line with heading.

Level 5 -- Indented, italicized, lowercase paragraph heading ending with a period. Start first paragraph in line with heading.

References – Books

Anderson, D. (2001). *Beyond change management: Advanced strategies for today's transformational leaders*. San Francisco, CA: Jossey-Bass/Pfeiffer.

- Always include the state postal code with cities or the country for foreign cities, e.g. New York, NY or London, England.

Bass, B. M., & Bass, R. (2008). *The Bass handbook of leadership: Theory, research, and managerial applications* (4th ed.). New York, NY: Free Press.

- Sometimes a book may be a revision of the original and be a 2nd, 3rd, 4th, revised etc., edition of the original. That information is important and should be included in the citation per the above example. If it was simply a revised edition, use, (Rev. ed.).

References – Book chapter

Goodman, M. (1955). Organizational inertia or corporate change momentum. In D. P. Cushman & S. Sanderson (Eds.), *Communicating organizational change: A management perspective* (pp. 95-112). Albany, NY: New York Press.

References – Book Review

Penny, J. (2010). Outliers: The story of success [Review of the book *Outliers*, by M. Gladwell]. *Personnel Psychology, 63*(1), 258-260. Retrieved from http://www.personnelpsychology.com

ADDENDUM S: EXAMPLE OF ARTICLE PUBLISHED IN SPORT MANAGEMENT REVIEW JOURNAL

Contents lists available at ScienceDirect

Sport Management Review

journal homepage: www.elsevier.com/locate/smr

Passion and pride in professional sports: Investigating the role of workplace emotion

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ABSTRACT

The current study examined the influence of passion and pride on employees of professional sport organizations. Anecdotally, much has been noted about the role that emotions play in making the sport industry one of the world's largest and most visible. However, empirical investigation is lacking in relation to those who choose a career in this environment. Results from an analysis of 933 employee survey responses representing 89 teams across 5 leagues suggest that passion and pride play an important role influencing commonly-assessed workplace attitudes and behaviors. Notably, obsessive passion seems to work in a distinctly positive fashion within professional sport workplaces, as compared to its negative influence on employees within other non-sport industries researched previously.

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1. Introduction

Sport and emotion are inextricably linked (Vallerand, 1983; Vallerand & Blanchard, 2000). For individuals in various roles (e.g., participant, coach, fan, etc.), emotion is at the core of the sporting experience (Duquin, 2000), and the passion that sport engenders is regarded as a distinguishing characteristic of the industry (Stewart & Smith, 1999). Sport and emotion have been studied from multiple perspectives (e.g., sociological, psychological, and physiological), and in relation to numerous subjects such as pride, performance, culture, and fan experience (Duquin, 2000; Vallerand & Blanchard, 2000). The sport management literature has also addressed the study of emotion, primarily through the lens of consumer behavior and its association with fan-related attitudes and behaviors (e.g., Wann, Dolan, McGeorge, & Allison, 1994).

Over the past decade there has been an increased emphasis in the mainstream management literature on the study of emotion in organizational life (e.g., Ashkanasy & Daus, 2002; Barsade & Gibson, 2007). The basis of this trend is that strong feelings are often present when individuals confront work issues related to organizational performance (Barsade & Gibson, 2007), and that emotion (affect) plays an important role for key workplace attitudes and behaviors (Ashkanasy & Daus, 2002). With the close association between sport and emotion, it seems plausible that emotion could also be an important element within the context of the sport workplace. While sport management has established a strong research paradigm for individuals external to organizations, enhanced focus is needed on the role that emotion might play with regard to those working inside sport organizations (Todd & Kent, 2009). For example, Taylor, Doherty, and McGraw (2008) suggest that the

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passion surrounding sport in general might also be reflected in employees working in the sport industry. They note examples of " . . . irrational passions and emotional attachments, despite the often variable quality of the product" (Taylor et al., 2008, p. 2), and suggest that evidence provided from studies of job satisfaction and volunteering patterns may be indicative of a similar irrationality amongst the sport industry workforce. Todd and Harris (2009) suggest that the pride of sport employees can be a psychological benefit which leads to increased levels of satisfaction and performance. Their investigation of pride amongst employees of professional sport teams, and its impact on the development of organizational identification, suggests that this element of emotion may be similar to passion in its particular relevance to employees within sport.

With sport being so closely intertwined with the concept of emotion, the lack of attention given to its role in sport organizations is surprising. Other than Todd and Harris (2009), the study of pride and passion in the workplace is notably absent in the sport management literature. This study provides initial research to establish a baseline understanding of the role that these emotional constructs play in the sport workplace environment. Despite the fact that these emotional elements are often said to be distinguishing aspects of our field (e.g., Stewart & Smith, 1999; Taylor et al., 2008), the current study makes one of the first attempts to explore these concepts empirically in relation to organizational behavior. As passion and pride are generally considered distinctly critical concepts in the sport context, it is proposed here that these constructs may also be particularly relevant for sport employees. The main purpose of the study is therefore to investigate the extent to which these affective constructs are linked to the organizationally-relevant outcomes of commitment, satisfaction, involvement, and organizational citizenship behavior. For this initial investigation of emotion in the sport workplace, we included these specific outcomes due to their theoretical connection to passion and pride, their prevalence in the mainstream management literature (Schleicher, Hansen, & Fox, 2011), and their specific relevance for employees working in the sporting environment (e.g., Doherty, 1998; Todd & Kent, 2009).

2. Theoretical background

2.1. Overview of the conceptual model

Our conceptual model of affective influence in the sport workplace is shown in Fig. 1. The general premise for this model is based on previous management literature suggesting that constructs of emotion lead to organizationally-relevant attitudes and behaviors (e.g., Ashkanasy & Daus, 2002). More specifically, this line of research suggests that positive emotions lead to positive outcomes, whereas emotions with a negative connotation are negatively related (or unrelated) to positive consequences (e.g., Ashkanasy & Daus, 2002; Vallerand, 2010). As outlined above, the affective predictors chosen for the current study include both passion and pride. As will be outlined in more detail below, passion is conceptualized to have two distinct forms. Although not always the case, harmonious passion is primarily considered to be a 'good' or positive emotion, whilst obsessive passion is generally considered as more of a 'bad' or negative emotion (Vallerand, 2010). In the current study, we also consider pride to be a positive affective construct due to its positive relationship with desirable outcomes in previous research (e.g., Todd & Harris, 2009). We further propose that passion and pride will lead to both attitudinal and behavioral outcomes.

