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The Professional Commitment of Actuaries

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Abstract

This study examines the nature and outcomes of the professional commitment of actuaries. The affective and continuance levels of professional commitment among actuaries are high. Overall, actuaries are more committed to their profession than to their employing organisations. Actuaries who have a high affective commitment to their profession and/or professional association are likely to have become involved in their profession recently and intend to remain in the profession for the foreseeable future. The overall professional-organisational conflict level for actuaries is very low. The outcomes of an increased professional-organisational conflict are seen in an increased intention to leave the profession and/or professional association. Findings of this study have implications for the actuarial profession, employers of actuaries and the actuarial professional associations.

Keywords: commitment, affective, continuance, actuary, profession, professional association, involvement, turnover, conflict.

Table of Contents

List of Tables vi
List of Figures vii
1 Introduction 1
2 Literature Review 5
2.1 An introduction to commitment 5
2.2 A two-component model of commitment 7
2.3 Use of studies from related professions 8
2.4 The relationship between commitment to the profession and commitment to an employing organisation 9
2.5 Professional-organisational conflict 10
2.6 Identifying with the profession 14
2.7 Outcomes of professional commitment 15
3 Hypotheses to be tested 19
4 Methods 20
4.1 Research participants 20
4.2 Data collection procedures 27
4.3 Data collection instruments 31
4.4 Data analysis 35
4.4.1 Final scales 35
4.5 The reliability of survey data 57
4.6 Multiple testing problem 60
4.7 Comparison of methodology to similar studies 61
5 Results 62
5.1 Scales used 62
5.2 Analyses of scales 70
5.3 Testing the hypotheses 78
5.4 Regression model results 85
6 Discussion 87
6.1 The nature of actuaries' commitment to the profession 87
6.2 Hypothesis tests 92

6.3 The profession versus the professional association 99
7 Conclusion 102
7.1 The nature of actuaries' commitment to the profession 102
7.2 Hypotheses tests 103
8 Recommendations 104
9 References 107
10 Appendices 116
10.1 Consent form: Interview 116
10.2 Understanding the commitment of South African actuaries to their profession: interview guide 118
10.3 Understanding the Commitment of South African Actuaries to their Profession: Questionnaire 119
10.4 Understanding the Commitment of South African Actuaries to Their Profession: Results to Discuss With Focus Group 133
10.5 Consent form: Focus Group 136

List of Tables

Table 1: Gender profile of participants 21
Table 2: Age profile of participants 21
Table 3: Racial profile of participants 22
Table 4: Questionnaire respondents by category 28
Table 5: A distribution of responses to the professional commitment questionnaire 38
Table 6: Initial factor loadings 39
Table 7: Factor loadings after removal of ACPQ1 40
Table 8: The coefficients of the final regression model of SATn 56
Table 9: The eigenvalues obtained for each respective scale 63
Table 10: Cronbach's Alpha Coefficients obtained for each respective scale 63
Table 11: A summary of the average scale values from the current study and from Bagraim (2003) and Bagraim & Fitzmaurice (unpublished) 70
Table 12: An age-band comparison of the scale values 71
Table 13: A gender comparison of the scale values 73
Table 14: An age-band and gender comparison of the scale values 74
Table 15: The p-values of the age-band and gender comparison of the scale values 75
Table 16: A comparison of the scale values by race 76
Table 17: The p-values of the comparison of the scale values by race 77
Table 18: The correlation matrix of the scales 78
Table 19: The t-test statistics that will be used to test the correlation between the items in the table 81
Table 20: The results of the hypotheses tests 82
Table 21: The final regression models of the scales 85
Table 22: Conclusion on the hypotheses tested 103

List of Figures

Figure 1: The distribution of participants by type of employer 23
Figure 2: The gender and racial profile of the South African population, FASSA designation holders, questionnaire participants and ASSA Council members 24
Figure 3: The gender and racial profile of FASSA designation holders, questionnaire participants, members of ASSA operational boards and chairs of ASSA operational boards 25
Figure 4: The gender and racial profile of FASSA designation holders, questionnaire participants, members of ASSA committees and chairs of ASSA committees 26
Figure 5: Eigenvalues graph 39
Figure 6: The variance inflation factor of the explanatory variables of the South Africa turnover intentions.....45
Figure 7: Diagnostic plots of the final regression model of SATn 57

1 Introduction

In order for the South African actuarial profession to keep growing and remain relevant within the diverse South African society it serves, it is important that we understand the nature of how South African Fellows relate to their profession and how this relationship is influenced by their relationship with their employing organisations and professional associations. This study focuses on the commitment of actuaries to their profession and how their professional commitment influences their intention to remain in the profession and to participate actively in the profession. Understanding professional commitment is important as it helps us to understand how people manage different commitments in their lives including their professional commitment (Meyer, Allen & Topolnytsky, 1998).

In order for individuals to refer to themselves as being actuaries, they need to be registered with an actuarial professional association that has the power to bestow such a designation. Most actuaries in South Africa once obtained their Fellowship qualifications from either the Institute of Actuaries or the Faculty of Actuaries in the United Kingdom (Naidoo, 2008). In 2010 the Actuarial Society of South Africa (ASSA) started offering its own professional qualification (Ramjee, Mokonyane & Bagraim, 2014). Since the introduction of the South African professional qualification, most South African employers actively encourage their actuarial employees to obtain this qualification and to be members of ASSA. In May 2013 there were 985 registered and active members of the Actuarial Society with the designation Fellow of the Actuarial Society of South Africa (FASSA). ASSA has few employees and relies heavily on volunteers to conduct its business as a professional association. As such, it is important for ASSA and the profession for its members to choose to spend their time on ASSA- and profession-related work over other things that are competing for their limited time.

The most significant contact between the profession and its members is through the completion of professional qualifications, representing an important socialisation process including that of exposure to the profession's values, expectations, ethical requirements, and responsibilities (Hall, Smith & Langfield-

Smith, 2005). After undergoing this rigorous qualification process, it is important to understand the nature of actuaries' professional commitment and if there are any outcomes that result from or are related to their professional commitment.

Understanding professional commitment is important because of its potential link to retention, – in terms of both professional and organisational (employer) membership (Lee, Carswell & Allen, 2000). Over the past few decades, the actuarial profession has seen some competitive challenges from other professions in performing work that had traditionally been seen as being the exclusive preserve of members of the actuarial profession (Ramjee, Mokonyane & Bagraim, 2014). It is arguable that this has led the actuarial profession to lose some of its membership to its competitor professions. An example of such work is in the retirement funding industry where actuarial professionals were almost exclusively relied upon to determine the required contribution levels and appropriate asset classes for pension funds to invest in.

As professionals are integrated into their employing organisations, the ability of some of them to remain impartial and to protect the public interest may become questionable. This can become a concern when professionals are more committed to their employing organisation than to their profession. Gunz & Gunz (2007) argued that very few financial scandals that the world was experiencing at the time, they wrote, could have been executed without the active assistance of willing professionals. In an earlier paper, Gunz & Gunz (2002) explained that professionals were hired not only for their technical expertise but also for their moral leadership. According to ASSA's code of professional conduct, members of ASSA, including actuaries, are supposed to act honestly, with integrity, competence and due care, and in a manner that fulfils the profession's responsibility to the public. Maintaining a strong professional commitment may be expected to assist actuaries in complying with their code of professional conduct and, therefore, not allowing financial misconduct to occur under their watch.

The actuarial profession in South Africa is making efforts to diversify its membership in order to reflect the racial and gender demographics of South Africa. The South African Actuaries Development Programme and the Association of South African Black Actuarial Professionals (ASABA) were founded in 2003 and 2005 respectively to meet this objective (Association of

South African Black Actuarial Professionals, 2013; Naidoo, 2008; South African Actuaries Development Programme, 2013). However, the representation of women and Black actuaries within the profession is low. This study examines whether the nature and outcomes of professional commitment of FASSA members differ based on their gender and race in order to increase the chance of success of the current efforts to diversify the profession.

The study answers the following question:

"What is the nature and outcome of the commitment of actuaries to their profession?"

Commitment to many other entities could potentially influence the professional commitment of actuaries. Such entities include an actuary's family, friends and hobbies. This study focuses only on the commitment of actuaries to their profession, employing organisations, professional associations and country.

This study is based on Fellows of the Actuarial Society of South Africa, i.e. FASSA designation holders, who are active members of ASSA and have, therefore, not resigned their FASSA membership or allowed it to lapse. They are referred to as actuaries or Fellows in the rest of this study. Some actuaries included are members of other professional associations in addition to their ASSA membership, and/or they are practising their profession outside the borders of South Africa. The actuaries included in this study do not have to be South African nationals. There is an Associate class of actuaries who are members of ASSA and hold the designation of being Associate Members of the Actuarial Society of South Africa (AMASSA). AMASSA members made up 5% of the total number of actuaries registered with ASSA in May 2013. They are not included in this study. It is important to note that there are some actuaries who work in South Africa but are neither FASSA nor AMASSA designation holders, and they will, therefore, not be included in this study.

The chapters below explore the research question, with chapter two reviewing the literature that defines the concept of professional commitment and introducing the commitment model that is used in this study. The literature review also explores the likely outcomes of professional commitment and chapter three introduces hypotheses to be tested. The methods employed in collecting and analysing data for this study are described in chapter four. Chapter five presents

the results. Chapters six and seven discuss these results and make conclusions respectively while recommendations from this research are made in chapter eight.

2 Literature Review

The literature review explores past studies that are relevant to answering the research question of the current study. For presentation purposes, this section starts off by introducing the concept of commitment and how it applies to the profession and other entities. A model of commitment that will be used for this study is chosen and the need to rely on studies from professions that are related to the actuarial profession is explained. The relationship between professional and organisational commitment for a professional is introduced and how the professional can experience conflict when they perceive that the intentions of both entities diverge while they find themselves having to manage this conflict. The notion of being able to identify with the profession in order to commit to it is explored later in this section. Finally, the possible outcomes of professional commitment are explored. Of particular interest is the intention to remain in the profession and getting involved within the profession.

2.1 An introduction to commitment

This chapter introduces and defines the concept of commitment to an entity. Early studies on commitment focused on defining organisational commitment and adapting this definition to professional commitment (Meyer, Allen & Smith, 1993, Aranya & Ferris, 1984). The terms ‘profession’, ‘occupation’ and ‘career’ have been used somewhat interchangeably in the literature (Meyer, Allen & Smith, 1993; Lee, Carswell & Allen, 2000). In the current study, the term profession will be used because the study deals with professionally-registered actuaries, i.e. FASSA designation holders. Professional identity is one of the possible substitutes for organisational identity (Baruch & Cohen, 2007). For this reason, one might expect conflict between professional and organisational identity for a professional who might have to choose between the two.

Meyer & Allen (1991) conceptualised a three-component framework of organisational commitment where commitment is a psychological state that (a) characterises the employee’s relationship with the organisation, and (b) has implications for the decision to continue or discontinue membership in an

organisation. The Meyer & Allen (1991) components of organisational commitment are defined as follows:

"Affective commitment refers to the employee's emotional attachment to, identification with, and involvement in the organisation. Employees with a strong affective commitment continue employment with the organisation because they ***want*** *to do so.*

Continuance commitment refers to an awareness of the costs associated with leaving the organisation. Employees whose primary link to the organisation is based on continuance commitment remain because they ***need*** *to do so.*

Finally, normative commitment reflects a feeling of obligation to continue employment. Employees with a high level of normative commitment feel that they ought to remain with the organisation" (p. 67).

Subsequently, Meyer, Allen & Smith (1993) extended this model to professional commitment as is shown below and finally Meyer & Allen (1997) generalised it to any entity with which one had a psychological relationship. For professional commitment, the Meyer, Allen & Smith (1993) three-component framework of professional commitment describes commitment as a psychological state that (a) characterises the professional's relationship with the profession, and (b) has implications for the decision to continue or discontinue membership of a profession. The components of professional commitment are defined as follows:

- Affective commitment refers to the professional's emotional attachment to, identification with, and involvement in the profession. Professionals with a strong affective commitment continue membership with a profession because they want to do so.
- Continuance commitment refers to an awareness of the costs associated with leaving the profession. Professionals whose primary link to the profession is based on continuance commitment remain because they need to do so.
- Finally, normative commitment reflects a feeling of obligation to continue professional membership. Professionals with a high level of normative commitment feel that they ought to remain with the profession.

Applying the definition of affective professional commitment given above to the actuarial profession suggests that actuaries with a strong affective commitment towards the actuarial profession will have an emotional attachment to the profession, identify with the profession and will subsequently be involved in the profession. For continuance professional commitment, the costs associated with leaving the actuarial profession include, but are not limited to, the loss of job and financial security and the loss of the social status of being associated with the actuarial profession. Normative professional commitment may arise from all the hard work, time and sacrifices put in towards obtaining the actuarial Fellowship qualification. The definitions of all three components of commitment suggest that an actuary with a strong level of commitment in at least one component of commitment will choose to remain in the actuarial profession (Meyer & Allen, 1991).

Lee, Carswell & Allen (2000) defined professional commitment as:

"a psychological link between a person and his or her profession that is based on an affective reaction to that profession. A person with strong professional commitment will more strongly identify with, and experience more positive feelings about, the profession than will one with weak professional commitment. This emotional connection that the person feels with the profession has implications for various work behaviours and, importantly, for whether the person wants to remain in the profession" (p. 800).

Two of the outcomes of professional commitment referred to in the definition of professional commitment in Lee, Carswell & Allen (2000) and Meyer, Allen & Smith (1993) are discussed in this study, viz. the actuary's professional involvement and the actuary's intention to remain in the actuarial profession.

2.2 A two-component model of commitment

Ko, Price & Mueller (1997) found the third dimension of commitment (normative commitment) in the three-component model of Meyer, Allen & Smith (1993) to be too closely correlated with affective commitment to be regarded as a separate dimension. This suggests that all the hard work, time and sacrifice put in towards obtaining the actuarial Fellowship qualification, which may strengthen normative commitment to the profession, may also strengthen affective commitment to the

profession. This further suggests that the use of a two-component model of commitment is appropriate for a study of actuaries and that the third dimension should be dropped. Solinger, van Olffen & Roe (2008) argued against the use of the three-component model of commitment of Meyer, Allen & Smith (1993) to explain an individual's commitment to any entity, explaining that it combined attitudinal experiences that were fundamentally different. They argued further that affective commitment was the best way to explain commitment as it described an individual's attitude towards an entity, while continuance commitment and normative commitment were attitudes regarding specific forms of behaviour, i.e. staying or leaving. They further contended that the three-component model was a model for predicting turnover and that using it for other purposes would be inappropriate. Snape, Wing-hung Lo & Redman (2008) supported the cross-cultural validity of the three-component model after testing the model using samples of British and Chinese accountants.

Based on the above, this study uses a two-component model of the commitment scale of Meyer, Allen & Smith (1993) to model the nature and outcomes of the profession commitment of actuaries.

2.3 Use of studies from related professions

A review of the literature reveals that little research has been done to examine the commitment levels of actuaries to their profession, employing organisations, professional associations or country. A professional association in this study is taken to be a formal group of practitioners in a given profession (McCroskey & O'Neil, 2010). To date, Bagraim (2003) and Bagraim & Fitzmaurice (unpublished) are the only studies found to focus explicitly on actuaries. Bagraim (2003) found high levels of affective and continuance professional commitment among South African actuarial professionals.

Membership of the accountancy profession has professional requirements similar to those of the actuarial profession. These include the requirement of passing board examinations in order to hold a professional designation, being a member of a professional association in order to use the designation of Chartered Accountant or Fellow of the respective professional association, upholding the ethics and norms of the profession, and complying with continuous professional

development requirements of the respective professional association (Actuarial Society of South Africa, 2013; South African Institute of Chartered Accountants, 2013). There are more studies on commitment focussing on accountants that could assist in this study than there are studies which focus on actuaries. Based on the above, the literature relative to accountants is relied upon in this study. The literature based on professionals such as lawyers and doctors, among other professionals, is, however, also used.

2.4 The relationship between commitment to the profession and commitment to an employing organisation

Actuaries practise their skill mostly within their employing organisations. Professional commitment is a critical career attitude that interacts over time with professionals' attitudes toward their employing organisations, influencing organisational commitment (Chang & Choi, 2007). Bryant, Moshavi & Nguyen (2007) in their study found that professional commitment correlated significantly with affective organisational commitment.

Understanding the nature and outcomes of professional commitment enables us to understand how people manage different commitments in their lives alongside their professional commitment (Meyer, Allen & Topolnytsky, 1998), and this should provide insight especially during stressful times. For example, individuals choose to redirect their emotional energies toward the profession to which they belong during times when employers undergo extensive organisational changes such as mergers, acquisitions and retrenchments (Meyer, Allen & Topolnytsky, 1998). This enhances the affective professional commitment levels and reduces the affective organisational commitment levels of the individual.

According to Eisenberger, Huntington, Hutchison & Sowa (1986) and Krishnan & Mary (2012), employees assess the extent to which their organisations care for and value their professional contribution. This belief, called perceived organisational support, can be viewed as the organisation's commitment to the individual or employee. The authors explain further that employees who have high perceived organisational support are likely to increase their affective commitment to their organisation. Krishnan & Mary (2012) suggested that perceived organisational support was driven mainly by pay level satisfaction,

professional development opportunities, work-family support, leader-member exchange, organisational rewards and job conditions, organisational size and procedural justice. The reaction of employees to these drivers of perceived organisational support depended on their level of professional commitment and involvement, making it necessary for organisations to pay attention to the professional needs and attitudes of each employee (Krishnan & Mary, 2012).

In addition to increased organisational commitment, high employee perceived organisational support has been associated with higher levels of job satisfaction, job involvement and performance. High levels of employee perceived organisational support have also been associated with (1) lower levels of job strain as emotional and material support are perceived to be available when facing high demands at work, (2) a desire to remain with the organisation, in contrast to feeling trapped in an organisation because of the high costs associated with leaving the organisation (continuance commitment), (3) reduced intention to leave the organisation because individuals who receive support from an organisation are more inclined to repay the organisation by remaining in the organisation, and (4) reduced withdrawal behaviour, including lower absenteeism and general lessening of the individual's active participation within the organisation. (Krishnan & Mary, 2012)

As such, an organisation that supports an actuary's professional involvement is likely to be rewarded by employee loyalty, especially with regard to actuaries who are highly committed to and involved in their profession.

2.5 Professional-organisational conflict

Professional-organisational conflict is an inconsistency experienced by employed professionals between the requirements of their employing organisation and their profession (Gunz & Gunz, 2002). When a professional is expected to adhere to organisational norms that are incompatible with their professional norms, such a professional will experience conflict in selecting which norms to follow (Sorensen, 1967). Organisational norms may be expressed in a variety of ways, ranging from formal company regulations and pressure exerted within the managerial hierarchy, to the informal social expectation of organisational loyalty (Brierley & Cowton, 2000).

Professional-organisational conflict was examined in Meixner & Bline (1989). They found that organisational commitment was negatively correlated with professional-organisational conflict. This meant that professionals with high levels of commitment to their employing organisations experienced less professional-organisational conflict when compared to those with lower levels of organisational commitment. The influence of professional commitment in relation to professional-organisational conflict could not be established in the study by Meixner & Bline (1989). The current study will examine professional-organisational conflict and its relationship to the professional and organisational commitment of actuaries.

Maas & Matejka (2009) found that professionals involved in the financial reporting process experienced stress which was related to pressure from management to engage in unethical behaviour, such as the manipulation of reported financial results, which conflicted with professional values such as self-governance and the service of the public interest (Shafer, 2002). Some doctors treat patients and also manage staff. They have to manage their professional (clinical) role and their managerial role which may conflict, especially where management decisions, driven by cost reduction and organisational efficiency, may be seen by some hybrid clinician managers as compromising the quality of delivering patient care and conflicting with their professional values (Kippist & Fitzgerald; 2009). Other professionals who face professional-organisational role conflict are open source software developers who are employed in traditional software development firms. Daniel, Maruping, Cataldo, & Herbsleb (2011) discussed the ideology of open source software placing value on sharing knowledge, peer review, collaboration, and user input which are values that may conflict with the more rigid, and process-oriented structure in a traditional software development firm, where the focus is on intellectual property rights, competition and individualism. Actuaries working at non-traditional actuarial organisations, such as banks and investment firms, are expected to experience similar conflicts in their professional and organisational roles. This is due to the professional ethics and norms of the actuarial profession being mostly integrated into the ethics and norms of the traditional employers of actuaries, such as insurance and reinsurance companies, and reflects the influence that traditional employers have had on the founding and evolution of the ethics and norms of the

profession which non-traditional employers were not necessarily a part of. The current study explores this further.

Brierley & Cowton (2000) and Aranya & Ferris (1984) found that the perceived professional-organisational conflict of accountants reduced as their seniority within the organisation increased. They argue that partners in accounting firms may tend to experience less professional-organisational conflict than other staff members do. Partners' length of service in the accounting profession and the organisation may be reflected in their ability or effort to reconcile conflicting demands, and they may have been socialised into the company culture leading to higher affective organisational commitment and less inclination to leave the organisation. Furthermore, partners have more at stake than employees on any other organisational level. The studies by Wallace (1993) and Kalbers & Cenker (2007) support these results. Based on this, the more senior an actuary is within the employing organisation, the less professional-organisational conflict the actuary is expected to experience. This relationship is examined in the current study.

Individuals may choose to resolve professional-organisational conflict by identifying with one role only and behaving in accordance with that role, i.e. choosing between an employee role and a professional role (Lui, Ngo & Tsang, 2001). Daniel, Maruping, Cataldo, & Herbsleb (2011) argued that when individuals identified with a group, they created psychological in-groups and out-groups. Professionals may identify more strongly with their profession than with their employing organisations, and this could create conflicts between professionals and the expectations of their organisations regarding their behaviour (Johnson, Morgeson, Ilgen, Meyer & Lloyd, 2006). Employers strive to maximise their employees' commitment to their organisation by enhancing employee integration within the organisation, upward job mobility, participation in decision making and the perceptions of the legitimacy of the authority structure (Wallace, 1995). Wallace (1995) argued that these act as incentives that are highly valued by professional workers and they state that they should increase the organisational commitment of such workers.

Another way of managing professional-organisational conflict is by working in an organisation or department where the profession is central to the work done, e.g. joining a public accounting firm if the individual is an accountant (Aranya &

Ferris, 1984). This is due to the organisational norms of such an organisation or department being likely to be more compatible with those of the profession and, therefore, reducing the incidence of professional-organisational conflict. An equivalent way of managing professional-organisational conflict for an actuary would be to practise in an environment where performing or managing a team that performs technical actuarial work at a traditional actuarial employer is the core function of the role. One senior actuary who was interviewed for this research study said, "As you move into executive management, I think there is certainly pressure to become more an executive and less an actuary, which can affect your commitment."

From time to time, professionals experience professional-organisational conflict that is particularly acute by comparison to the situation of other occupational groups because of the moral dimension of the role of professionals (Gunz & Gunz, 2002). Kinnie & Swart (2012) argued that conflict between the desire of the professional to engage in profession-specific training and development and the ability and willingness of their employing organisation to provide this can put strain on the professional's organisational commitment and professional commitment. Lui, Ngo & Tsang (2001) found that professional-organisational conflict had a positive relationship to a professional's propensity to leave the organisation. Furthermore, individuals with a low professional commitment were more likely to quit their jobs when they experienced a high level of professional-organisational conflict compared to those who had a high level of professional commitment (Lui, Ngo & Tsang, 2001). This result may be seen as counter-intuitive but a study by Wallace (1993) puts this result in to perspective where a relatively strong positive correlation between professional commitment and organisational commitment was established. This is supported further by Shafer, Park & Liao (2002) who found that when people experienced higher professional-organisational conflict, they were less committed to their employing organisation and were more likely to intend to leave the organisation. These results combined suggest that it would be in the organisation's interest to ensure that its professional employees were highly committed to their professions, so helping to increase organisational commitment and improve employee retention.

2.6 Identifying with the profession

An important factor in understanding professional commitment relates to whether the professional can identify with the profession or not. Domain (e.g. profession, organisation or professional association) identification occurs when one perceives good prospects in the domain, i.e. one has the interest, skills, resources, opportunities to prosper in the domain and also that one belongs there in the sense of being accepted and valued in the domain (Steele, 1997). When an actuary has the interest, skills, resources, opportunities to prosper in the actuarial profession and feels that he/she belongs there in the sense of being accepted and valued in the profession, he/she is less likely to leave the profession and more likely to become involved in the profession. The study by Steele (1997) found that the domain identification of women and black people could be frustrated by societal pressures, such as gender roles and economic disadvantages. Men and women tend to become involved differently in their domestic and work roles; men are socialized to assume the breadwinner role, whereas women are socialized to carry a major role in the family (Loi, Ngo & Foley, 2004). Given this fact, one might expect the professional involvement and turnover intentions of men and women to differ in the actuarial profession. It was noted that having children was seen as a pause in a career among the younger generation of women actuaries rather than an end to advancement or a career (Bellis, 1996).

Women and black people who are able to identify with the actuarial profession, professional associations and employing organisations face the further barrier of a stereotype threat. Steele (1997) defines stereotype threat as:
"the event of a negative stereotype about a group to which one belongs becoming self-relevant, usually as a plausible interpretation for something one is doing, for an experience one is having or for a situation one is in that has relevance to one's self-definition" (p. 616).

This can result in dis-identification with the actuarial profession. When actuaries do not identify with their profession, professional associations and employing organisations, they are likely to be less committed to these domains and may seek opportunities outside these domains where they have the hope of identifying with their new role and their employing organisation better than with the old one. Professional associations like ASABA are necessary to ensure that

under-represented groups in the South African actuarial profession can still identify with the profession. This can be expected to lead to the better retention and professional involvement of women and black actuaries in the profession.

Clugston, Howell & Dorfman (2000) showed that an individual's cultural socialisation can influence his/her commitment to an entity. This is supported by similar results found in Meyer & Allen (1991) and Gendron, Suddaby & Qu (2009). The socialisation of women and black actuaries in the profession and employing organisations is important in ensuring their retention. The professional (work) commitment levels of men and women might have been expected to differ but this was not the case in a study by Ngo & Tsang (1998). For this particular study, the sample consisted of business executives in Hong Kong and the competitiveness of this business environment combined with the many educational and employment opportunities available to women may explain this result (Ngo & Tsang, 1998). The effect of gender on the nature and levels of commitment is examined in the current study.

2.7 Outcomes of professional commitment

In this section, the behavioural outcomes of professional commitment are discussed as they pertain to actuaries, namely an actuary's intention to remain in the actuarial profession and an actuary's level of involvement in the actuarial profession. Aranya & Ferris (1984) mentions these as behavioural intentions and attitudes that are referred to in the definition of commitment.

2.7.1 Intention to remain in the profession

Morgan, Walker, Wang & Aven (2012) found, in their study, that professional commitment was negatively correlated with the professional's intention to leave his/her profession. This negative relationship was statistically significant. This result supports earlier studies on professional commitment and its effect on professional turnover intention. Earlier studies of this relationship include those by Blau (1985), Meixner & Bline (1989), Blau (1989) and Aryee & Tan (1992) and these found that individuals who were highly committed to their professions were more likely to remain in their professions and not look for alternative professions.

The actuarial profession in South Africa is trying to grow its membership base in order to meet the demands of a growing South African economy and population. Before 1994, black people in South Africa were given inferior Mathematics education compared to the Mathematics education given to white people, making it difficult for black people to pursue an actuarial career. Black people, as well as women, now have a better chance of pursuing an actuarial career, and they represent a potential actuarial resource that was previously untapped. Given this reality, the South African actuarial profession is trying to attract women and black people into the profession and to provide them with a fair chance of finding success in this profession. It is expected that women and black Fellows would show greater commitment to the profession, compared to their peers, as, for them to qualify as actuaries they would have had to overcome the obstacles that remained as a result of previous attempts to keep people who looked like them out of the profession.

Ericsson & Lehmann (1996) found that the highest levels of human performance in different domains can be attained only after about ten years of extended, daily amounts of deliberate practice activities. Employing organisations and professional associations need to retain members in order to benefit from these high levels of performance. Individuals with high levels of affective organisational commitment are less likely to consider leaving their employing organisations (Stallworth, 2004) and can be expected to have the intention of remaining in their profession (Meyer, Allen & Smith, 1993) as well. Dhawan & Mulla (2011) refer to a "war for talent" where organisations compete with one another in order to induce employees to stay by using material rewards and transformational strategies such as leadership development and cultural transformation. Organisations spend large amounts of money using these strategies hoping that they will enhance the employees' commitment to the organisation and, so, their retention within the organisation. The relationship between affective organisational commitment and professional commitment suggests an alternative way for employers to retain their professional staff. Employers who promote or support professional commitment in their organisations may increase the professional's affective organisation commitment, which, in turn, should increase the professional's intention to remain in his/her employing organisation and profession.

The results of a study by Dhawan & Mulla (2011) found that continuance commitment was related to the years of experience one had had in one's organisation or profession. The cost of leaving a profession increases as an individual gains work experience and this reality increasing his/her intention to remain in the profession. It is to be expected that the longer an actuary has been in the actuarial profession, the more likely it is that he/she will have a higher level of continuance commitment to his/her profession.

Based on studies by Chang and Choi (2007) and Bryant, Moshavi & Nguyen (2007), professional commitment is seen as being closely linked to organisational commitment. In their study of fulltime university faculty members in Pakistan, Nawaz and Pangil (2016) could not support the proposition that organisational commitment mediates organisational turnover intention. This is contrary to results from the study by Rubel and Kee (2015) which found that organisational commitment had a significant effect on the turnover intentions of fulltime nurses employed in hospitals across Bangladesh.

2.7.2 Professional involvement

Professional involvement refers to the active participation of members of a profession in the profession beyond compliance with minimum membership standards (Hall, Smith & Langfield-Smith, 2005). The current study examines professional involvement that occurs within and beyond the actuarial professional associations.

Meyer & Herscovitch (2001) argued that both continuance commitment and affective commitment to the profession led to a desire to remain in the profession, but that affective professional commitment also led to professionals engaging in discretionary behaviours in the profession, e.g. performing extra-roles beyond those required to maintain membership. Findings from a study by Meyer, Allen & Smith (1993) suggested that professionals with strong continuance commitment levels may be less inclined to get involved in the profession and are likely to do only the minimum required to retain their membership within the profession. They retain their membership because of the high costs associated with leaving the profession. Hall, Smith & Langfield-Smith (2005) argue that accountants experience relatively high levels of continuance commitment to their profession

owing to perceived high costs associated with leaving the profession, such as loss of status, skills, or rewards. The actuarial profession offers high status and rewards to an individual, and it is a highly skilled profession. It seems reasonable to expect actuaries to experience continuance commitment to their profession in a way similar to that of accountants.

Gendron, Suddaby & Qu (2009) studied the committee volunteering and conference attendance of Canadian accounting professionals in order to determine their level of professional involvement. They found that accounting professionals who volunteered to join professional committees had a higher professional commitment compared to those who did not participate in committee work. This resulted in a significant relationship between professional commitment and professional involvement in their study. Similar results can be expected for actuaries. Actuarial professional organisations rely heavily on volunteers to carry out their day-to-day activities. The introduction of a South African actuarial professional designation has increased this reliance on volunteers to support the actuarial society's education functions because these functions were previously undertaken by the Institute and Faculty of Actuaries. This highlights the importance and need for actuaries to be involved in their profession and professional associations.

3 Hypotheses to be tested

The literature referred to above has shown the importance of professional commitment, its relationship to commitment to several domains and its ability to aid the understanding of professional turnover intentions and professional involvement. Based on this literature, the study tests the following hypotheses:

- Professional commitment is not correlated with professional involvement (H1a);
- Commitment to professional associations is not correlated with professional involvement (H1b);
- Professional commitment is not correlated with professional or professional association turnover intention (H2a);
- Commitment to professional associations is not correlated with professional or professional association turnover intention (H2b);
- Professional involvement is not correlated with professional or professional association turnover intention (H3);
- Professional-organisational conflict is not correlated with professional involvement (H4a);
- Professional-organisational conflict is not correlated with professional or professional association turnover intention (H4b); and
- Professional-organisational conflict is similar at traditional and non-traditional actuarial organisations (H5).

These hypotheses will be tested using responses from actuaries, and the results will be compared with those of similar studies, where possible.