For our initial assessment of the influence of the affective constructs, we include established outcomes which are theoretically connected to the predictors. The attitudinal outcomes include organizational commitment, job satisfaction, and job involvement, which are three of the most highly researched attitudes in the employee literature and generally considered as desirable in the organizational setting (Schleicher et al., 2011). With regard to behaviors, organizational citizenship behavior (OCB) is considered a key construct based on its important connection with organizational effectiveness, and is also one of the most heavily researched behaviors in the employee literature (Podsakoff, Whiting, Podsakoff, & Blume, 2009). The

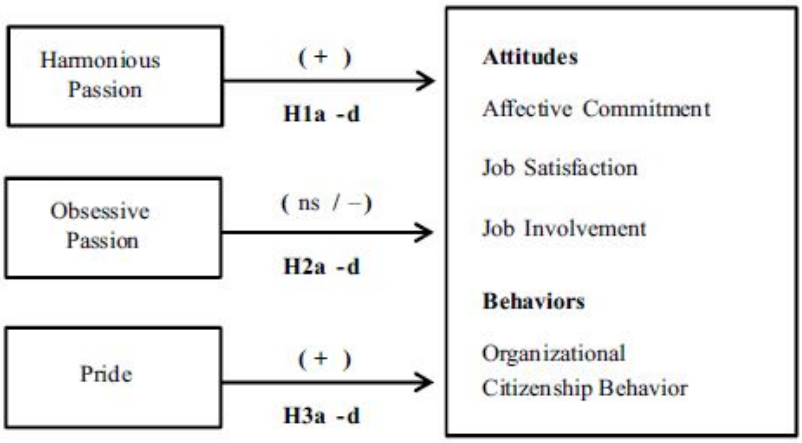


Fig. 1. A model of affective influence on organizational outcomes in professional team sport organizations.

list of outcomes also incorporates different conceptual foci (organization, job, and coworkers), which provides for a more comprehensive perspective on the influence of the affective predictors.

While the sport management literature has not given much attention to pride and passion in the workplace, there is some indication that constructs of emotion may be particularly relevant to the sport context. For example, Todd and Harris (2009) found the pride of sport employees to ultimately lead to job satisfaction, and theorized this in part to be related to the pleasurable state experienced when a job has high emotional significance to an employee. In addition, Swanson and Kent (2015) proposed that team identification would enhance positive attitudes like commitment and involvement for professional sport employees due to the meaningfulness they experience through this emotional connection with the team. Furthermore, the inclusion of these four outcomes is also consistent with Todd and Kent's (2009) proposition that they may be especially relevant for employees in the professional team sport environment. Consistent with findings noted above, the model indicates that harmonious passion and pride will have positive influence, while obsessive passion will be unrelated (or negatively related) to these organizationally relevant outcomes.

2.2. Passion

The concept of passion has been considered by philosophers for more than three centuries. Multiple definitions have been proposed, however two generally accepted positions have emerged over time (Vallerand, 2010; Vallerand et al., 2003; Vallerand & Houlfort, 2003). The first, espoused by Descartes (1596–1650), conceptualizes passion as a strong emotion which can be positive when reason serves as a basis for behavior (Vallerand et al., 2003). The second, proposed by Spinoza (1632–1677), is in concert with passion's etymology (from Latin *passio* meaning suffering) where passion can be negative because it is associated with a loss of reason and control (Vallerand, 2010).

Both of these perspectives are evident in the sporting environment. On one hand, it could be argued that passion has generally taken on a positive connotation in recent history, with a multitude of venerated descriptions of passionate athletes, coaches, and managers (e.g., Michael, 2008; Zinser, 2005), and success often considered to be at least in part the result of the passion one has for their sport (Vallerand, Mageau et al., 2008). That is, individuals who are passionate for their sport are able to dedicate themselves fully, and pursue their quest for excellence in the face of obstacles or resistance (Vallerand, Mageau et al., 2008). On the other hand, however, it should be noted that passion has also been cited in relation to unwise decisions in sport such as excessive sideline misconduct by coaches (e.g., BBC, 2010) and the use of expletives by senior managers communicating in the public domain (e.g., Mazzeo & Youngmisuk, 2014).

Passion has also been considered as an important energy source for goal achievement, and is frequently viewed as a necessary ingredient for significant accomplishment (Vallerand, 2010; Vallerand, Mageau et al., 2008). Within the workplace specifically, passion (harmonious) has recently been associated with important outcomes such as engagement, commitment, and employee sense of control (Forest, Mageau, Sarrazin, & Morin, 2011; Trepanier, Fernet, Austin, Forest, & Vallerand, 2014). However, in relation to the divergent conceptualizations discussed above, passion (obsessive) has also been connected to negative consequences such as burnout and psychological conflict (Trepanier et al., 2014; Vallerand, 2010). In accordance with these differing relationships, a dualistic model of passion toward activities (such as work) has been developed (Vallerand et al., 2003; Vallerand & Houlfort, 2003) which incorporates two distinct forms: harmonious and obsessive. This approach conceptualizes the general notion of passion as a strong feeling towards something which individuals like (or even love), find important, and invest their time and energy in (Vallerand et al., 2003; Vallerand, Paquet, Philippe, & Charest, 2010). However, the specific form of passion is then distinguished by the process in which the focal object is internalized into an individual's self-concept (Vallerand et al., 2003), which can be either autonomous or controlled (Deci & Ryan, 2000; Sheldon, 2002).

Harmonious passion refers to "a strong desire to freely engage" and is the result of autonomous internalization where individuals willingly accept the activity (or object) as important (Marsh et al., 2013, p. 797). This sense of willing participation is associated with volition and personal approval (Vallerand et al., 2010), where individuals freely engage in the activity rather than feeling compelled to do so (Vallerand et al., 2003). In contrast, obsessive passion refers to a "strong and uncontrollable urge to partake in the activity" (Belanger, Lafreniere, Vallerand, & Kruglanski, 2012, p. 2), and is the result of controlled internalization where pressures are felt due to the perception of attached contingencies (Vallerand et al., 2010). In this situation, individuals feel compelled to take part due to pressures such as social acceptance and self-esteem preservation, or because an uncontrollable sense of excitement is derived from engaging in the activity (Vallerand et al., 2003).