4 Methods

This section describes the methods used in the current study to examine the nature and outcomes of the professional commitment of actuaries. It includes a description of the methods employed for the selection of research participants, data collection procedures, data collection instruments, data analysis and the reliability of the survey data.

4.1 Research participants

The participants of this study are Fellow members of ASSA, the main professional body for actuaries who practise in South Africa. There were three groups of participants. One group participated in interviews, another group completed the questionnaire, and the third group formed part of focus groups that discussed some of the results of this study. Interview and focus group participants were mutually exclusive but were eligible to participate in the questionnaire.

For the interviews, the aim was to interview ten Fellows but one of the ten Fellows did not respond to the invitation to participate and was replaced by another one. This gave a response rate for the interviews of 91%. The interviews were conducted during March and April 2013. The participants were chosen in order to ensure that they represented the demographics of Fellow members of ASSA while balancing this with the need to represent the demographics of the South African population. The main demographics used in this selection were age, gender, race, sector (e.g. academic, consultancy or insurance), level of position at work (e.g. director, senior manager or junior actuary) and city of work.

Once the data had been analysed and the results obtained, five groups of actuaries were invited to participate in a focus group discussion in order to comment on whether some of the results obtained made sense or not. 10 out of the 12 actuaries who were invited participated, giving a response rate of 83%. The focus groups were kept small, with two participants in each, in order to explore the observed results in a comfortable environment. As such, the focus groups were chosen to ensure as much homogeneity as possible based on the age, gender and race of participants. Unless otherwise stated, demographics from the Actuarial Society of South Africa reflect the FASSA membership during 2013 and the

demographics about the general South African population reflect those obtained from the South African 2011 national census (Statistics South Africa, 2011).

The gender profile of the participants is shown below:

Table 1: Gender profile of participants

Gender	Interviews	Questionnaire	Focus Group	FASSA	South Africa
Female	50%	25%	30%	21%	51%
Male	50%	75%	70%	79%	49%
Total	**100%**	**100%**	**100%**	**100%**	**100%**
Count	**10**	**214**	**10**	**985**	**51 770 560**

The gender split for interview and focus group participants was chosen to be close to that of the general South African population. The gender proportions from the questionnaire and ASSA Fellow members in 2013 were relatively close to each other. By 2016, female FASSA members made up 23% of the total FASSA membership (Actuarial Society of South Africa, 2017).

The age profile of the participants is shown below:

Table 2: Age profile of participants

Age	Interviews	Questionnaire	Focus Group	FASSA
20 – 29	20%	17%	20%	13%
30 – 39	40%	42%	50%	49%
40 – 49	30%	25%	30%	27%
50+	10%	17%	0%	11%
Total	**100%**	**100%**	**100%**	**100%**

The 2011 census data from Statistics South Africa split the population age into three age groups, these are “0-14” with 28.1%, “15-64” with 65.4% and “65+” with 6.5%. A distribution was not given for the “15-64” age range. However, a median age of 25 was given for the South African population. For the interviews, questionnaire, focus group participants and the FASSA members, the 30 to 39 age range has the highest concentration of Fellows. The median age of participants involved in the interviews, questionnaire, focus group and FASSA members were

35, 36, 33 and 37 respectively. This is within the median age range of between 30 and 39 years from Bagraim (2003). Although the median age of the South African population was 25, the median age for each race group was 24, 27, 32 and 39 for African, Coloured, Indian & Oriental and White respectively in 2011 (Statistics South Africa, 2011). It is worth noting that the focus groups had the highest concentration of Africans compared to the racial composition of interviews, questionnaire and FASSA members and this came through in the median age of the focus groups being the lowest of all these groupings. Also worth noting is that the median age of White people in South African is close to that of FASSA members and within the median age band of "30-39" which is consistent with the median age band from the interviews, questionnaire, focus group participants and the FASSA members.

The racial profile of the participants is shown below:

Table 3: Racial profile of participants

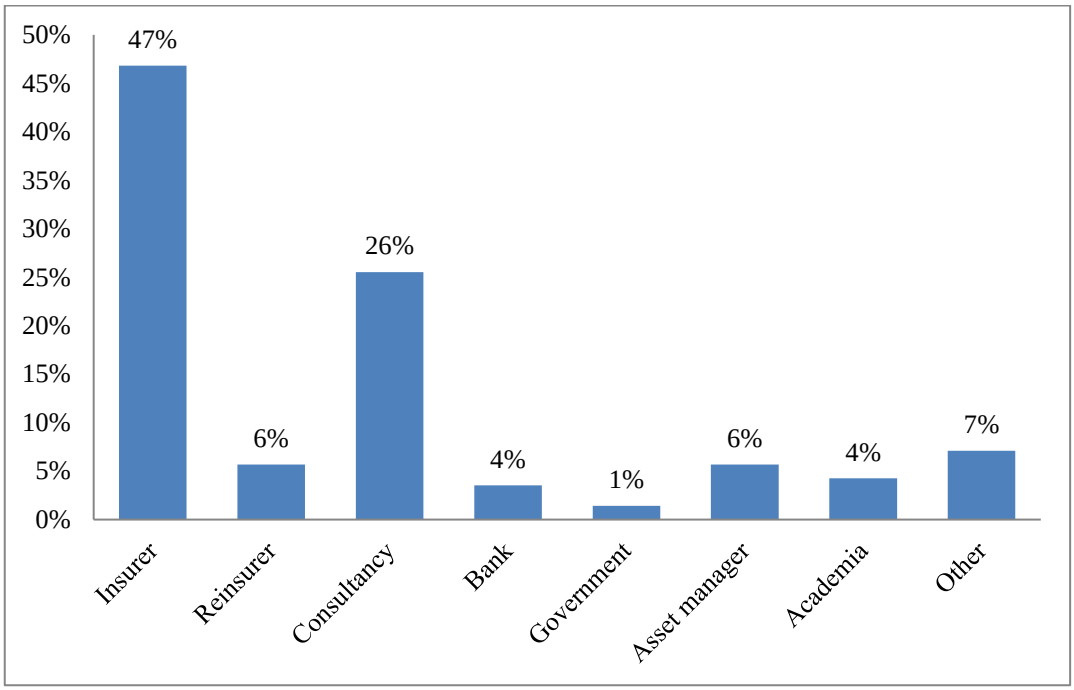
Race	**Interviews**	**Questionnaire**	**Focus Group**	**FASSA**	**South Africa**
African Black	30%	4%	50%	6%	79%
Coloured	10%	1%	0%	1%	9%
Indian & Oriental	10%	7%	10%	9%	3%
White	50%	82%	40%	84%	9%
Other	0%	0%	0%	1%	1%
Prefer not to answer	0%	6%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**

The racial proportions of the participants in the questionnaire are similar to those of ASSA members. When the 2016 racial demographics of FASSA members were released by ASSA, the representation of African Black and Coloured fellows remained stagnant at 6% and 1% respectively and the number of fellows had increased to 1417.

Based on the demographics shown on tables 1, 2 and 3 above and the response rates on the interviews, questionnaire and focus groups, the data collected from the interviews, questionnaire and the focus groups are expected to be a fair representation of the responses of the general ASSA Fellow members.

The participants work for various types of traditional and non-traditional employers of actuaries and hold a variety of positions at work from an entry-level actuary to executive positions. A distribution of the questionnaire participants' employer type is shown in figure 1 below:

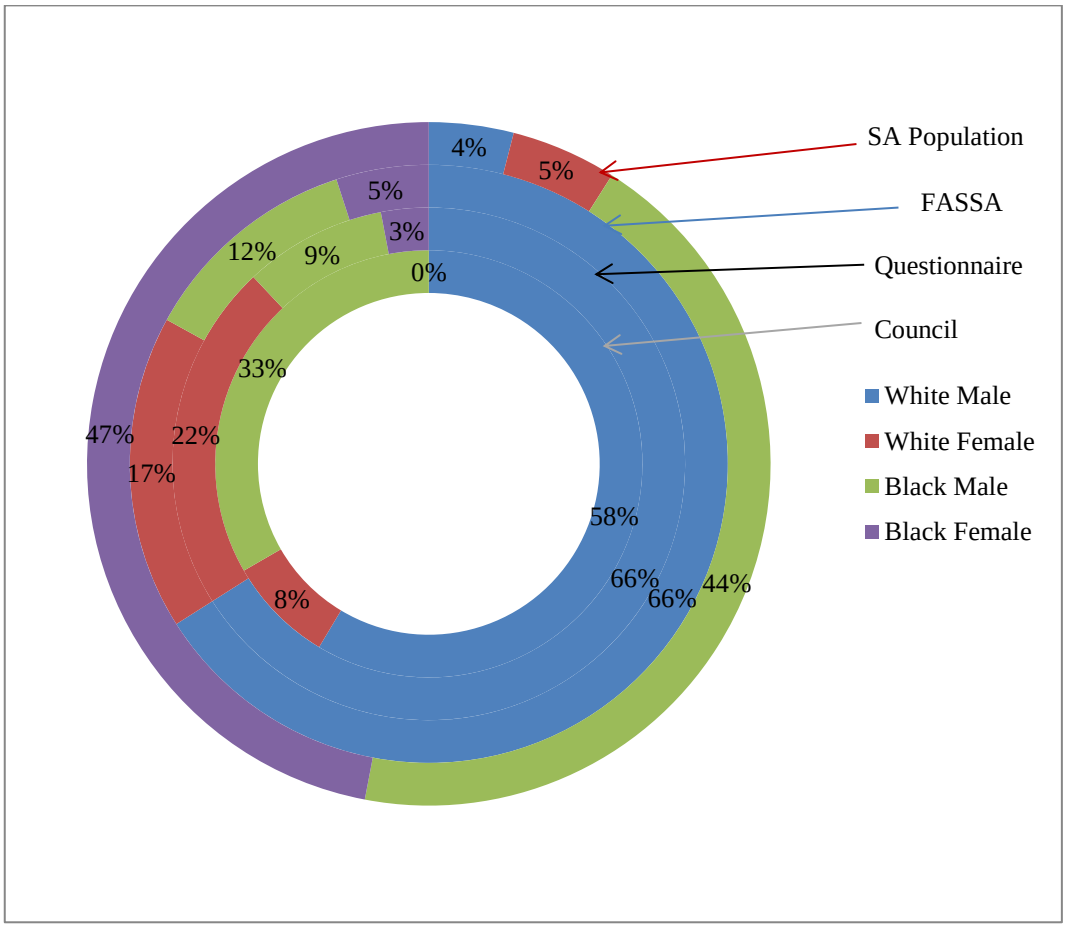
Figure 1: The distribution of participants by type of employer



Most participants work for traditionally recognised employers of actuaries.

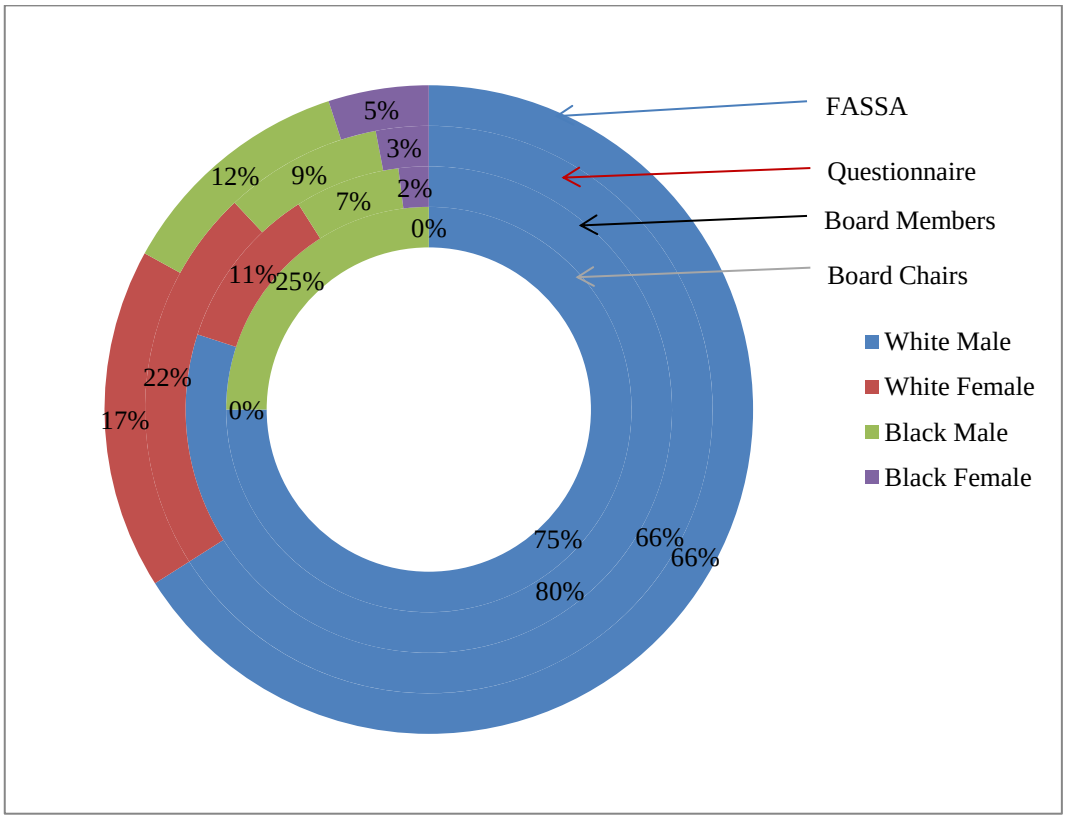
The South African population information was taken from the South African census 2011 study. The proportion of women and black (African Black, Coloured, Indian and Oriental) fellow members who are registered with ASSA has been increasing, from 5.9% and 2.2% in 1998 to 20.5% and 15% in 2013, respectively (ASSA; Ramjee, Sibiya & Dreyer, 2011). It is important to monitor the observed levels of involvement of women and black people in the actuarial profession and to encourage them to become more involved in the profession in order to include previously marginalised views. Figures 2, 3 and 4 below illustrate the FASSA membership and professional involvement of actuaries within ASSA, as provided by the Actuarial Society in August 2014:

Figure 2: The gender and racial profile of the South African population, FASSA designation holders, questionnaire participants and ASSA Council members



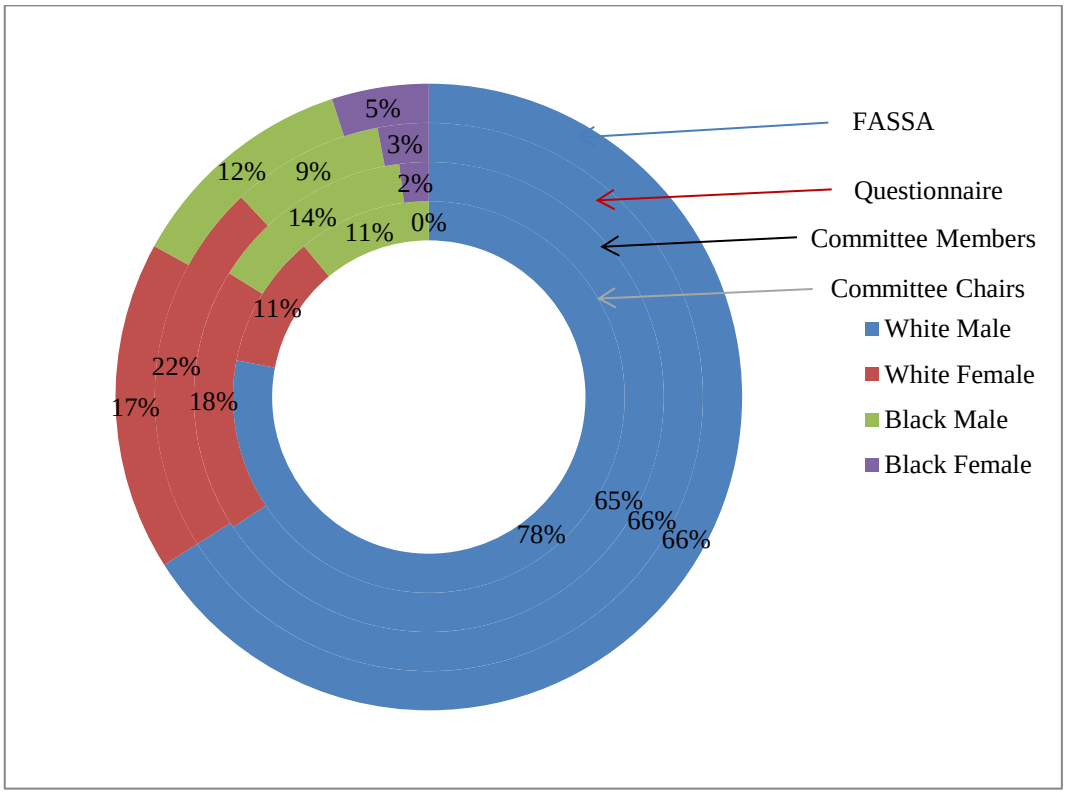
White males made up 4% of the South African population, 66% of FASSA designation holders and questionnaire participants, and 58% of ASSA Council members. In contrast, black females made up 47% of the South African population, 5% of FASSA designation holders, 3% of questionnaire participants, and they were not represented on ASSA Council. The gender and race of the questionnaire participants broadly reflected those of FASSA members. The representation of black males on Council was 175% higher than their representation as FASSA members.

Figure 3: The gender and racial profile of FASSA designation holders, questionnaire participants, members of ASSA operational boards and chairs of ASSA operational boards



A higher proportion of men get involved in ASSA operational boards than their representation in the population of ASSA Fellows, with no female board chair. ASSA operated seven boards, namely the board of examiners, communications and marketing board, education and continuous professional development board, finance and operations board, human resources board, international board and professional affairs board. Three of the seven boards had no female members.

Figure 4: The gender and racial profile of FASSA designation holders, questionnaire participants, members of ASSA committees and chairs of ASSA committees



Similar to the chairing of boards, there was no black female chairing a committee. White women and black men's representation in committees and chairing reflects their FASSA designation representation. ASSA had 24 committees, namely the accreditation committee, admissions committee, Africa interaction committee, AIDS committee, CSI committee, curriculum committee, ICA2010 finance, internal communications committee, IT committee, marketing committee, professional skills committee, quality assurance committee, research committee, social security task team, student consultation committee, tuition committee and eight practice area committees. The practice area committees consisted of committees in the practice areas of life insurance, healthcare, short-term insurance, retirement/pensions, investments, banking and finance, micro-insurance and enterprise risk management.

4.2 Data collection procedures

In this section, the procedures that were followed to collect data that were used to test hypotheses in this study are described. These procedures include the use of interviews, a questionnaire and focus groups to collect data.

4.2.1 Interviews

Quota sampling was used to determine a list of Fellows to interview. This sampling method was used to ensure that enough representation of Fellows from different backgrounds would be sourced to give their opinion on the need for the actuarial community to be aware of and understand the different entities that actuaries were committed to and what benefits would come out of such a study. This provided a good sample by which to test the need, direction and relevance of the research. The participants were asked to give verbal and written interview consent. A sample of the consent form is included in appendix 10.1. The consent form included the name of the researcher and the supervisor, the research topic, the name of the university, the purpose of the study, a notice that the participation in the interview was voluntary, consent for the recording of the interview and permission for the participant to be quoted directly from the interview.

During the interviews, each actuary was asked open-ended questions about entities that they were committed to which are included in appendix 10.2 below. Common themes that came out of the interviews were (1) the interplay between commitment to the organisation, profession and professional association; (2) levels of professional involvement; (3) components of commitment; and (4) life roles. The researcher decided to continue with the rest of the study with a focus on the themes from (1), (2) and (3) above. These themes were used in this study to structure the literature review, explore outcomes of commitment, establish organisation, profession and professional association commitment scales and to measure conflict between professional and organisational commitment. The themes were also used to determine the hypotheses to test. When the researcher could not find a suitable professional involvement scale in literature, the researcher went back to the interview transcripts and used the participants' responses to develop questions to ask in the questionnaire that would form part of the professional involvement scale that was used in the current study. Mokonyane

& Ramjee (2014) gives more detail on the process followed during the interviews and the key outcomes from the interviews.

4.2.2 Questionnaire

The questionnaire was piloted by three fellows to ensure that the questions were unambiguous and that the length of the questionnaire was reasonable. Once the pilot had been completed, an email invitation to all fellow members of ASSA to participate in the questionnaire was sent out through ASSA. The questionnaire was open from 10 December 2013 to 14 January 2014 inclusive. The invitation included a link to the questionnaire. The invitation and questionnaire are included in appendix 10.3. Once the questionnaire was closed, the responses to the questionnaire were downloaded on to Excel, and data analysis began. There were 985 Fellow members of ASSA in May of 2013 and 214 of them responded to the questionnaire, giving a response rate of 22%.

While completing the questionnaire, participants were free to stop participating whenever they decided to and the responses that they had given before deciding to quit the questionnaire were saved and submitted to the researcher. The table below shows the number of respondents for each category of questions.

Table 4: Questionnaire respondents by category

Scale or category of questions	**Number of respondents**
Consent to participate in the questionnaire.	214
Indicated the professional association(s) that they are affiliated with. Survey participants who did not answer this set of questions were removed from the data. So the dataset becomes smaller as we go.	203
Professional involvement over the past year: these are all responses about professional involvement over the past year.	187
Professional involvement over the past 3 months.	174
Plans regarding professional involvement over the next	174

year.	
Professional commitment data: I took all responses on professional commitment from the data.	170
Organisational commitment data: I took all responses on organisational commitment from the data.	161
SA commitment data: same as above for South Africa.	151
ASSA commitment data: same as above for ASSA.	149
ASABA commitment data: I took responses on commitment to ASABA from ASABA members.	13
Professional organisational conflict data.	147
Professional turnover intention data: professional turnover responses.	146
Organisational turnover intention data: organisational turnover responses.	146
SA turnover intention data: South Africa turnover responses.	146
ASSA turnover intention data: ASSA turnover responses.	145
ASABA turnover intention data: ASABA turnover responses.	13
Lottery questions.	144
The importance of an internationally recognised actuarial qualification.	142
Indicated their age (this field was not compulsory).	139
Other demographic and work-related questions.	141

On average, about five participants dropped off the questionnaire as they moved from one category to the other, leading to 141 respondents getting to the end of the questionnaire.

4.2.3 Focus groups

Groups of actuaries were invited to a meeting where some of the results obtained in this study were discussed. Quota sampling was also used here. This sampling

method was used to ensure that enough representation of Fellows from different backgrounds would be sourced to give their opinion on the results of the study and compare their interpretation of the research insights with that of the researcher. The participants were asked to give written interview consent. A sample of the consent form is included in appendix 10.5. The consent form included the name of the researcher and the supervisor, the research topic, the name of the university, the purpose of the study, a notice that the participation in the focus group was voluntary, consent for the recording of the discussion and permission for the participant to be quoted directly from the discussion. The results that were presented for discussion, together with the initial comments of the researcher before discussing with the participants, are shown in appendix 10.4.

4.2.4 ASSA membership data

Membership data of members of ASSA, as at May 2013, was obtained from ASSA. The "Fellow" membership type was used, and the "active" and "overseas" options were chosen for the membership status.

The ASSA membership data was expected to be of good quality because ASSA's membership registration occurs annually and members are required to pay a membership fee and have the opportunity to update their details during registration. Even with such an expectation, it is good actuarial practice to perform reasonability and spot checks on this data. Data checks were performed to obtain an indication of the quality of the data. These included calculating the age of each member using their date of birth and comparing it with the age calculated using national identity numbers for Fellows who had their national identity numbers included in the database. The calculated ages corresponded for all members. One member did not have either a date of birth or a national identity number. Another member had a calculated age of 98 and this was assumed to be an error. Neither of the two members' ages were used to calculate any statistics relating to age.

Most ASSA members who become involved in the profession are fellows, although a small percentage of non-fellows also join committees and/or boards. For the purposes of this study, no distinction was made between membership status of those who are involved, i.e. non-fellows were also included.

4.2.5 Ethical clearance

This study relied on data that was obtained from asking human subjects questions. As such, ethical clearance was required for the interviews, questionnaire and focus groups. Once ethical clearance to conduct the initial interviews was given by the Commerce Faculty Ethics in Research Committee, face-to-face interviews were arranged and conducted. The outcome of the interviews was to design a research questionnaire in order to collect all the relevant data for this study. Once the questionnaire design was completed, the Commerce Faculty Ethics in Research Committee was approached for ethical clearance for the questionnaire and clearance was granted. Lastly, ethical clearance was required and obtained from the Commerce Faculty Ethics in Research Committee so that the focus group discussions could take place.

4.3 Data collection instruments

The questionnaire was designed to provide data to measure the following aspects about actuaries:

- professional involvement;
- commitment to the profession, organisations, South Africa, ASSA and ASABA;
- professional-organisational conflict; and
- professional, organisational, South African, ASSA and ASABA turnover intentions.

These measurement scales are described below.

Where the Likert-type scale was used, the intention was to measure the extent to which the respondent agreed or disagreed with a statement and Likert-type scales allow for that. This gave more information compared to binary responses of agreeing or disagreeing with a statement. The use of a Likert-type scale assumes that there is an equal distance of moving from one unit of response to the next one closest to it and numerically the responses are treated this way. Knapp (1990) showed that this can be a disadvantage of using a Likert-type scale because different respondents may perceive different distances of moving from one unit of

response to the next while the Likert-type scale averages out the responses from different respondents assuming an equal weighting to each response. After considering the benefits and limitations of using Likert-type scales, Bishop & Herron (2015) contend that statistics are tools that allow researchers to think about the data at hand and researchers need to also apply their minds to what the data truly means about the population. They explain further that showing the sample size next to p-values allows researchers to understand better the Type 1 and Type 2 statistical errors present.

4.3.1 Professional involvement scale

A self-developed professional involvement questionnaire was used to establish a scale for the professional involvement of actuaries in South Africa. The professional involvement scale was split into two parts; the first part dealt with professional involvement over the past year and the second part dealt with professional involvement during the past three months. This split and the questions used were chosen based on the responses of fellows in the interviews about their professional involvement and how it differed based on the particular time of their lives in which they found themselves.

For the first part of the self-developed professional involvement scale, questions regarding a fellow's professional involvement over the past year were given binary "yes" – "no" responses. These questions covered a fellow's level of compliance with his/her continuous professional development (CPD) requirements, involvement with professional committees, attendance at major actuarial professional events, reading professional journals and contributing articles to professional journals.

The second part of the self-developed professional involvement scale was about professional involvement during the past three months. The questions covered topics ranging from the attendance of professional sessional meetings, professional readings, mentorship and knowledge transfer, volunteering within the profession, transformation of the actuarial profession and the legacy of the profession. A five-point Likert-type scale, ranging from "very frequently (1)" to "never (5)", was used to record responses to these professional involvement questions.

4.3.2 Professional commitment scale

Professional commitment was measured using the 12-item Meyer, Allen & Smith (1993) professional commitment scale by selecting the items for affective and continuance commitment. The items/statements were adjusted to make them suitable for actuarial professionals (the original statements had been specific to nurses). Four items in the scale that had been negative statements and were supposed to have been reverse scored were changed so that they were positive statements and did not need to be reverse scored. This was done to avoid possible answering mistakes from participants who might be in a rush when responding to the questionnaire and might not realise that a statement was negative. Negatively scored statements are usually used in scales as checks for the alertness of participants when they respond to questionnaires and to look for patterns in participants' responses. Mouton & Marais (1996) stated that a negatively- or positively- phrased statement would not have a significant effect on responses of participants with high education levels. Actuaries can be regarded as people with a high level of education. The need for correct or accurate responses exceeded the benefit of having negatively-scored statements in the questionnaire.

Responses were made on five-point Likert-type rating scales ranging from "strongly disagree (1)" to "strongly agree (5)". The reliability of a scale is represented by the value of its Cronbach's alpha. Cronbach's alpha is a measure of how closely related all the items that make up the construct are, and it is a number between zero (0) and one (1) (Cronbach, 1951). According to Cronbach (1951), a construct is more reliable when its alpha is closer to one compared to a construct whose alpha is closer to zero. For the professional commitment scales in the Meyer, Allen & Smith (1993) study, Cronbach's alpha was 0.87 at the beginning of the year and 0.85 at the end of the year for affective professional commitment, and 0.79 at the beginning of the year and 0.83 at the end of the year for continuance professional commitment. In Bagraim & Fitzmaurice (unpublished) the Cronbach's alphas for the affective and continuance professional commitment scales for ASSA members (Fellows and students) were 0.79 and 0.85 respectively.

4.3.3 Organisational commitment scale

Organisational commitment was measured using the 12-item Meyer, Allen & Smith (1993) organisational commitment scale for affective and continuance commitment. Three items in the scale that were negative statements and were supposed to be reverse-scored were changed so that they were positive statements and did not need to be reverse-scored. Responses were made on five-point Likert-type rating scales ranging from "strongly disagree (1)" to "strongly agree (5)". The Cronbach's alphas in Bagraim & Fitzmaurice (unpublished) for ASSA members' professional commitment scales were 0.87 and 0.75 for affective and continuance professional commitments, respectively.

4.3.4 Country and professional association commitment scales

The South African, ASSA and ASABA commitment scales were developed directly from the Meyer, Allen & Smith (1993) organisational commitment scale using the general extension of the organisational commitment scale to other domains, as shown in Meyer & Allen (1997). Before the introduction of the South African fellowship qualification, all actuaries in South Africa obtained and maintained their professional membership with an international actuarial body that could assist them to maintain their professional designations. This option is still available. As such, continuance commitment to ASSA and ASABA would not be relevant for fellows because most fellows do not have to belong to ASSA or ASABA in order to continue practicing as actuaries, which is what continuance commitment generally measures. This led to the commitment scales for ASSA and ASABA only having affective commitment statements. The validity of the assumption of not including continuance commitment to ASSA and ASABA should be tested in future research.

4.3.5 Professional-organisational conflict scale

The professional-organisational conflict scale in Lui, Ngo & Tsang (2001) was used. This scale was formed by adapting the Rizzio, House & Lirtzman (1970) inter-role conflict scale. In the current study, the Lui, Ngo & Tsang (2001) professional-organisational conflict scale was adapted to make it suitable to use with actuaries. Although there are other professional-organisational conflict

scales, Lui, Ngo & Tsang (2001) showed that the professional-organisational conflict scale used in their study is suitable for determining the general professional-organisational conflict levels of accountants. Section 2.3 indicates that results from studies of accountants can be used in the current study of actuaries. In Lui, Ngo & Tsang (2001), the professional-organisational conflict scale has a Cronbach's alpha value of 0.79. This is a high alpha value and gives a good reliability measure for professional-organisational conflict (Bendermacher, 2010). Bendermacher (2010) argues that a better lower-bound for a scale's reliability is Guttman's λ_2. A congeneric reliability measure gives a better measure of data's true reliability but it is not as widely used in literature as Cronbach's alpha (Graham, 2006). For comparison with similar studies, Cronbach's alpha is used in the current study with the understanding that it gives a lower-bound reliability measure.

4.3.6 Turnover intention scales

Turnover intention scales were measured using the professional and organisational turnover intention scales from Meyer, Allen & Smith (1993) and these were adapted for actuaries and extended to the South African, ASSA and ASABA turnover intentions. Responses were made on five-point Likert-type rating scales ranging from "strongly disagree (1)" to "strongly agree (5)". For the professional turnover intention scale in the Meyer, Allen & Smith (1993) study, Cronbach's alpha was 0.67 at the beginning of the year and 0.71 at the end of the year.

4.4 Data analysis

This section describes the analysis that was performed on the questionnaire data.

4.4.1 Final scales

The purpose of this analysis was to create final scales, based on the questionnaire responses, which will be used for hypotheses testing. Data were gathered from the responses to the questionnaire and downloaded onto an Excel spreadsheet. Care was taken to ensure that:

- the number of questionnaire responses received matched with the number of responses that were downloaded;
- all the questions in the questionnaire were included in the download to the spreadsheet;
- each response had a unique identifier;
- a sample of responses was checked to ensure that the responses to each question for the unique respondent were the same in the questionnaire and the downloaded data on Excel; and
- the responses to each question were checked to ensure that all responses were within the allowable parameters.

In the worksheet, the items were placed across in the columns, and the responses were in each row.