In concert with these dual conceptualizations of passion, research has generally shown harmonious passion to be associated with positive outcomes and obsessive passion to be linked to negative (or less positive) consequences (Forest et al., 2011). For example, the literature indicates that harmonious passion is positively associated with psychological well-being (Forest et al., 2011), self-esteem (Vallerand, Ntoumanis et al., 2008), work engagement (Trepanier et al., 2014), and adaptive outcomes and positive emotions in general (Vallerand et al., 2003). Additionally, harmonious passion has been seen to be negatively associated with constructs such as burnout (Trepanier et al., 2014), shame (Vallerand et al., 2003), psychological distress (Forest et al., 2011), and intentions to quit (Burke, Astakhova, & Hang, 2015). As for obsessive passion, previous studies have demonstrated a positive association with undesirable constructs such as burnout (Trepanier et al., 2014), conflict between work and life activities (Vallerand et al., 2010), and negative emotions in general (Vallerand et al., 2003). Previous research has also shown obsessive passion to have non-significant associations with

positively viewed constructs such as self-esteem (Vallerand, Ntoumanis et al., 2008), job performance (Burke et al., 2015), and positive emotions in general (Vallerand et al., 2003). In addition, some studies have indicated obsessive passion to have a negative relationship with adaptive outcomes such as psychological well-being and subjective vitality (e.g., Forest et al., 2011).

2.3. Pride

One of earliest references to the notion of pride is Aristotle's (384–322 BCE) conceptualization of it as a fundamental moral virtue (Sokolowski, 2001). From this perspective pride is a positive construct relating to dignity, self-efficacy, and feeling valuable as a person (Wärnå, Lindholm, & Eriksson, 2007). This view is in line with the etymology of the word which stems from a variety of meanings such as having high opinion of oneself (*prut*: Old English), valiant (*prud*: Old French), and being of value (*prudesse*: Latin).

The concept of pride also has a close connection to the sporting environment. In relation to coaches and players, feelings of pride are generally viewed as being worthy of pursuit and experienced in conjunction with hard work and team success (e.g., Maraniss, 1999). For example, a common message in the sport psychology domain is that coaches should instill pride in their players to engender group cohesion which can ultimately contribute to team success (e.g., Weinberg & Gould, 2011). Pride has also been identified as an important factor in the sport management literature. For example, civic pride has been viewed as an important benefit of hosting sporting events (e.g., Misener & Mason, 2009), and national pride has been seen to play an important role in the development of national identity (Chalip, 2006). It has been suggested that volunteering at international sporting events can be viewed as an avenue for individuals to express their national pride (Bang & Chelladurai, 2009), and that facilities can provide a tangible source for fans to experience the feeling of pride associated with sport (Wann, 2006). In sum, the concept of pride has been portrayed as the "cornerstone of fan consumption" and considered to be an antecedent of outcomes such as fan commitment, loyalty, and increased consumption (Decrop & Derbaix, 2010, p. 586).

In the management and organizational behavior literature, the notion of pride has sometimes been viewed as an evaluation of the attitudinal target's status and general worth (e.g., Blader & Tyler, 2009; Smith & Tyler, 1997; Tyler & Blader, 2001). While this approach has seemingly emphasized the cognitive aspects of the construct, in the current investigation we conceptualize pride more in line with recent studies which also account for its affective nature (e.g., Gouthier & Rhein, 2011; Horberg, Kraus, & Keltner, 2013). This approach does not cast pride as purely an affective construct, but instead is consistent with Smith and Tyler's (1997, p. 165) conceptualization of pride as a "measure of affective and evaluative feelings" about the attitudinal object. From this perspective we refer to pride in the workplace as feelings of importance, value, and admiration based on status evaluations of one's current job (Todd & Harris, 2009; Tyler & Blader, 2001).

Previous research indicates that pride is positively associated with a variety of outcomes generally considered as important in managerial settings and organizational research. For example, the literature suggests that pride leads to organizational identification for both employees (Todd & Harris, 2009) and volunteers (Boezeman & Ellemers, 2014), as well as affective organizational commitment for a wide range of employees working in different organizations and with various job types and levels (Ellemers, Kingma, van de Burgt, & Barreto, 2011). It has also indicated that pride has a positive association with employee creativity (Gouthier & Rhein, 2011), self-efficacy (Todd & Harris, 2009), job satisfaction, compliance, and intentions to stay (e.g., Tyler & Blader, 2001). Indeed, pride in the workplace has been referred to as strategic asset which is closely linked with employee performance and business success more generally (Katzenbach, 2003a, 2003b). However, it has been suggested that many views noting the importance of pride are based more on anecdotes and intuition rather than empirical investigation (Gouthier & Rhien, 2011).

2.4. Theoretical development

2.4.1. Outcomes of passion

As the proposed outcomes in our model are considered as positive attitudes and behaviors in the workplace, the current research generally proposes their relationship to be positive with harmonious passion and nonsignificant (or negative) with obsessive passion (e.g., Philippe, Vallerand, Houlfort, Lavigne, & Donahue, 2010; Vallerand, 2010; Vallerand et al., 2003).

Affective commitment is defined as "an individual's emotional attachment to and engagement in an employing organization" (Bedeian, 2007, p. 13). Relatively few studies have assessed the relationship between passion and commitment, however it seems intuitive that those who possess a strong desire to engage in their work (Marsh et al., 2013) would be more inclined to become emotionally attached and engaged with their organization (Bedeian, 2007). In addition, a positive relationship between harmonious passion and affective commitment would be consistent with Vallerand et al.'s (2003) finding of this passion type's connection with positive emotions in general. However, as previous research has indicated a nonsignificant relationship between obsessive passion and positive emotional outcomes (e.g., Vallerand et al., 2003; Vallerand et al., 2006), we propose a similar relationship with affective commitment. As obsessive passion is the result of controlled internalization and the experience of pressure (Vallerand et al., 2003), it seems likely that individuals will not be able to freely attach themselves emotionally to their employing organization. In addition, as Vallerand et al. (2003) indicates that this controlled internalization can originate from interpersonal pressure (e.g., coworkers), this stress could perhaps also lead to resentment or negative feelings about the organization. Such a finding would be consistent with

previous research indicating lower levels of commitment for individuals who are obsessed with their work (Burke & Fiksenbaum, 2009).

Hypotheses 1a. Harmonious passion will be positively related to affective organizational commitment.

Hypotheses 2a. Obsessive passion will be unrelated or negatively related to affective organizational commitment.