The items were grouped in to those that related to the:

- professional involvement over the past year;
- professional involvement during the past three months;
- professional commitment;
- organisational commitment;
- commitment to South Africa;
- commitment to ASSA;
- commitment to ASABA;
- professional-organisational conflict;
- professional turnover intention;
- organisational turnover intention;
- South Africa turnover intention;
- ASSA turnover intention; and
- ASABA turnover intention.

The groupings that had more than three items needed to be reduced so that the data could be suitable for analysis. Items are the individual questions asked in the questionnaire. All the groupings above had more than three items except those that related to turnover intentions. Exploratory factor analysis is a variable reduction technique which identifies the underlying factor structure of a set of variables (Suhr, 2014). For the current study, exploratory factor analysis is used to

summarise the data because it allows the observed variables that have a common underlying and unobserved factor to be grouped together. Each grouping is called a factor. Trninić, Jelaska & Štalec (2013) conclude that the researcher will rely on their theoretical beliefs and knowledge of the field they are studying to infer the existence of a factor and its interpretations. It is therefore critical for a researcher to have a firm knowledge of the field that they are working in and to seek guidance and peer review from experts in that field in order to improve the reliability of their model and their interpretation of it.

The exploratory factor analysis model is (Suhr, 2014):

$$Y = X\beta + \varepsilon$$

where Y is a matrix of measured variables;

X is a matrix of common factors;

β is a matrix of weights (factor loadings); and

ε is a matrix of unique factors, error variation.

The use of exploratory factor analysis requires an initial number of underlying factors to be chosen for the analysis. The "eigenvalue rule" is used for this purpose. The "eigenvalue rule" states that all factors or components whose eigenvalues are greater than 1.0 should be retained in the exploratory factor analysis (Bagraim & Fitzmaurice, unpublished; Matsunaga, 2010; Kantor, 2013). When performing the exploratory factor analysis, each item will load on one of the factors. An "item loading" on a factor is the correlation of the item with the factor (Matsunaga, 2010). The resulting item loadings on each factor are summed up to give scales that will be used for hypotheses testing. Cronbach's alpha should be calculated to determine the reliability of the data from which the scales are determined.

An example of creating a final scale

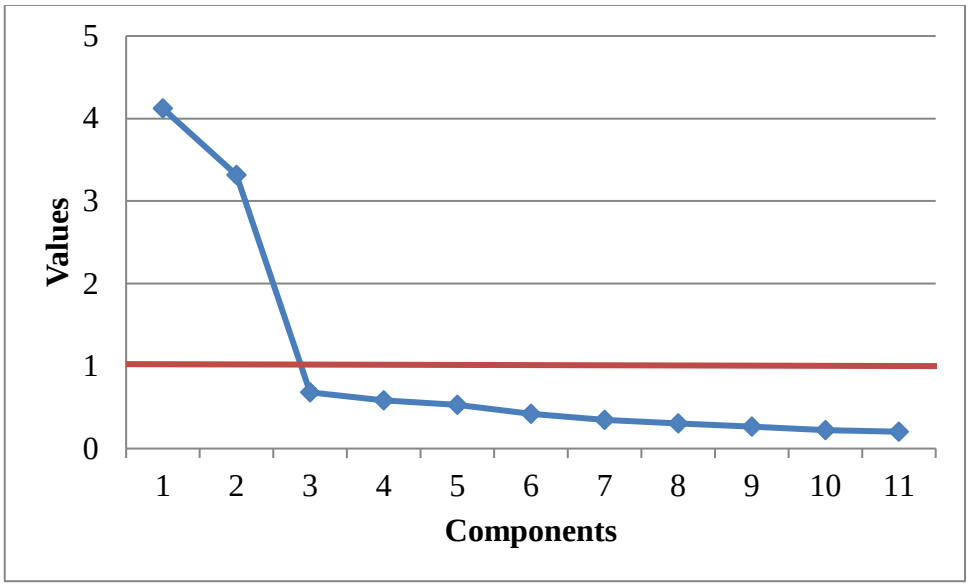
This is an illustrative example of how the data analysis was performed to determine: (1) the number of factors that were sufficient to explain the nature of actuaries' professional commitment; and (2) the final professional commitment scale. This analysis was performed using the "R" software. The following table shows the 12 items that were included in the professional commitment scale in the questionnaire and a summary of the responses to each item by 170 respondents.

Table 5: A distribution of responses to the professional commitment questionnaire

	Commitment	Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree	Mean	Variance
	To the actuarial profession	1	2	3	4	5		
a	Being an actuary is important to my self-image.	8	14	41	81	26	3.61	1
b	There are pressures to keep me from changing professions.	21	32	45	58	14	3.07	1.36
c	Changing professions now would be difficult for me to do.	9	24	21	72	44	3.69	1.34
d	I like being an actuary.	0	0	14	91	65	4.3	0.38
e	Too much of my life would be disrupted if I were to change my profession.	5	30	38	65	32	3.52	1.16
f	I am enthusiastic about being an actuary.	0	7	28	84	51	4.05	0.63
g	I have put too much into the actuarial profession to consider changing now.	6	19	42	66	37	3.64	1.11
h	I am proud to be in the actuarial profession.	0	4	11	80	75	4.33	0.49
i	I am glad that I entered the actuarial profession.	2	1	11	79	77	4.34	0.53
j	It would be costly for me to change my profession now.	7	15	41	71	36	3.67	1.07
k	I identify with the actuarial profession.	1	12	28	90	39	3.91	0.72
l	Changing professions now would require considerable personal sacrifice.	4	15	31	67	53	3.88	1.05

The eigenvalues of the professional commitment data above are calculated and shown below in order to apply the eigenvalue rule. The numbered items in the x-axis correspond to the number of components or factors that the data can be summarised into.

Figure 5: Eigenvalues graph



The first two factors have eigenvalues that are greater than one. This suggests that a two-factor model should be used for exploratory factor analysis of the professional commitment scale.

The following acronyms are used in the analysis:

ACPQ*i* stands for the *i'th* item in the standard Allen & Meyer (1993) scale of Affective Commitment to the Profession, where *i* = 1, 2, 3, 4, 5, 6.

CCPQ*i* stands for the *i'th* item in the standard Allen & Meyer (1993) scale of Continuance Commitment to the Profession, where *i* = 1, 2, 3, 4, 5, 6.

The factor loadings are shown below.

Table 6: Initial factor loadings

Items	**Factor 1**	**Factor 2**
ACPQ1	0.253	0.497
CCPQ5	0.544	-0.140
CCPQ2	0.791	
ACPQ4	0.111	0.726
CCPQ3	0.882	0.118
ACPQ6		0.822
CCPQ1	0.778	0.226
ACPQ3		0.834
ACPQ2	-0.167	0.667
CCPQ4	0.813	
ACPQ5		0.802
CCPQ6	0.769	

For an item to belong to one factor it needs to have a loading of at least 0.3 on that factor. If an item loads on more than one factor there then needs to be a difference greater than or equal to 0.3 between its loadings on each factor (Bagraim & Fitzmaurice; unpublished). The difference in the loadings for item ACPQ1 was 0.244 (0.497 – 0.253) which was less than 0.3. This prompted the removal of this item from the professional commitment scale because it did not load significantly on either factor.

Performing the two-factor exploratory factor analysis without ACPQ1 gives the following:

Table 7: Factor loadings after removal of ACPQ1

Items	**Factor 1**	**Factor 2**
CCPQ5	0.538	-0.162
CCPQ2	0.787	
ACPQ4	0.130	0.733
CCPQ3	0.882	
ACPQ6		0.826
CCPQ1	0.783	0.208
ACPQ3		0.829
ACPQ2	-0.151	0.671
CCPQ4	0.820	
ACPQ5		0.793
CCPQ6	0.774	

From the above exploratory factor analysis, each statement is assigned a factor on which it loads. All statements that were taken from the continuance commitment scale load on a single factor and the same is true for statements from the affective commitment scale. This result is consistent with the general Meyer, Allen & Smith (1993) two-factor model of professional commitment. The above two-factor model explains 61% of the total response variability in the professional commitment scale.

This new 11-item professional commitment scale needs to give a high Cronbach's alpha value in order for the scale to be reliable. A good (and acceptable) Cronbach's alpha value is a value of at least 0.7 (Kantor, 2013). The Cronbach's alpha for this scale is calculated to be 0.82. A Cronbach's alpha value of 0.82 shows that the statements of the 11-item professional commitment scale are well designed and that they are appropriate measures of the same underlying scale, i.e. the professional commitment scale.

Here, the researcher has used their theoretical beliefs and knowledge of psychology and the actuarial profession to select the items from the Meyer, Allen & Smith (1993) commitment model and test their validity to explain the professional commitment of actuaries. The results from the exploratory factor analysis showed that one item needed to be removed from the scale and that a two-factor model of professional commitment was appropriate. The researcher then used the naming conventions from the Meyer, Allen & Smith (1993) commitment model to interpret what each of the two factors explained i.e. affective and continuance commitment to their profession. The review part of this study was conducted by an actuarial professional while the researcher worked under the guidance of an actuary and a professor in psychology whose specialisation included the field of commitment to an entity.

Based on the above analysis, the factors for the professional commitment scale of actuaries are:

Factor1 = (CCPQ1 + CCPQ2 + CCPQ3 + CCPQ4 + CCPQ5 CCPQ6)/6 = continuance commitment to the profession = CCP

Factor2 = (ACPQ2 + ACPQ3 + ACPQ4 + ACPQ5 + ACPQ6)/5 = Affective commitment to the profession = ACP

CP = (CCP + ACP)/2 = commitment to the profession

Note that these final scales are the arithmetic mean of the items that are included for each factor. These factors will be used in the hypotheses testing. The factors for all other scales are shown in section 5.1.3.

4.4.2 Multiple linear regression

Multiple linear regression is used in this study to determine whether a relationship can be established using explanatory variables to explain commitment levels, conflict levels, turnover intentions and professional involvement of actuaries. As a result, commitment, conflict, turnover intentions and professional involvement of actuaries were each treated as dependent variables in the regression models where a relationship was being studied between each of them and the explanatory or independent variables sourced during the study. The scales of each of these dependent variables are continuous and the explanatory variables are either continuous or categorical. This made it possible to use multiple linear regression

for this analysis (Campbell & Shantikumar, 2016). It should be noted that it was not possible to think of all possible explanatory variables to use in this study and hence there may be other variables that could explain the dependent variables better. The researcher used her skills and knowledge to come up with the exploratory variables that were used in this study. By using multiple linear regression, the following assumptions are important to note for this study:

- the regression residuals follow a Normal distribution and have the same variance; and
- a linear relationship exists between the dependant and explanatory variables (Statistics Solutions, 2019).

The above assumptions are assumed to be appropriate for this study and a determination of how deviation from these assumptions will affect the results of this study is recommended for further research.

Only the data from respondents who had completed the questionnaire were used because the regression analysis used demographic variables, which were in the last part of the questionnaire. 141 out of 214 respondents completed the questionnaire fully. Their responses were saved in a comma delimited file and loaded on to R software for analyses. It is assumed that the scaling of the Likert scale is consistent between integers hence there is no need to convert the data into ordinal form in the R language. A model for the predicted variable was proposed and the variance inflation factor (VIF) of the proposed model was determined. The VIF is used to detect multicollinearity, i.e. the correlation between explanatory variables. It is important to remove multicollinearity in the data otherwise small changes in the data will result in large changes in the model. The VIF for each explanatory variable is calculated as:

$$VIF_j = \frac{1}{1 - {R_j}^2}$$

where

${R_j}^2$ is the coefficient of determination obtained from regressing the *j*th explanatory variable against all the other explanatory variables. If it is

uncorrelated with all the other variables, then the VIF = 1. VIF increases as the correlation increases. (Dobson & Barnett, 1945)

Where VIF is greater than 5, Montgomery, Peck & Vining (2006) suggests that one should be concerned. In such a case, it can be difficult to determine which variables to remove and which ones to keep (Dobson & Barnett, 1945). One way to get past this is to perform a stepwise regression using the akaike information criterion (AIC) to determine the best model. This is the model with the lowest AIC value. The AIC is calculated using the following formula:

$$AIC = -2\ln(L) + 2 \times M$$

where,

L denotes the likelihood function of the model; and

M is the number of parameters in the model (Viljoen, 2012).

Once the model is determined, it is tested for multicollinearity. Here, the VIF for all variables in the model should be less than 5. Then a hypothesis that the model is appropriate to determine the predictor variable is tested at 5% significance level. If there are variables in the model that are not significant then the variable with the highest p-value is removed from the model, and the new model is tested for its appropriateness in determining the predictor variable. The same process is followed until all the explanatory variables are significant at 5% significance level. The p-value of the F-statistic is used to determine whether the hypothesis is rejected or not. Diagnostic plots are also used to determine the appropriateness of the developed model. These are plots of:

- residual errors plotted against their fitted values. A good fit shows the residual errors plotted against their fitted values being randomly scattered around zero, representing a residual error of zero;
- the square root of the standardised residual errors plotted against their fitted values. If there is a good fit, the points on the plot should be randomly scattered around zero;
- the standardised residual errors plotted against the theoretical quantiles. For a good fit, the points on the plot should follow the dotted line where

the standardised residuals of the Normal distribution would lie in the theoretical quantiles. This would suggest that the residual errors are normally distributed; and

- standardised residual errors against their leverage. This is a measure of the importance of each point in determining the regression result. For a good fit, the points should be randomly scattered around zero. Overlaying the plot are contour lines for the Cook's distance, which is another measure of the importance of each observation to the regression. Smaller distances mean that removing the observation will have a minimal effect on the regression results.

The adjusted R^2 value of the model gives the proportion of the total variance in the predictor variable that has been explained by the model. The adjusted R^2 value is used because it adjusts for the number of variables in the model. By adding a variable to a model, its multiple R-squared value will increase even if the variable does not improve the model. The adjusted R^2 value increases only if the new term improves the model more than would be expected by chance and decreases when the variable improves the model by less than expected by chance. The adjusted R^2 is between 0 and 1.

A low adjusted R^2 value does not necessarily mean that the model is not a good fit. In the study of human behaviour, which is the case in this study, adjusted R^2 values are typically below 0.5 because human behaviour is generally difficult to predict.

An illustrative example

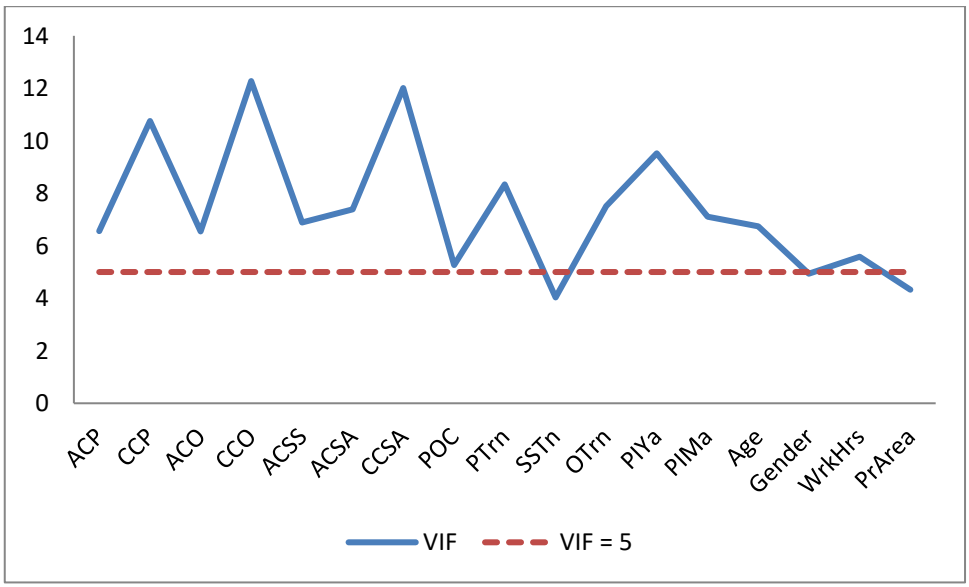
This section illustrates how the final regression models were determined based on the description of this process above. The South Africa turnover intention (SATn) predicted variable is used. A model for SATn is proposed where the explanatory variables used are:

- ACP: Affective commitment to the profession;
- CCP: Continuance commitment to the profession;
- ACO: Affective commitment to the organisation;
- CCO: Continuance commitment to the organisation;
- ACSS: Affective commitment to ASSA;

- ACSA: Affective commitment to South Africa;
- CCSA: Continuance commitment to South Africa;
- POC: Professional-organisational conflict;
- PTrn: Professional turnover intention;
- SSTn: ASSA turnover intention;
- OTrn: Organisational turnover intention;
- PIYa: Professional involvement over the past year (adjusted);
- PIMa: Professional involvement during the past three months (adjusted);
- Age;
- Gender;
- Race1: if white = 0 and black = 1;
- WrkHrs: Average number of hours worked in a week;
- ErTyp: Type of employer;
- ErTypa: Type of employer where Insurer (insurer and reinsurer) = 0 and Non-insurer (consultancy, bank, asset manager, government, other) = 1
- PrArea: Practice area;
- PrAreB: Practice area where Traditional practice areas (healthcare, life insurance, general insurance and pensions) = 0 and Non-traditional practice areas = 1;
- CoreFn: category of actuary's core function; and
- CoreFA: adjusted core function where CoreFA = 0 for category C, D and E and CoreFA = 1 for category A and B.