Job satisfaction refers to "a positive (or negative) evaluative judgment one makes about one's job or job situation" (Weiss, 2002, p. 175), with previous research indicating a positive relationship between harmonious passion and this form type of satisfaction (e.g., Carbonneau, Vallerand, Fernet, & Guay, 2008; Vallerand et al., 2010). Vallerand et al. (2010) proposed this positive relationship to exist on the basis that harmonious passion allows individuals to experience task satisfaction through immersion in their work. This association is also based upon previous research indicating that it leads to a variety of adaptive outcomes such as work satisfaction (Carbonneau et al., 2008). In addition, since job satisfaction has been conceptualized as incorporating positive emotion (e.g., Locke, 1976), a positive relationship could also be expected due to harmonious passions generally leading to positive emotions both during and after the passionate activity (Burke et al., 2015; Vallerand et al., 2003). In line with previous research, however, we suggest that obsessive passion will be either unrelated or negatively related to work satisfaction (e.g., Burke et al., 2015; Carbonneau et al., 2008; Houlfort, Philippe, Vallerand, & Ménard, 2014). This is proposed on the basis that the controlled internalization leads to more rigid forms of task engagement and constrains enjoyment associated with the activity (Burke et al., 2015; Vallerand & Houlfort, 2003). This type of relationship would also be consistent with previous research where obsessed employees demonstrated lower levels of job satisfaction (Burke & Fiksenbaum, 2009).

Hypotheses 1b. Harmonious passion will be positively related to job satisfaction.

Hypotheses 2b. Obsessive passion will be unrelated or negatively related to job satisfaction.

The construct of job involvement refers to the degree of cognitive preoccupation and concern individuals have with their current job (Paullay, Alliger, & Stone-Romero, 1994). Although we know of no passion research specifically assessing its relationship with job involvement, some studies have indicated a positive association with related constructs such as concentration (Forest et al., 2011; Vallerand et al., 2003), cognitive absorption, and attention (Ho, Wong, & Lee, 2011). As these concepts both have overlap with cognitive engagement (Paullay et al., 1994), we also propose a positive relationship between harmonious passion and job involvement on the basis that autonomous internalization of work leads to employees to experience task engagement more fully (Vallerand et a., 2003). Another reason for this proposed positive relationship is that employees will be more likely to invest their attention to roles that they are passionate about (Ho et al., 2011). Conversely, we expect obsessive passion to be either unrelated or negatively related to job involvement. The general argument for this association is that pressured internalization leads to psychological conflict which distracts individuals from giving full attention to their jobs (Ho et al., 2011). A finding like this would also be consistent with previous research assessing the relationship between obsessive passion and attention, absorption, and concentration (Forest et al., 2011; Ho et al., 2011).

Hypotheses 1c. Harmonious passion will be positively related to job involvement.

Hypotheses 2c. Obsessive passion will be unrelated or negatively related to job involvement.

Finally, organizational citizenship behaviors (OCBs) are those of a discretionary nature, which are not directly or explicitly recognized by a formal reward system, yet still promote the effective functioning of the organization (Ferrin, Dirks, & Shah, 2006; Organ, 1988). Although, little attention has been given to the relationship between passion and OCBs, we propose a positive relationship on the basis that an intense desire to freely engage in one's work should lead to prosocial activity on behalf of the organization (Marsh et al., 2013). In addition, with OCB-related concepts such as teamwork, cheerleading, and sportsmanship (Organ, 1988, 1990) being highly relevant in this environment, it seems that sports employees with harmonious desire would be naturally inclined to engage in behaviors directed more specifically to colleagues as well. However, as obsessive passion is generally associated with less adaptive (or maladaptive) outcomes (Vallerand, Mageau et al., 2008), we propose that obsessive passion will be unrelated or negatively related to OCBs. As obsessive passion is related to internal pressure and rigid persistence of tasks (Vallerand et al., 2003), this inflexibility may lead employees to view OCBs as distractions or even threats to their primary work (Burke et al., 2015). We therefore propose that harmonious and obsessive passion will also demonstrate contrasting relationships with discretionary behaviors which are beneficial to the organization.

Hypotheses 1d. Harmonious passion will be positively related to organizational citizenship behavior.

Hypotheses 2d. Obsessive passion will be unrelated or negatively related to organizational citizenship behavior.

2.4.2. Outcomes of pride

As our conceptualization of pride is a general feeling of importance and value based on the status on one's job, we expect this construct to relate positively with the organizationally desirable outcomes included in this investigation. Whilst this

construct has not received a great deal of attention in the literature (Gouthier & Rhein, 2011), previous studies have indicated positive relationships with a variety of important workplace outcomes (e.g., Todd & Harris, 2009; Tyler & Blader, 2001). In the current research, we first propose that pride in the workplace will be positively associated with employee levels of affective organizational commitment. As employees experience positive emotion from perceptions of job importance and status, we propose that these individuals will attribute some of this feeling to their employing organization and in turn become more emotionally attached (e.g., Bedeian, 2007). Relatively few studies have assessed the association between pride and commitment in the workplace, however some empirical support does exists for a positive relationship between affective commitment and both group pride (Tyler & Blader, 2001) and organizational pride (Ellemers et al., 2011). We therefore propose the following hypothesis.

Hypotheses 3a. Pride in one's job will be positively related to affective organizational commitment.

We also propose that pride will be positively related to employee job satisfaction in this setting. As individuals experience positive feelings from perceptions of their job's status and importance, it seems likely that this will lead to positive evaluations and feelings about their job or job situation (Locke, 1976; Weiss, 2002). The literature also provides empirical support for this proposition, with pride demonstrating a positive influence on work satisfaction (Ellemers et al., 2011), as well as satisfaction with one's job and supervisor (Tyler & Blader, 2001).

Hypotheses 3b. Pride in one's job will be positively related to job satisfaction.

A similar relationship is also proposed between pride and job involvement. We know of no research specifically assessing this relationship; however we suggest that feelings related to perceived job importance and value will lead to increased levels of cognitive preoccupation and concern for one's job, along the lines of Paullay et al. (1994). That is, the more employees experience positive emotion in relation to job status, the more focused they will become to deliver on expectations and maintain their occupational standing.

Hypotheses 3c. Pride in one's job will be positively related to job involvement.

Finally, we suggest that pride in one's job will lead to prosocial behaviors beyond employees' contractual obligations. For example, employees who experience positive feelings from perceptions of job importance and value may also be more likely to assist coworkers as an additional means of feeling important and valued. In addition to its relationship with the aforementioned attitudinal outcomes, we propose pride to be an important affective construct which also leads to positive employee behaviors in professional sport organizations.

Hypotheses 3d. Pride in one's job will be positively related to organizational citizenship behaviors.

3. Methodology

3.1. Sample and measures

The participants were business operations employees from 89 randomly sampled organizations in the top five professional sports leagues in North America: Major League Baseball (MLB, 19), Major League Soccer (MLS, 12), the National Basketball Association (NBA, 19), the National Football League (NFL, 20), and the National Hockey League (NHL, 19). These individuals worked in departments such as communications, public relations, marketing, sales, accounting, finance, human resources, facilities, and information technology. Using proportional stratified sampling method (e.g., Leedy & Ormrod, 2001), approximately 63% of the teams in each league were randomly chosen for the study with data collected via online surveys sent to 8739 employees. A total of 933 participants completed the survey for a response rate of 10.7%. The participants were 66.3% male, 83.8% Caucasian, with the average age and organizational tenure being 35.9 years and 6.0 years, respectively. In terms of league representation, 33.9% of the sample was from MLB, 21.3% from the NBA, 19.7% from the NHL, 19.0% from the NFL, and 6.1% from MLS.

The current study used survey items which have been used previously in the literature and shown to be valid and reliable. Each scale used a five-point Likert-type scale unless otherwise indicated (1 = strongly disagree and 5 = strongly agree). Harmonious and obsessive passion were each measured with three items from Vallerand et al.'s (2003) passion for work scale, per Trepanier et al. (2014). Job pride was assessed using the three-item scale developed by Todd and Harris (2009). To measure affective organizational commitment, we utilized Meyer, Allen, and Smith's (1993) six-item affective commitment scale, and job satisfaction was assessed with Cammann, Fichman, Jennkins, and Klesh's (1983) three-item measure. Following Frone, Russell, and Cooper (1995), job involvement was measured using the five-item abbreviated version of Kanungo's (1982) job involvement scale with items assessed on a six-point Likert-type scale (1 = strongly disagree; 6 = strongly agree). Finally, organizational citizenship behavior was assessed using three-items from Lee and Allen's (2002) measure for citizenship behaviors towards coworkers.

3.2. Data analysis and results

3.2.1. Non-response and common methods

Non-response error is concerned with whether respondents can be seen as true representatives of the entire sample, and the assessment of differences between respondents and non-respondents (Dillman, Smyth, & Christian, 2009; Jordan, Walker, Kent, & Inoue, 2011). In order to assess the potential for non-response error, a short follow-up survey was sent to approximately 2500 non-participants from the original survey. This included two demographic variables (age and gender), and one item from four different constructs in the original survey. The 101 respondents were then compared to original survey respondents across the six variables. The results of a chi-square test ($p = .32$) indicated that responders and non-responders did not differ with respect to gender, and MANOVA results indicated no differences amongst the other variables (*Wilks'* $\Lambda = .99$, $F(5, 1028) = 1.59$, $p = .16$). These results suggest a reduced concern of nonresponse error for the current study.

Common methods bias refers to an element of measurement error that can be attributed to the method used in a particular study (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). As a first indication, Harman's one-factor test was conducted by performing a principle component analysis with all items in the study (e.g., Stam & Elfring, 2008). Six distinct factors were extracted explaining 67% of the total variance, with the first factor accounting for 33%. With no single factor emerging, nor one which accounted for a majority of the explained variance, these results lessen the concern regarding common method variance in the current study (Stam & Elfring, 2008). As a second test, a single item marker variable of agreeableness was also included, as marker variables are theoretically not related to any other variables in the study (Podsakoff et al., 2003). Other than a small negative association with affective commitment (−.08) and job satisfaction (−.13), the marker variable was not significantly correlated with any of the other constructs in the current study ($p < .05$). The collective results suggest that common method variance is not of great concern in the current research (Pritchard & Funk, 2010).

3.2.2. Measurement model analysis

The data were analyzed in a two stage structural equation modeling (SEM) process (Anderson & Gerbing, 1988). First, a measurement model was assessed using confirmatory factor analysis (CFA) which specified all of the survey items loading on their respective latent constructs. As there were some items with non-normal distributions, all SEM analysis utilized maximum likelihood estimation with robust standard errors (MLR), which addresses the potential violation of multivariate normality in such circumstances (Muthén & Muthén, 1998-2012). To assess the convergent validity of the seven constructs, we assessed both the construct reliability (CR) and average variance extracted (AVE) levels as outlined by Fornell and Larcker (1981). All the constructs had CR and AVE levels above .7 and .5, respectively, with only one exception. Contrary to previous findings, harmonious passion indicated inadequate convergent validity (CR = .64; AVE = .38) and was therefore removed from the analysis (Fornell & Larcker, 1981). Another measurement model was then assessed which specified the remaining six constructs and their associated items. All factor loadings were significant and above the recommend .5 level (Hair, Black, Babin, Anderson, & Tatham, 2006; Hulland, 1999), and the CFA indicated acceptable fit with the data ($\chi^2 = 842$, $df = 215$, CFI = .93, TLI = .92, RMSEA = .06, SRMR = .05). With only one exception (AVE = .49 for affective commitment), all the latent constructs met the recommended levels of CR and AVE (Fornell & Larcker, 1981). As AVE is a conservative measure which is often slightly below .5 (Jiang, Klein, & Carr, 2002), this lone exception was deemed acceptable for the current analysis. The CR, AVE, and Cronbach alpha values for the constructs are provided with the correlation matrix in Table 1.

Discriminant validity was also assessed by comparing the squared interconstruct correlation (SIC) values with the AVE value for each construct (Fornell & Larcker, 1981). In all but the following two cases, the AVE was greater than the SIC values between relevant construct pairs: obsessive passion and job involvement; and, affective commitment and job satisfaction. Following Anderson and Gerbing (1988), chi-square difference tests were then conducted which compared the measurement model with two alternate models that constrained the relationship between each of these construct pairs to be equal to 1.0 (Anderson & Gerbing, 1988). As appropriate with MLR estimation, all SEM procedures of this nature utilized the Satorra-Bentler scaled chi-square difference test (Muthén & Muthén, 1998- 2012). In both cases, the results indicated that the constrained model has significantly worse fit with the data than the unconstrained measurement model: obsessive passion and job involvement ($\Delta\chi^2_{(1)} = 118$, $p < .001$); and, affective commitment and job satisfaction ($\Delta\chi^2_{(1)} = 262$, $p < .001$).