Checking for multicollinearity:

Figure 6: The variance inflation factor of the explanatory variables of the South Africa turnover intentions.



Most variables have a VIF greater than five, making it difficult to determine which variables to remove and which ones to keep in the model. To get past this, a stepwise regression is performed using the AIC to determine the best model. The output from the stepwise regression is shown below.

Start: AIC=-0.19

SATn ~ ACP + CCP + ACO + CCO + ACSS + ACSA + CCSA + POC + PTrn + SSTn + OTrn + PIYa + PIMa + Age + Gender + WrkHrs + PrArea

Scales	**Degrees of freedom**	**Sum of squares**	**Residual sum of squares**	**AIC**
-CCSA	1	0.00231	4.2490	-2.1761
-PTrn	1	0.00470	4.2514	-2.1637
-CCP	1	0.01411	4.2608	-2.1150
-ACO	1	0.02311	4.2698	-2.0686
-ACSS	1	0.02725	4.2739	-2.0473
-Gender	1	0.03149	4.2781	-2.0255
-CCO	1	0.03418	4.2808	-2.0117
-WrkHrs	1	0.04933	4.2960	-1.9339
-PIYa	1	0.09764	4.3443	-1.6879
-PIMa	1	0.12389	4.3706	-1.5554
-PrArea	1	0.19588	4.4425	-1.1960
-SSTn	1	0.25102	4.4977	-0.9246
-POC	1	0.26970	4.5164	-0.8334
-ACP	1	0.31452	4.5612	-0.6162
-Age	1	0.37229	4.6189	-0.3393
<none>			4.2467	-0.1880
-OTrn	1	0.81116	5.0578	1.6576
-ACSA	1	1.34488	5.5915	3.8647

Removing CCSA from the model to reduce the AIC of the model.

Step: AIC=-2.18

SATn ~ ACP + CCP + ACO + CCO + ACSS + ACSA + POC + PTrn + SSTn + OTrn + PIYa + PIMa + Age + Gender + WrkHrs + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-PTrn	1	0.00393	4.2529	-4.1557
-ACO	1	0.02205	4.271	-4.0622
-CCP	1	0.02536	4.2743	-4.0451
-ACSS	1	0.02796	4.2769	-4.0318
-Gender	1	0.03664	4.2856	-3.9871
-WrkHrs	1	0.05378	4.3027	-3.8994
-PIYa	1	0.15721	4.4062	-3.3768
-CCO	1	0.18182	4.4308	-3.2542
-PIMa	1	0.2029	4.4519	-3.1498
-PrArea	1	0.21163	4.4606	-3.1067
-POC	1	0.27725	4.5262	-2.7854
-SSTn	1	0.29642	4.5454	-2.6924
-ACP	1	0.3201	4.5691	-2.5781
-Age	1	0.38569	4.6347	-2.2646
<none>			4.249	-2.1761
+CCSA	1	0.00231	4.2467	-0.188
-OTrn	1	0.8961	5.1451	0.0339
-ACSA	1	1.42445	5.6734	2.1845

Removing PTrn from the model to reduce the AIC of the model.

Step: AIC=-4.16

SATn ~ ACP + CCP + ACO + CCO + ACSS + ACSA + POC + SSTn + OTrn +

PIYa + PIMa + Age + Gender + WrkHrs + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-ACO	1	0.01812	4.271	-6.0622
-ACSS	1	0.036	4.2889	-5.9703
-CCP	1	0.03691	4.2898	-5.9656
-Gender	1	0.04669	4.2996	-5.9155
-WrkHrs	1	0.11353	4.3664	-5.5762
-PIYa	1	0.16983	4.4227	-5.2943
-CCO	1	0.20173	4.4546	-5.1362
-PIMa	1	0.21684	4.4697	-5.0617
-PrArea	1	0.23072	4.4836	-4.9935
-POC	1	0.29987	4.5528	-4.6568
-SSTn	1	0.3075	4.5604	-4.6199
-ACP	1	0.36321	4.6161	-4.3528
-Age	1	0.38976	4.6427	-4.2266
<none>			4.2529	-4.1557
+PTrn	1	0.00393	4.249	-2.1761
+CCSA	1	0.00154	4.2514	-2.1637
-OTrn	1	1.06806	5.321	-1.2266
-ACSA	1	1.48931	5.7422	0.4496

Removing ACO from the model to reduce the AIC of the model.

Step: AIC=-6.06

SATn ~ ACP + CCP + CCO + ACSS + ACSA + POC + SSTn + OTrn + PIYa +
PIMa + Age + Gender + WrkHrs + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-ACSS	1	0.02474	4.2958	-7.9351
-CCP	1	0.06578	4.3368	-7.7259
-Gender	1	0.07535	4.3464	-7.6775
-WrkHrs	1	0.13732	4.4083	-7.366
-PIYa	1	0.17965	4.4507	-7.1558
-PIMa	1	0.21452	4.4855	-6.984
-CCO	1	0.23629	4.5073	-6.8775
-PrArea	1	0.25736	4.5284	-6.7749
-SSTn	1	0.3013	4.5723	-6.5625
-ACP	1	0.34684	4.6179	-6.3444
-Age	1	0.37775	4.6488	-6.1977
<none>			4.271	-6.0622
-POC	1	0.42726	4.6983	-5.9646
+ACO	1	0.01812	4.2529	-4.1557
+CCSA	1	0.00124	4.2698	-4.0686
+PTrn	1	0	4.271	-4.0622
-OTrn	1	1.10001	5.371	-3.0205
-ACSA	1	1.52146	5.7925	-1.3586

Removing ACSS from the model to reduce the AIC of the model.

Step: AIC=-7.94

SATn ~ ACP + CCP + CCO + ACSA + POC + SSTn + OTrn + PIYa + PIMa +
Age + Gender + WrkHrs + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-CCP	1	0.05703	4.3528	-9.6449
-Gender	1	0.08384	4.3796	-9.5098
-WrkHrs	1	0.12425	4.42	-9.3078
-PIYa	1	0.16167	4.4574	-9.1223
-PrArea	1	0.23376	4.5295	-8.7694
-CCO	1	0.24696	4.5427	-8.7054
-PIMa	1	0.29037	4.5861	-8.4961
-SSTn	1	0.29677	4.5925	-8.4655
<none>			4.2958	-7.9351
-ACP	1	0.49963	4.7954	-7.5145
-Age	1	0.54217	4.8379	-7.3202
-POC	1	0.56223	4.858	-7.2292
+ACSS	1	0.02474	4.271	-6.0622
+ACO	1	0.00686	4.2889	-5.9703
+PTrn	1	0.00309	4.2927	-5.9509
+CCSA	1	0.00142	4.2943	-5.9424
-OTrn	1	1.10891	5.4047	-4.8831
-ACSA	1	1.83773	6.1335	-2.1001

Removing CCP from the model to reduce the AIC of the model.

Step: AIC=-9.64

SATn ~ ACP + CCO + ACSA + POC + SSTn + OTrn + PIYa + PIMa + Age +

Gender + WrkHrs + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-Gender	1	0.0389	4.3916	-11.4494
-WrkHrs	1	0.1138	4.4666	-11.0772
-PrArea	1	0.1927	4.5455	-10.692
-CCO	1	0.2024	4.5552	-10.6449
-PIYa	1	0.3382	4.691	-9.9988
<none>			4.3528	-9.6449
-SSTn	1	0.4317	4.7845	-9.5645
-ACP	1	0.4426	4.7954	-9.5144
-PIMa	1	0.5164	4.8692	-9.1785
-POC	1	0.5496	4.9024	-9.0289
-Age	1	0.5855	4.9383	-8.8685
+CCP	1	0.057	4.2958	-7.9351
+ACO	1	0.0275	4.3253	-7.7845
+CCSA	1	0.021	4.3318	-7.7513
+ACSS	1	0.016	4.3368	-7.7259
+PTrn	1	0.0075	4.3453	-7.6831
-OTrn	1	1.0593	5.4121	-6.853
-ACSA	1	3.9932	8.346	2.6763

Removing Gender from the model to reduce the AIC of the model.

Step: AIC=-11.45

SATn ~ ACP + CCO + ACSA + POC + SSTn + OTrn + PIYa + PIMa + Age +
WrkHrs + PrArea

Scales	**Degrees of freedom**	**Sum of squares**	**Residual sum of squares**	**AIC**
-WrkHrs	1	0.1154	4.5071	-12.8787
-CCO	1	0.2549	4.6465	-12.2083
-PIYa	1	0.325	4.7167	-11.8786
-SSTn	1	0.3999	4.7915	-11.5324
<none>			4.3916	-11.4494
-ACP	1	0.4222	4.8139	-11.4299
-PrArea	1	0.4471	4.8387	-11.3167
-PIMa	1	0.4823	4.8739	-11.1571
-POC	1	0.5286	4.9202	-10.9492
-Age	1	0.7554	5.147	-9.9577
+Gender	1	0.0389	4.3528	-9.6449
+ACO	1	0.0348	4.3568	-9.6246
+ACSS	1	0.025	4.3667	-9.575
+CCSA	1	0.0164	4.3752	-9.5319
+CCP	1	0.012	4.3796	-9.5098
+PTrn	1	0.0108	4.3808	-9.5036
-OTrn	1	1.244	5.6357	-7.9623
-ACSA	1	4.3523	8.744	1.7011

Removing WrkHrs from the model to reduce the AIC of the model.

Step: AIC=-12.88

SATn ~ ACP + CCO + ACSA + POC + SSTn + OTrn + PIYa + PIMa + Age +
PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-PIYa	1	0.2725	4.7795	-13.5874
-CCO	1	0.2794	4.7865	-13.5553
-ACP	1	0.359	4.8661	-13.1924
-SSTn	1	0.4035	4.9105	-12.9925
<none>			4.5071	-12.8787
-PIMa	1	0.4602	4.9673	-12.7398
-POC	1	0.6224	5.1295	-12.0329
-Age	1	0.64	5.147	-11.9577
+WrkHrs	1	0.1154	4.3916	-11.4494
+ACO	1	0.0943	4.4127	-11.3441
-PrArea	1	0.7914	5.2985	-11.3195
+PTrn	1	0.0526	4.4544	-11.1372
+Gender	1	0.0405	4.4666	-11.0772
+CCSA	1	0.0211	4.486	-10.9819
+ACSS	1	0.0087	4.4983	-10.9213
+CCP	1	0.0077	4.4994	-10.9164
-OTrn	1	1.5959	6.103	-8.2099
-ACSA	1	4.4201	8.9272	0.1573

Removing PIYa from the model to reduce the AIC of the model.

Step: AIC=-13.59

SATn ~ ACP + CCO + ACSA + POC + SSTn + OTrn + PIMa + Age + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-PIMa	1	0.2196	4.9992	-14.5989
-CCO	1	0.2238	5.0033	-14.5808
-ACP	1	0.2272	5.0067	-14.5659
-SSTn	1	0.2978	5.0774	-14.2575
-Age	1	0.382	5.1615	-13.8959
<none>			4.7795	-13.5874
-PrArea	1	0.6017	5.3812	-12.9789
+PIYa	1	0.2725	4.5071	-12.8787
+ACO	1	0.1753	4.6042	-12.4096
+CCP	1	0.0992	4.6803	-12.049
-POC	1	0.8423	5.6218	-12.0166
+WrkHrs	1	0.0629	4.7167	-11.8786
+CCSA	1	0.0515	4.728	-11.8257
+Gender	1	0.0275	4.752	-11.7144
+ACSS	1	0.0231	4.7564	-11.6941
+PTrn	1	0.0028	4.7767	-11.6004
-OTrn	1	1.6475	6.427	-9.0716
-ACSA	1	5.4246	10.2041	1.0984

Removing PIMa from the model to reduce the AIC of the model.

Step: AIC=-14.6

SATn ~ ACP + CCO + ACSA + POC + SSTn + OTrn + Age + PrArea

Scales	**Degrees of freedom**	**Sum of squares**	**Residual sum of squares**	**AIC**
-CCO	1	0.1025	5.1017	-16.1523
-ACP	1	0.3145	5.3137	-15.2566
-Age	1	0.4304	5.4296	-14.7821
<none>			4.9992	-14.5989
-SSTn	1	0.62	5.6192	-14.0268
-PrArea	1	0.6897	5.6889	-13.7554
+PIMa	1	0.2196	4.7795	-13.5874
+CCP	1	0.1806	4.8186	-13.4081
-POC	1	0.8341	5.8333	-13.2041
+CCSA	1	0.1318	4.8674	-13.1868
+ACO	1	0.1275	4.8717	-13.1673
+WrkHrs	1	0.0744	4.9248	-12.9286
+PIYa	1	0.0319	4.9673	-12.7398
+Gender	1	0.0068	4.9924	-12.6287
+PTrn	1	0.0008	4.9983	-12.6026
+ACSS	1	0.0003	4.9989	-12.6
-OTrn	1	1.5886	6.5878	-10.5282
-ACSA	1	5.2049	10.2041	-0.9016

Removing CCO from the model to reduce the AIC of the model.

Step: AIC=-16.15

SATn ~ ACP + ACSA + POC + SSTn + OTrn + Age + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-ACP	1	0.2566	5.3583	-17.073
<none>			5.1017	-16.152
-Age	1	0.5421	5.6438	-15.931
-SSTn	1	0.5977	5.6994	-15.715
-PrArea	1	0.6493	5.751	-15.517
-POC	1	0.7636	5.8653	-15.084
+ACO	1	0.1216	4.9801	-14.683
+CCO	1	0.1025	4.9992	-14.599
+PIMa	1	0.0984	5.0033	-14.581
+WrkHrs	1	0.087	5.0147	-14.531
+PIYa	1	0.0466	5.0551	-14.354
+PTrn	1	0.0376	5.0642	-14.315
+Gender	1	0.0307	5.071	-14.285
+CCSA	1	0.0074	5.0943	-14.184
+CCP	1	0.0063	5.0954	-14.18
+ACSS	1	0.0004	5.1013	-14.154
-OTrn	1	1.4888	6.5905	-12.519
-ACSA	1	5.2376	10.3393	-2.612

Removing ACP from the model to reduce the AIC of the model.

Step: AIC=-17.07

SATn ~ ACSA + POC + SSTn + OTrn + Age + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-SSTn	1	0.467	5.8254	-17.234
-Age	1	0.4894	5.8477	-17.1499
<none>			5.3583	-17.0726
-PrArea	1	0.5482	5.9065	-16.9298
-POC	1	0.6398	5.9981	-16.591
+ACP	1	0.2566	5.1017	-16.1523
+PTrn	1	0.2103	5.148	-15.9533
+PIMa	1	0.1773	5.181	-15.8129
+ACSS	1	0.1013	5.257	-15.4925
+WrkHrs	1	0.0469	5.3114	-15.2662
+ACO	1	0.0455	5.3128	-15.2602
+CCO	1	0.0446	5.3137	-15.2566
+Gender	1	0.0146	5.3437	-15.1325
+CCP	1	0.0088	5.3495	-15.1089
+CCSA	1	0.0019	5.3564	-15.0803
+PIYa	1	0.0011	5.3572	-15.0772
-OTrn	1	1.257	6.6153	-14.4365
-ACSA	1	5.5488	10.9072	-3.4357

Removing SSTn from the model to reduce the AIC of the model.