Table 1
Correlation matrix of the constructs.

		α	CR	AVE	1	2	3	4	5	6
1.	Obsessive passion	.80	.80	.57	1.00					
2.	Job pride	.89	.89	.74	.41	1.00				
3.	Affective commitment	.85	.85	.49	.39	.34	1.00			
4.	Job satisfaction	.85	.93	.66	.32	.28	.79	1.00		
5.	Job involvement	.88	.88	.61	.79	.43	.50	.41	1.00	
6.	OCB	.77	.78	.54	.20	.27	.34	.31	.22	1.00

All values significant ($p < .001$); α = Cronbach alpha.

Table 2
Structural model comparisons.

	χ^2	*df*	CFI	TLI	RMSEA	SRMR	AIC
Model 1	870	234	.93	.92	.05	.04	55,868
Model 2	979	257	.92	.91	.06	.05	61,857
Model 3	1419	263	.88	.86	.07	.09	62,341

In addition to this analysis providing support for discriminant validity, this is generally not viewed as a concern when correlation levels are below the .85 level (Kline, 2005). These results lessened the concern for discriminant validity issues, and the measure model was retained for use in the structural model analysis.

3.2.3. Structural model analysis

The structural model was assessed while accounting for whether the respective leagues were currently in season. Due to the possibility that employees could be more passionate and prideful about their jobs, and more committed and cognitively involved when their teams are actively competing, a dummy variable for this aspect (in-season 1; off-season 0) was also included. Consistent with the measurement model, the results of the hypothesized structural model also indicated acceptable fit with the data ($\chi^2 = 870$, $df = 234$, CFI = .93, TLI = .92, RMSEA = .05, SRMR = .04, AIC = 55,868). After determining acceptable fit for the hypothesized model (Model 1), two alternative models were also considered (see Table 2). The first comparison (Model 2) assessed Vallerand, Ntoumanis et al.'s (2008) proposition that in certain situations passion may be an antecedent of the pride construct. Model 2 therefore specified obsessive passion leading directly to job pride, which in turn predicted all of the remaining constructs. However, as results from this model indicated worse fit with the data for all of the model fit indices ($\chi^2 = 979$, df = 257, CFI = .92, TLI = .91, RMSEA = .06, SRMR = .05, AIC = 61,857), Model 1 was retained. The second comparison assessed the potential for organizational citizenship behavior being more distal from the effects of passion and pride, and stemming directly from the attitudinal variables of commitment, satisfaction, and involvement (e.g., Organ & Ryan, 1995; Rich, Lepine, & Crawford, 2010). Model 3 therefore specified obsessive passion and job pride both predicting affective commitment, job satisfaction, and job involvement, which in turn all predicted organizational citizenship behavior. However, as the results from this analysis also indicated worse fit with the data ($\chi^2 = 1419$, $df = 263$, CFI = .88, TLI = .86, RMSEA = .07, SRMR = .09, AIC = 62,341), Model 1 was therefore retained as the final structural model. Fig. 2 displays the results of the final structural model with the standardized path coefficients listed next to each of the hypothesized relationship paths. Contrary to expectations, all of the hypothesized relationships between obsessive passion and the outcomes (Hypotheses 2a–d) indicated a significant positive association rather than a nonsignificant or negative relationship. However, the results did support the hypothesized positive relationships between job pride and all of the specified outcomes in the model (Hypotheses 3a–d).

4. Discussion

This study sought to investigate the extent to which passion and pride are associated with key employee outcomes in the professional sport environment. The results of the structural equation modeling analysis indicate that both passion and pride are significantly related to affective organizational commitment, job satisfaction, job involvement, and organizational citizenship behaviors. However, the most notable finding of the current investigation is that obsessive passion had a positive relationship with these outcomes, as previous research has generally shown this construct to be unrelated (or negatively related) to positive consequences in the workplace (e.g., Forest et al., 2011; Ho et al., 2011; Trepanier et al., 2014).

As the literature suggests that passion is the result of how an activity is internalized into the self-concept (Vallerand et al., 2003), one explanation for the current findings is that passion is somehow internalized in a different manner within the professional sport setting. The dualistic approach outlined above proposes that a passion which is internalized though free acceptance and without perceived contingencies (i.e., harmonious) will in turn lead to positive outcomes. Therefore, rather than perceiving interpersonal or intrapersonal expectations as a contingency, obsessive passion in the present context might instead be internalized in an autonomous fashion. That is, the "strong and uncontrollable urge" (Belanger et al., 2012, p. 2) to take part in work activities may be more freely accepted by employees working in the sport environment. One explanation could be that the team environment of the current study might facilitate free acceptance of interpersonal pressures, as reliance on others is a standard aspect of team dynamics. For example, it could be that many sport employees have sporting backgrounds that have conditioned them to view pressure from their work teams as standard operating procedure, or perhaps even something that they welcome in relation to an interest and background in competitive sport. Future research should therefore focus on the specific sporting backgrounds of employees as one possible explanation for obsessive employee passion having a positive influence in this setting.

The manner in which work activity is internalized could also be related to sport employees having irrational perspectives (Taylor et al., 2008) and high levels of attraction to the industry (Todd & Kent, 2009). For example, an elevated attraction toward working in professional sport could in turn manifest into more freely accepting an impulse to partake in work activities (e.g., Belanger et al., 2012). In a similar way, it could be that motivations found in the sport volunteer literature such as sharing contextual expertize (Allen & Shaw, 2009; Fairley, Kellett, & Green, 2007) and sharing a connection to the sporting

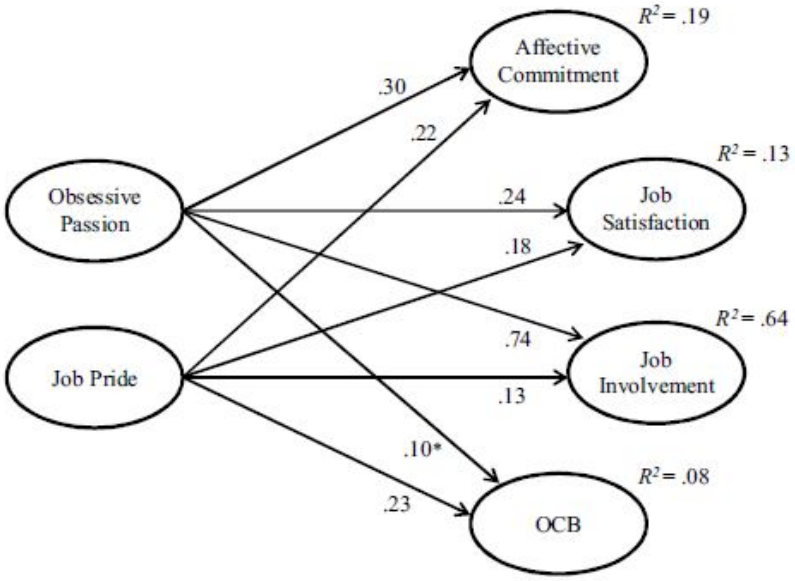


Fig. 2. Final structural model.
Note. All parameter estimates significant at $p < .001$, unless otherwise indicated ($^*p < .05$).

events and the overall mission itself (Filo, Funk, & O'Brien, 2009), may also play a role for those who have jobs in the sport industry. Future qualitative inquiry might play a pivotal role in identifying reasons why a sense of volition and personal approval (e.g., Vallerand et al., 2010) may be operating in place of the controlled internalization normally associated with obsessive passion.

The sport component of the present environment provides another possible explanation for obsessive passion's positive influence. Whilst this construct is generally not associated with positive outcomes, one exception to this trend is in the context of sport participation. Recognizing that passionate athletes often excel in their chosen sports, Vallerand, Mageau et al. (2008) proposed that dedication (e.g., practice) may play a significant role in linking obsessive passion to performance level. Deliberate practice refers to engagement in highly structured activities with the clear goal of improving on related tasks, and previous research in various domains has indicated its significant influence on performance (Vallerand, 2010; Vallerand, Mageau et al., 2008). In two studies utilizing basketball, water polo, and synchronized swimming participants, Vallerand, Mageau et al. (2008) found obsessive sport passion to have a positive influence on deliberate practice, which in turn led to higher levels of performance approach, mastery goals, and performance attainment. As the professional sport context is saturated with participation examples and high-level performance, this atmosphere may be more conducive to positive outcomes from obsessive passion. With a constant focus on team performance, it's possible that a sports *participation* mindset is present in this particular workplace environment which enables positive outcomes for obsessively passionate employees.

Viewing sport employee mentalities in this way, it could be that an obsessive mentality towards work may be a normative component of the organizational cultures and internalized more freely in this setting. An uncontrollable sense of excitement may be derived from working in this atmosphere, but internalized autonomously and welcomed by those who are can strongly relate to sports participation. As the primary objective of these organizations is to enable success in the competitive arena, employees may readily accept associated pressures as a normative aspect of the environment. Future research should investigate this mentality more fully, and also consider the role of deliberate practice in this process.

The concepts which are reflected in the obsessive passion survey items may also be instructive when considering this positive influence further. These questions relate to employees being emotionally reliant on their jobs, experiencing obsessive feelings about work, and having difficulty imagining life without their current occupation. The notion that emotional significance can serve as a positive force is consistent with Todd and Kent's (2009) research on social identity and sport employees. Underscoring the emotional significance attached to membership in high profile status groups (e.g., Tajfel, 1981), these authors proposed that working in sport can engender psychological fulfillment which leads to organizationally relevant attitudes and behaviors. As they referred to this concept as a *positive* social identity derived from increased levels of member attraction (Todd & Kent, 2009), a desire to be part of the sport industry might also be associated with unbridled excitement and compelling urges to work in this setting (i.e., obsessive passion) (Vallerand et al., 2003). In addition, the knowledge of belonging to a high profile social group (e.g., professional sport) could indeed become part of an individual's self-concept (e.g., Tajfel, 1981) and therefore make it more difficult to imagine working in a different environment. The relationship between passion and social identity is worthy of further exploration, and the connection between these concepts provides additional perspective on how obsessive passion can have a positive influence in this setting.

The influence of the predictor variables ranged from small to large in effect size (Cohen, 1988) with r-squared values indicating between eight and sixty-four percent of variance explained in the outcomes (see Fig. 2). Of particular note was the strong positive effect of obsessive passion on job involvement, as this construct is not generally found to be associated with task-related concentration (Vallerand, 2010). One basis for obsessive passion being non-conducive to cognitive performance is because ego-invested processes are also involved (Hodgins & Knee, 2002; Vallerand, 2010). Individuals are unable to concentrate due to distracting external factors such as the outcomes and other participants, which only allows for partial investment on the task at hand (Vallerand, 2010). One explanation for obsessive passion being supportive of job involvement in the present case is that a team-focused environment might meld these factors more closely together. With a focus on team outcomes being predominant in this setting, it could be that outcomes related to specific tasks seem less of distraction and simply in line with the main objectives of the organization. Furthermore, a large emphasis on teamwork might also assist in participant cohesion in this environment. Such a factor might therefore lead employees to see other task participants as less of a distraction and more as a useful cog in the overall process. With job involvement's close connection to individual performance and organizational effectiveness (Diefendorff, Brown, Kamin, & Lord, 2002; Lawler, 1992), subsequent research should examine the potential for obsessive passion to play such a significant positive role in other sport settings. As professional sports teams represent only a fraction of the sports industry as a whole, additional inquiry should address this relationship within a variety of other sectors (e.g., manufacturing, and non-profit organizations).

Finally, obsessive passion's relative impact on the outcomes should also be considered. While interpreting the results it should first be noted that some of the positive influence of obsessive passion could in part be due to variance shared with harmonious passion. Future research should therefore look to test the potential for such a circumstance when considering the relative influence of each passion construct. Although the directionality of obsessive passion's influence was indeed a surprise, its magnitude of effect in comparison with pride was also unexpected. Obsessive passion had a larger effect on all of the attitudinal outcomes, with job pride having the greater influence on OCBs only. When comparing meanings between the two predictor variables, it may be that the interpersonal aspects of job pride (i.e., value and admiration) are more relevant for promoting prosocial activities on behalf of the organization (e.g., Marsh et al., 2013). Nevertheless, with pride being a more established predictor of key outcomes such as satisfaction, self-efficacy, and commitment (e.g., Ellemers et al., 2011; Todd & Harris, 2009; Tyler & Blader, 2001) in the mainstream literature, obsessive passion's significant influence in the professional sport setting whilst accounting for job pride is notable.