Step: AIC=-17.23

SATn ~ ACSA + POC + OTrn + Age + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-Age	1	0.3989	6.2242	-17.777
<none>			5.8254	-17.234
-PrArea	1	0.5734	6.3988	-17.169
+SSTn	1	0.467	5.3583	-17.073
-POC	1	0.6567	6.4821	-16.884
+PIMa	1	0.3914	5.4339	-16.764
+ACP	1	0.126	5.6994	-15.715
+CCP	1	0.0847	5.7406	-15.556
+WrkHrs	1	0.0772	5.7482	-15.528
+CCO	1	0.0432	5.7822	-15.398
+Gender	1	0.0374	5.788	-15.376
+ACSS	1	0.0322	5.7932	-15.356
+PIYa	1	0.0317	5.7936	-15.354
+PTrn	1	0.0221	5.8033	-15.318
+CCSA	1	0.0073	5.818	-15.262
+ACO	1	0.0008	5.8246	-15.237
-OTrn	1	2.7457	8.5711	-10.738
-ACSA	1	5.6529	11.4782	-4.313

Removing Age from the model to reduce the AIC of the model.

Step: AIC=-17.78

SATn ~ ACSA + POC + OTrn + PrArea

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-PrArea	1	0.3377	6.5619	-18.6147
-POC	1	0.3831	6.6073	-18.463
<none>			6.2242	-17.777
+Age	1	0.3989	5.8254	-17.234
+SSTn	1	0.3765	5.8477	-17.1499
+PIMa	1	0.347	5.8772	-17.0391
+ACSS	1	0.1724	6.0518	-16.3949
+PIYa	1	0.1716	6.0527	-16.3919
+PTrn	1	0.1427	6.0815	-16.2874
+CCO	1	0.115	6.1093	-16.1872
+ACP	1	0.1027	6.1216	-16.1429
+Gender	1	0.008	6.2162	-15.8053
+CCP	1	0.0022	6.222	-15.7848
+CCSA	1	0.0021	6.2222	-15.7843
+WrkHrs	1	0.0013	6.223	-15.7815
+ACO	1	0.0008	6.2235	-15.7796
-OTrn	1	2.4342	8.6585	-12.5151
-ACSA	1	5.2619	11.4862	-6.2978

Removing PrArea from the model to reduce the AIC of the model.

Step: AIC=-18.61

SATn ~ ACSA + POC + OTrn

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
-POC	1	0.2816	6.8436	-19.6902
<none>			6.5619	-18.6147
+PIMa	1	0.4313	6.1306	-18.1106
+SSTn	1	0.4207	6.1413	-18.0723
+PrArea	1	0.3377	6.2242	-17.777
+ACSS	1	0.2349	6.327	-17.4168
+PIYa	1	0.2188	6.3431	-17.3609
+Age	1	0.1631	6.3988	-17.1685
+PTrn	1	0.1439	6.418	-17.1024
+WrkHrs	1	0.1219	6.44	-17.0273
+Gender	1	0.1201	6.4418	-17.0211
+CCO	1	0.067	6.4949	-16.8405
+ACP	1	0.0567	6.5052	-16.8057
+ACO	1	0.0395	6.5224	-16.7477
+CCP	1	0.0159	6.546	-16.668
+CCSA	1	0.0021	6.5598	-16.6218
-OTrn	1	2.098	8.6599	-14.5115
-ACSA	1	5.9962	12.5582	-6.3348

Removing POC from the model to reduce the AIC of the model.

Step: AIC=-19.69

SATn ~ ACSA + OTrn

Scales	Degrees of freedom	Sum of squares	Residual sum of squares	AIC
<none>			6.8436	-19.6902
+SSTn	1	0.4539	6.3897	-19.1999
+PIMa	1	0.4447	6.3989	-19.1681
+POC	1	0.2816	6.5619	-18.6147
+PrArea	1	0.2362	6.6073	-18.463
+WrkHrs	1	0.1792	6.6644	-18.2739
+PTrn	1	0.1733	6.6703	-18.2543
+ACO	1	0.0831	6.7605	-17.9589
+PIYa	1	0.0626	6.7809	-17.8925
+Age	1	0.0469	6.7967	-17.8414
+ACSS	1	0.0438	6.7998	-17.8313
+Gender	1	0.041	6.8026	-17.8223
+ACP	1	0.0264	6.8172	-17.7751
+CCO	1	0.023	6.8205	-17.7644
+CCSA	1	0.015	6.8285	-17.7386
+CCP	1	0.0128	6.8307	-17.7315
-OTrn	1	1.9259	8.7695	-16.2348
-ACSA	1	5.7934	12.637	-8.1971

The final model for SATn is

SATn = constant + ACSA + OTrn

The coefficients of the model are shown below.

Table 8: The coefficients of the final regression model of SATn

Variables	Estimate	Std. Error	t value	Pr(>|t|)	Significance
Intercept	4.0965	0.9298	4.406	0.000304	***
ACSA	-0.7299	0.1820	-4.011	0.000748	***
OTrn	0.3140	0.1358	2.312	0.032127	*

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.6002 on 19 degrees of freedom

Multiple R^2: 0.6702, Adjusted R^2: 0.6355

F-statistic: 19.31 on 2 and 19 DF, p-value: 2.649e-05

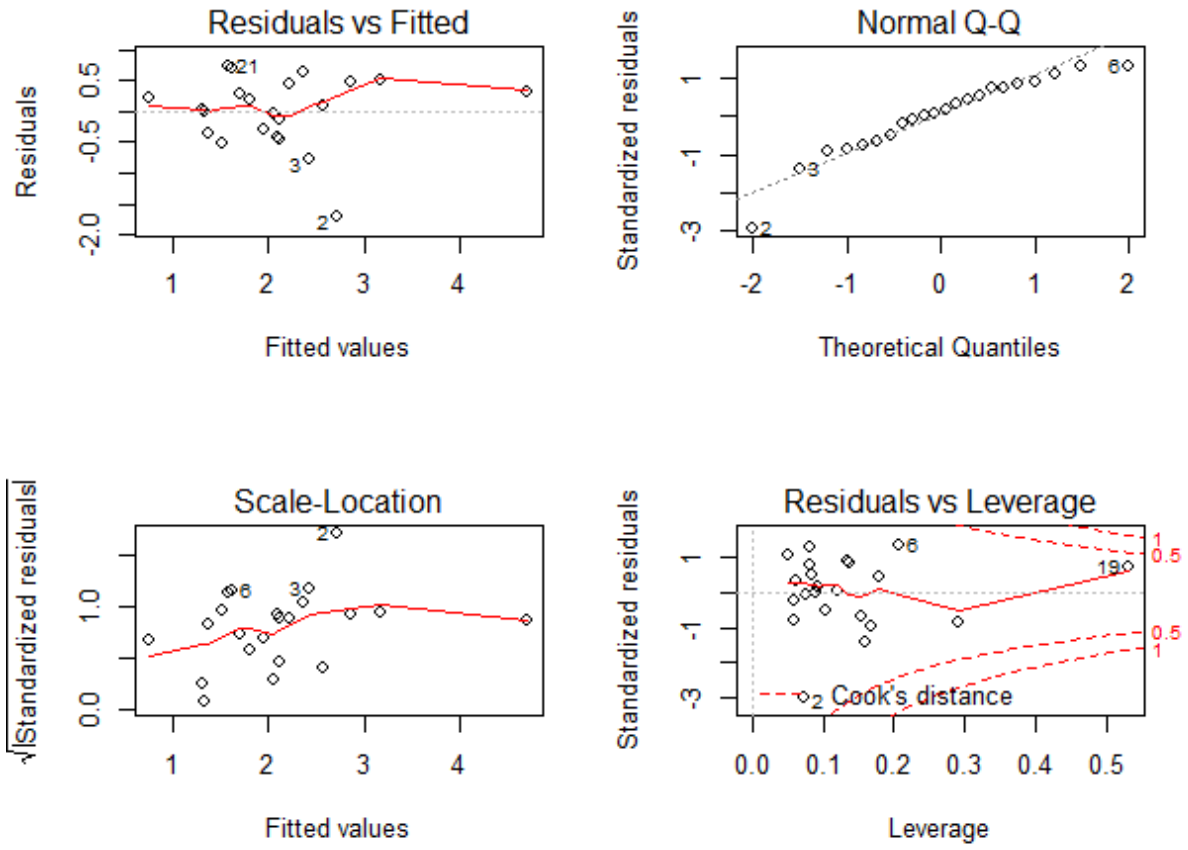
The VIFs of the variables of the final model are:

- 1.281748 for ACSA; and
- 1.281748 for OTrn.

The VIFs of both variables are close to one.

The following diagnostic plots are also used to determine the appropriateness of the final SATn model:

Figure 7: Diagnostic plots of the final regression model of SATn



This shows a good fit. The regression model for SATn is:

SATn = 4.0965 - 0.7299*ACSA + 0.314*OTrn

4.5 The reliability of survey data

When dealing with survey data, the process of data collection affects the reliability of the data. Mouton & Marais (1996) state that the requirement for data

to be reliable means that *"the application of a valid measuring instrument to different groups under different sets of circumstances should lead to the same observations"* (p. 95). According to Mouton & Marais (1996), the reliability of survey data is influenced by the researcher, the participant, the measuring instrument and the research context or circumstances under which the research is conducted. In this study, the researcher undertook three surveys and the factors that may have affected the reliability of the survey data are discussed below. It should be noted that the use of interviews, questionnaires and focus groups increased the reliability of the data collected during this study because this allowed the researcher to explore the research question with different groups of actuaries under different sets of circumstances and led to similar observations, in most cases. It should be noted that the interviews highlighted the need to study some key sub-groups within the profession, such as African actuaries and members of ASABA, but their representation in the study and/or the FASSA membership was too small to give reliable results. As such, analysis on African actuaries and members of ASABA were not performed.

4.5.1 Interviews

The researcher/interviewer was a stranger to some of the interview participants. The result of this is that the researcher may have been seen as an intruder and the participants may have given evasive responses or avoided responding to some of the questions (Mouton & Marais, 1996). Interviews were planned in such a way that people with diverse demographic backgrounds were interviewed. Questions about race were raised and response bias would be expected towards more favourable responses to the race of the researcher. The location of the interviews may have affected the researcher's perception of the participant and the participant's responses (Lutynska, 1970). For example, interviews at the participant's residence may have accentuated their family role while interviews at the participant's workplace may have done the same for their work role.

4.5.2 Questionnaire

The length of the questionnaire would have affected the response rate and the proportion of questionnaires that were not completed. Questionnaire respondents

were given an opportunity to comment at the end of the questionnaire, and five of them complained about the length of the questionnaire. This would explain partly why there were 141 participants at the end of the questionnaire when there were 214 participants at the beginning of the questionnaire.

It is worth noting that the questionnaire ran throughout the summer holiday period in South Africa. For someone to take part in the survey, he/she would access it at their convenience, and they were not forced to participate. A concern with such a sampling method is the introduction of bias in the responses owing to the fact that not all actuaries had access to their emails and so the survey, during this period (convenience bias), and those with access choosing not to participate in the survey (non-response bias). Figure 1, 2 and 3 above show that the questionnaire data are representative of the gender, age and race demographics of FASSA members and suggest that the effect of the bias introduced in the survey sampling is minimal. However, this is not tested in this study.

4.5.3 Focus groups

Participants were asked to comment on the logic of some of the results from the questionnaire. Survey reliability concerns faced during the interviews are also relevant here. In addition, soliciting comments or opinions in a group may result in an individual with strong opinions dominating a discussion. Keeping the groups small would have kept this to a minimal. Groups of siblings may have been a "safer" discussion environment because siblings would have grown up together and the physical presence of their sibling may have created a supportive environment for them to feel more comfortable sharing their views. This would rely on the nature of the relationship between the siblings. Peer pressure to uphold a certain moral ground when analysing the results may have skewed some of the results, especially amongst colleagues who wanted to present a professional image at work. The choice of grouping actuaries with similar backgrounds was intended to reduce this effect.

4.5.4 Interviews, questionnaire and focus group

For all three surveys, the affiliation of the researcher with the University of Cape Town is likely to have motivated respondents to answer questions seriously

and authentically. Responses to the interviews, questionnaire and focus groups will have some bias because Fellows who participate can be expected to have higher professional commitment levels when compared to those who did not respond or participate. The eventual observations of the survey data will be influenced, to a certain extent, by the researcher's prejudices, expectations, attitudes, opinions, and beliefs (Mouton & Marais, 1996). The fact that a participant is required to remember certain details from his/her past in order to respond to a survey meant that some of the responses would be less than reliable owing to recall bias and the lack of the importance of the events that are being recalled.

In order to increase the validity of data in this study, the following methods are used:

- data are collected from multiple sources;
- anonymous and voluntary participation is used;
- the researcher has a personal relationship with some of the participants; and
- the chosen scales are tested for reliability (internal consistency) using Cronbach's alpha.

Interviews were used to inform the contents of the professional involvement scales in order to increase the probability of the scale being valid.

4.6 Multiple testing problem

In this study, the same data are used to test eight (8) main hypotheses. This introduces a multiple testing problem (Goldman, 2008).

The probability of observing at least one significant result just due to chance in eight hypotheses is:

$$\begin{aligned} P(\text{at least one significant result}) &= 1 - P(\text{no significant result}) \\ &= 1 - (1 - 0.05)^8 \\ &= 0.33658, \text{ which is very high.} \end{aligned}$$

The Bonferroni correction is a method of dealing with this problem so that the probability of a false positive (type 1 error) remains below the desired significance level, which is 5% in this study. The Bonferroni correction adjusts

the significance level by dividing it by the number of hypotheses to be tested. In this case, the adjusted significance level is 0.00625 (= 0.05/8).

Now, the probability of observing at least one significant result just due to chance in eight hypotheses is:

P(at least one significant result) = 1 – P(no significant result)

$= 1 - (1 - 0.00625)^8$

= 0.04892, which is close to 0.05 i.e. the significance level.

Based on this, the adjusted significance level is used to test the hypotheses.

The value of the t-test statistic used is calculated using the following formula:

$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$ where *n* is the sample size.

4.7 Comparison of methodology to similar studies

Since this research has been undertaken towards the award of the degree of Master of Commerce in Actuarial Science, the technical work done had to reflect that of an actuarial science student. As such, the researcher wrote code from scratch using R-software and used numerical and statistical methods in Excel to perform all the data analysis contained herein. Typical dissertations towards the requirements for the award of the degree of Master of Commerce in Organisational Psychology in the fields related to commitment, for example studies by Kropman (unpublished), Howard (unpublished) and Giuricich (unpublished) to name a few, do not focus much on building the technical model to analyse the data but relied on commercialised software such as IBM SPSS where most of the coding had been done by the software providers.

5 Results

This section presents an analysis of the statistical results from the data that were collected in this study.

5.1 Scales used

Exploratory factor analysis, eigenvalue rule and Cronbach's alpha were used to determine the scales that were used to test the hypotheses. The results for each of these methods are discussed below.

Note the abbreviations below that are used.

CP: professional commitment;

CO: organisational commitment;

ACSS: Affective commitment to ASSA;

ACSB: Affective commitment to ASABA;

CSA: Commitment to South Africa;

PIY: Professional involvement over the past year;

PIM: Professional involvement during the past three months;

POC: Professional-organisational conflict;

PTrn: Professional turnover intention;

OTrn: Organisational turnover intention;

SATn: South African turnover intention;

SSTn: ASSA turnover intention; and

SBTn: ASABA turnover intention.

5.1.1 Eigenvalue rule

The eigenvalue rule was used to decide on the number of factors to use for each scale. The following table presents the eigenvalues that were obtained for each scale.