5. Limitations, future directions, and concluding comments

As directions for future research are considered, limitations of the current study should also be noted. The cross-sectional design of present research does not account for any differences in data which may occur over time, nor does it allow for conclusions to be made regarding causality. Future studies should therefore consider multiple data collection points to address this issue, especially as these might identify any nuances due to the seasonality of professional sport. As customary in the literature, the measurement model and structural model were also analyzed using the same sample. Whilst the current data had representation across five major sports leagues, cross-validation with alternative samples from various geographical regions is also recommended for future research. In addition, a major limitation to the current investigation is that the abbreviated harmonious passion scale did not satisfy the statistical criteria necessary for inclusion in the structural equation analysis. Use of the extended passion scale is therefore recommended for future studies to potentially mitigate this circumstance, and provide increased understanding of how the dualistic model of passion operates within the sport workplace environment.

Based on the present findings, future employee studies should also consider the sport participation literature for constructs associated with the development of passion and pride. For example, Vallerand et al. (2006) found the value participants place on their respective sports to be a strong predictor of both obsessive and harmonious passion. Subsequent research may wish to consider previous work in the sport management literature incorporating sport-specific attitudes (e.g., Trail, Robinson, Dick, & Gillentine, 2003) and investigate how passion towards sport in general may also play a role in this process. Utilizing the internalization framework of the dual model of passion, Vallerand et al. (2006) also found evidence for personality orientation (autonomous and controlled) being predictive for both forms of passion. Future employee research may therefore contemplate how other personal characteristics such as background and experience (e.g., Swanson & Kent, 2014) might play a role in this process.

Other factors in the sport context previously viewed as antecedents of pride such as industry prestige (e.g., Todd & Harris, 2009) and team success (e.g., Decrop & Derbaix, 2010) should also be considered for future research in this area. In addition, future studies may wish to consider how sport related concepts such as "basking in reflective glory" (BIRGing) (Cialdini et al., 1976, p. 366) and team identification (Wann, 1997) might be related to passion and pride for professional sport employees. For example, while the current sample included employees working for organizations with both successful and unsuccessful sports teams, a perceived association with the celebrity participants might still serve as a catalyst for increasing employee levels of passion and pride. Fandom in the workplace (e.g., Swanson & Kent, 2015), where sport employees can identify with their organization's affiliated sports teams, might also be a factor in relation to how passionate and prideful employees are about their work.

While the current investigation conceptualized and measured pride as a unidimensional construct (e.g., Boezeman & Ellemers, 2007; Boons, Stam, & Barkema, 2015; Smith and Tyler, 1997) as is a common approach in the literature, it is also

worth noting that other scholars have viewed pride from a multidimensional perspective. For example, Tracy and Robbins (2007) view the concept of pride to consist of two different types; authentic and hubristic. According to the authors, authentic pride is associated with accomplishment and confidence, whereas hubristic pride has a narcissistic element relating to arrogance. Future research on employee pride in the sport industry should therefore look to also consider the role that these more specific types of passion might also pay in the sport environment.

As the current study incorporated only positive outcomes, additional research is needed which considers the potential for negative outcomes of passion and pride. Despite the positive effects found in this research, the literature generally indicates that obsessive passion is related to negative outcomes such as rigid persistence, burnout, and life conflict which might be especially relevant in the sport environment (Vallerand, 2010). For example, Vallerand, Ntoumanis et al. (2008) found that obsessive passion in sports fans to be predictive of negative consequences such as hate towards opponents, mocking the supporters from rival teams, and partner relationships conflict. The stream of research relating to work-family conflict in sport (e.g., Dixon & Bruening, 2007) may be especially relevant to consider in terms of its relationship with obsessive passion in the workplace. As pride has also been associated with organizational failure and antisocial behavior when conceptualized in relation to narcissism (e.g., Bodolica & Spraggon, 2011), additional consideration is also warranted for negative outcomes of this construct as well.

When considering the positivity indicated in the current study, attention should also be given to employee levels of obsessive passion. Rather than obsessive passion being more positive in the sport workplace setting then elsewhere, it could instead be that the threshold for creating negative outcomes is simply pushed further along the continuum. Obsessive passion could therefore also have a nonsignificant (or negative) relationship with positive outcomes in the sport workplace that does not manifest until the level exceeds a certain threshold. That is, while being passionate about one's craft could be a normative aspect of high achievement levels in sport, it may not be until sport employees become excessively passionate about their work that negative consequences materialize. Similar consideration is also needed in relation to job pride, as it could be that going beyond an optimal range will instead lead to negative outcomes. Employees who feel unrealistically important or overly preoccupied with their own status could in turn become unconducive for teamwork and organizational performance objectives. For individuals operating at a below-optimal level of obsessive passion, however, one potential implication would be for managers in this setting to emphasize the exciting and self-esteem enhancing aspects (e.g., Vallerand et al., 2003) of employment, which could in turn enhance the cognitive involvement levels of these individuals. Future research is therefore needed to look at how passion and pride levels may impact organizational outcomes across different work settings. It should also be considered whether organizations would be better off targeting passionate and prideful individuals in their recruiting efforts, or instead focus on augmenting these emotional factors through human resource initiatives after employment. Additional managerial implications include determining an appropriate balance between focusing on normal dispassionate business objectives versus leveraging the emotional aspects that sport can offer.

Finally, the results of the current study provide support for Todd and Kent's (2009) proposition that the sport industry contains areas of distinction in relation to employee psychology. While the literature generally indicates that individuals who are obsessively passionate about an activity "cheat themselves out of some important positive outcomes" (Vallerand, 2010, p. 182), the findings here suggest this not to be the case for key organizational outcomes in the sport workplace. These findings provide the first empirical evidence that passion and pride play significant roles in fostering sport employee commitment and satisfaction, cognitive involvement, and voluntary behaviors which are beneficial to the organization (e.g., Todd & Kent, 2009). Managers should therefore look to incorporate passion and pride building capacity into their organizational objectives, as these integral components of sport participation also appear useful for individuals working in sport. As sport management scholars have noted the importance of establishing distinct aspects of our discipline (e.g., Chalip, 2006; Slack, 1996), the role of emotion in the sport workplace represents another productive avenue toward realizing this potential.

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I hereby declare that I have edited the language of the thesis

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