Table 9: The eigenvalues obtained for each respective scale

Comp.	CP	CO	ACSS	ACSB	CSA	PIY	PIM	POC	PTrn	OTrn	SATn	SSTn	SBTn
1	**4.1216**	**4.2864**	**4.5918**	**5.4177**	**4.0341**	**1.9559**	**2.4374**	**2.5201**	**2.1733**	**2.3783**	**2.2196**	**2.1679**	**2.7468**
2	**3.3164**	**3.0380**	0.5250	0.2927	**2.4083**	**1.4732**	**1.3616**	0.6575	0.4851	0.4006	0.4418	0.5533	0.1854
3	0.6822	0.9670	0.3523	0.2260	0.8329	**1.1072**	0.7817	0.4571	0.3416	0.2211	0.3386	0.2787	0.0678
4	0.5838	0.7823	0.2170	0.0416	0.6281	**0.9760**	0.6384	0.3653					
5	0.5297	0.6093	0.1910	0.0220	0.5135	0.7166	0.4477						
6	0.4210	0.4452	0.1229	0.0000	0.4793	0.6654	0.3333						
7	0.3462	0.3931			0.4139	0.5622							
8	0.3062	0.3788			0.2523	0.5435							
9	0.2650	0.3314			0.2282								
10	0.2240	0.3095			0.2095								
11	0.2040	0.2686											
12		0.1904											

A one-factor model is supported for affective commitment to ASSA because there is only one eigenvalue above 1 in the components of this commitment scale. Similarly, the number of factors used for each scale is represented by the number of components that have been bolded under that scale.

5.1.2 Cronbach's alpha coefficient

Cronbach's alpha coefficient is calculated to determine the internal consistency of the final scales that are used for hypotheses testing. The table below presents the Cronbach alpha coefficients that were obtained.

Table 10: Cronbach's Alpha Coefficients obtained for each respective scale

Scales	Sample Size	Number of Items	Cronbach's Alpha Coefficients
CP	170	11	0.8198
CO	161	12	0.7923
ACSS	149	6	0.9376
ACSB	13	6	0.9782
CSA	151	12	0.7380
PIY	187	8	0.4928
PIM	174	6	0.6985
POC	147	4	0.8037
PTrn	146	3	0.7848
OTrn	146	3	0.8654
SATn	146	3	0.8156
SSTn	145	3	0.7850
SBTn	13	3	0.9481

The affective commitment to ASABA has the highest alpha value of 0.978 and professional involvement over the past year has the lowest alpha value of 0.493.

Although the affective commitment to ASABA scale has the highest alpha value, it also has the lowest sample size of 13, and its credibility is questionable. The affective commitment to ASSA has an alpha value of 0.938, which is high. Professional involvement during the past three months has the second lowest alpha value of 0.699, which is acceptable.

5.1.3 Final scales

Based on the results above, the factors for the final scales are presented below.

Organisational commitment

For this scale:

ACOQ*i* stands for the *i'th* statement in the standard Allen & Meyer (1993) scale of Affective Commitment to the Organisation, where *i* = 1, 2, 3, 4, 5, 6. These are shown below.

ACOQ1: I would be very happy to spend the rest of my career with this organisation;

ACOQ2: I really feel as if this organisation's problems are my own;

ACOQ3: I feel a strong sense of "belonging" to my organisation;

ACOQ4: I feel "emotionally attached" to this organisation;

ACOQ5: I feel like "part of the family" at my organisation; and

ACOQ6: This organisation has a great deal of personal meaning to me.

CCOQ*i* stands for the *i'th* statement in the standard Allen & Meyer (1993) scale of Continuance Commitment to the Organisation, where *i* = 1, 2, 3, 4, 5, 6. These are shown below.

CCOQ1: Right now, staying with my organisation is a matter of necessity as much as desire;

CCOQ2: It would be very hard for me to leave my organisation right now, even if I wanted to;

CCOQ3: Too much of my life would be disrupted if I decided I wanted to leave my organisation now;

CCOQ4: I feel that I have too few options to consider leaving this organisation;

CCOQ5: If I had not already put so much of myself into this organisation, I might consider working elsewhere; and

CCOQ6: One of the few negative consequences of leaving this organisation would be the scarcity of available alternatives.

Factor1 = (ACOQ1 + ACOQ2 + ACOQ3 + ACOQ4 + ACOQ6)/5 = affective commitment to the organisation = ACO.

Commitment to ASSA

For this scale:

ACSSQ*i* stands for the *i'th* statement in the standard Allen & Meyer (1993) scale which has been adjusted for Affective Commitment to ASSA as opposed to the organisation in the Affective Commitment to the Organisation scale above, where *i* = 1, 2, 3, 4, 5, 6.

Factor1 = (ACSSQ1 + ACSSQ2 + ACSSQ3 + ACSSQ4 + ACSSQ5 + ACSSQ6)/6 = affective commitment to ASSA = ACSS.

Commitment to ASABA

For this scale:

ACSBQ*i* stands for the *i'th* statement in the standard Allen & Meyer (1993) scale which has been adjusted for Affective Commitment to ASABA as opposed to the organisation in the Affective Commitment to the Organisation scale above, where *i* = 1, 2, 3, 4, 5, 6.

Factor1 = (ACSBQ1 + ACSBQ2 + ACSBQ3 + ACSBQ4 + ACSBQ5 + ACSBQ6)/6 = affective commitment to ASABA = ACSB.

Commitment to South Africa

For this scale:

ACSAQ*i* stands for the *i'th* statement in the standard Allen & Meyer (1993) scale which has been adjusted for Affective Commitment to South Africa as opposed to the organisation in the Affective Commitment to the Organisation scale above, where *i* = 1, 2, 3, 4, 5, 6.

CCSAQ*i* stands for the *i'th* statement in the standard Allen & Meyer (1993) scale which has been adjusted for Continuance Commitment to South Africa as opposed to the organisation in the Continuance Commitment to the Organisation scale above, where *i* = 1, 2, 3, 4, 5, 6.

Factor1 = (ACSAQ1 + ACSAQ2 + ACSAQ3 + ACSAQ4 + ACSAQ5 + ACSAQ6)/6 = affective commitment to South Africa = ACSA.

Factor2 = (CCSAQ1 + CCSAQ2 + CCSAQ4 + CCSAQ6)/4 = continuance commitment to South Africa = CCSA.

CSA = (ACSA + CCSA)/2 = commitment to South Africa.

Professional involvement over the past year

For this scale, abbreviations have been used as per below.

CPD: complied with the minimum requirements for CPD;

OvrCPD: attended activities organised by the actuarial association(s) beyond those required for CPD;

Commtt: was a member of an actuarial professional committee;

Leader: was a leader in an actuarial professional committee;

AGM: attended the annual general meeting of my actuarial professional body;

Cnvtn: attended the Actuarial Convention;

CnvtnP: contributed towards a paper that was presented at the Actuarial Convention;

SAAJ: read the South African Actuarial Journal; and

SAAJP: contributed towards a paper for the South African Actuarial Journal.

Factor1 = (CPD + OvrCPD + Cnvtn)/3 = CPIY = compliance level of PIY.

Factor2 = (Commtt + Leader)/2 = OCPIY = organisational championing level of PIY.

Factor3 = (CnvtnP + SAAJP)/2 = TCPIY = thought championing level of PIY.

Factor4 = SAAJ = ICPIY = intellectual citizenship level of PIY.

(CPIY + OCPIY + TCPIY + ICPIY)/4 = PIY = professional involvement over the past year.

The definition of the levels of professional involvement, as stated in the four factors above, is consistent with that from Mokonyane & Ramjee (2014).

The alpha is low for the PIY scale.

Professional involvement during the past 3 months

For this scale, abbreviations have been used as per below.

Sessnl: attended actuarial sessional meetings;

ActJ: read actuarial journals;

Prfnwl: read professional newsletters;

Prfmag: read professional magazines;

Mentor: provided mentorship to other actuarial professionals;

Trnsfr: transferred my knowledge and skills to other actuarial professionals beyond that required by my job;

Awrnss: actively created awareness about the actuarial profession;

Encrge: encouraged people to join the actuarial profession;

VlntrA: volunteered my time within an actuarial association;

VlntrO: volunteered my time, as part of my professional involvement, outside an actuarial association;

Trnsfrm: actively contributed towards the transformation of the actuarial profession; and

Legacy: worried about the legacy of the actuarial profession.

Factor1 = (ActJ + Prfnwl + Prfmag)/3 = CPIM = compliance level of PIM.

Factor2 = (Mentor + Encrge + Trnsfrm)/3 = GCPIM = general citizenship level of PIM.

(CPIM + GCPIM)/2 = PIM = professional involvement during the past 3 months.

Professional-organisational conflict

For the professional-organisational conflict scale from Lui, Ngo & Tsang (2001), the scale items below were used.

POCQ1: The expectations of my work behaviour and attitudes from my employer are incompatible with those from my profession.

POCQ2: It is easy to be "a good employee" of my employer and "an ideal actuary" at the same time.

"A" stands for Adjusted and shows that a reverse scored item has been adjusted or "reversed".

POCQ3: The work procedures and practices of my employer sometimes deviate from the standard practices of the profession.

POCQ4: The way I do my work seems to be more accepted by my employer than by my profession.

Factor1 = (POCQ1 + POCQ2A + POCQ3 +POCQ4)/4 = POC = professional organisational conflict.

Professional turnover intentions

For this scale,

PTrnQ*i* stands for the *i'th* statement in the Meyer, Allen & Smith (1993) Professional turnover intention scale, where *i* = 1, 2, 3.

PTrnQ1: I often think about leaving the actuarial profession.

PTrnQ2: I am likely to explore other career opportunities outside the actuarial profession.

PTrnQ3: I am likely to leave the actuarial profession within the next year.

Factor1 = (PTrnQ1 + PTrnQ2 + PTrnQ3)/3 = PTrn = Professional turnover intentions.

Organisational turnover intentions

For this scale,

OTrnQ*i* stands for the *i'th* statement in the Meyer, Allen & Smith (1993) Organisational turnover intention scale, where *i* = 1, 2, 3.

OTrnQ1: I often think about leaving my employing organisation.

OTrnQ2: I am likely to explore other career opportunities outside my employing organisation.

OTrnQ3: I am likely to leave my employing within the next year.

Factor1 = (OTrnQ1 + OTrnQ2 + OTrnQ3)/3 = OTrn = Organisational turnover intentions.

SA turnover intentions

For this scale,

SATnQ*i* stands for the *i'th* statement in the Meyer, Allen & Smith (1993) Organisational turnover intention scale but adjusted for South African, where *i* = 1, 2, 3.

Factor1 = (SATnQ1 + SATnQ2 + SATnQ3)/3 = SATn = South African turnover intentions.

ASSA turnover intentions

For this scale:

SSTnQ*i* stands for the *i'th* statement in the Meyer, Allen & Smith (1993) Organisational turnover intention scale but adjusted for ASSA, where *i* = 1, 2, 3.

Factor1 = (SSTnQ1 + SSTnQ2 + SSTnQ3)/3 = SSTn = ASSA turnover intentions.

ASABA turnover intentions

For this scale:

SBTnQ*i* stands for the *i'th* statement in the Meyer, Allen & Smith (1993) Organisational turnover intention scale but adjusted for ASABA, where *i* = 1, 2, 3.

Factor1 = (SBTnQ1 + SBTnQ2 + SBTnQ3)/3 = SBTn = ASABA turnover intentions.

5.2 Analyses of scales

The table below presents the average values of the scales based on the questionnaire survey responses. Where they are available, similar scale results from the study by Bagraim (2003) and Bagraim & Fitzmaurice (unpublished) are shown. The commitment and turnover scales of ASABA are not analysed because the ASABA sample size is too small.

Table 11: A summary of the average scale values from the current study and from Bagraim (2003) and Bagraim & Fitzmaurice (unpublished)

Scale	Average scale values (current study)	Average scale values (Bagraim & Fitzmaurice (unpublished))
ACP	4.186	4
CCP	3.580	3.5
CP	3.883	
ACO	3.519	
CCO	2.713	
CO	3.116	
ACSS	3.427	
ACSA	3.857	
CCSA	2.675	
CSA	3.266	
POC	2.039	
CPIY	1.150	
ICPIY	1.599	
OCPIY	1.738	
TCPIY	1.904	
PIY	1.598	
CPIM	2.921	
GCPIM	3.371	
PIM	3.146	
PTrn	1.824	
OTrn	2.390	
SSTn	1.618	
SATn	2.158	

A scale value of 4 for affective commitment to the profession means that, on average, the group of actuaries who responded to the questionnaire agree with all the questions that they were asked about their affective commitment to the profession. This means that they tend to agree that they like being actuaries, they are enthusiastic about being actuaries, they are proud of the actuarial profession,

they are glad to have entered the actuarial profession and they identify with the actuarial profession.

The responses for CPIY, ICPIY, OCPIY, TCPIY and PIY are binary "yes" and "no" and take the value 1 and 2 respectively. For non-binary responses, except for CPIM, GCPIM and PIM, values between one and three represent low levels of the scale being examined, and those between three and five represent high levels. Scale values around three represent a general neutral response to the idea being examined by the scale. The scale values for CPIM, GCPIM and PIM work in the opposite way with (1;3) representing high involvement and (3;5) low levels of involvement.

Below is a comparison of the above scale values from this study, split by age bands, using a two-sided t-test. Two participants chose not to provide their age. It was decided to include their responses with the 40+ age group responses.

Table 12: An age-band comparison of the scale values

Scales	Aged less than 40	Aged 40 and more	p-value	Sample size (n)
ACP	4.153	4.270	0.248	170
CCP	3.502	3.772	0.074	170
CP	3.828	4.021	0.039	170
ACO	3.496	3.544	0.727	161
CCO	2.527	2.889	**0.004**	161
CO	3.011	3.217	0.027	161
ACSS	3.233	3.728	**0.001**	149
ACSA	3.827	3.997	0.162	151
CCSA	2.571	2.783	0.124	151
CSA	3.199	3.390	0.027	151
POC	2.003	2.058	0.659	147
CPIY	1.132	1.122	0.805	187
ICPIY	1.654	1.483	0.042	187
OCPIY	1.815	1.592	**0.000**	187
TCPIY	1.926	1.842	0.058	187
PIY	1.632	1.510	**0.000**	187
CPIM	3.078	2.756	**0.016**	174
GCPIM	3.436	3.233	0.160	174
PIM	3.257	2.994	**0.020**	174
PTrn	1.802	1.800	0.985	146
OTrn	2.399	2.389	0.952	146
SSTn	1.675	1.517	0.197	145
SATn	2.111	2.167	0.737	146

There is a difference, at 5% significance level, between younger and older Fellows in their continuance commitment to their employing organisation and affective commitment to the Actuarial Society of South Africa, with older Fellows showing a higher commitment on both scales. The most significant result, at 5% significance level, is on the difference between younger and older actuaries when considering the organisational championing level of professional involvement scale and the general professional involvement over the past year. Older Fellows are more likely to be members of actuarial committees and lead such committees compared to younger Fellows. Younger actuaries were generally less involved in the profession over the past year compared to older actuaries. A similar result is found when looking at professional involvement during the past three months at a 5% significance level. On average, older Fellows are more likely to read actuarial journals, professional newsletters and magazines than the younger Fellows and this result is significant at 5% level.

Below is a comparison of the scale values, split by gender. The scales were tested for gender differences using a two-sided t-test.

Table 13: A gender comparison of the scale values

	Gender			
Scale	**Female**	**Male**	**p-value**	**Sample size (n)**
ACP	4.263	4.183	0.491	170
CCP	3.576	3.631	0.755	170
CP	3.92	3.907	0.906	170
ACO	3.371	3.564	0.224	161
CCO	2.59	2.711	0.409	161
CO	2.98	3.138	0.142	161
ACSS	3.319	3.484	0.341	149
ACSA	3.814	3.928	0.417	151
CCSA	2.6	2.682	0.606	151
CSA	3.207	3.305	0.327	151
POC	2.043	2.021	0.880	147
CPIY	1.133	1.126	0.864	187
ICPIY	1.600	1.575	0.800	187
OCPIY	1.786	1.698	0.214	187
TCPIY	1.843	1.906	0.219	187
PIY	1.590	1.576	0.712	187
CPIM	3.019	2.915	0.501	174
GCPIM	3.362	3.346	0.923	174
PIM	3.190	3.131	0.647	174
PTrn	1.790	1.805	0.925	146
OTrn	2.362	2.406	0.823	146
SSTn	1.657	1.591	0.639	145
SATn	2.267	2.091	0.353	146

From the table above showing a gender comparison of the scale values, there was no scale with a p-value below 0.025 for a two-tailed test of 5% significance. This shows that the results of the current study found no statistically significant gender difference in the commitment, conflict, involvement and turnover intentions levels of Fellows at 5% significance level. In fact, this result holds at 25% significance level.

An age-gender split of the scale values is shown below. Respondents who did not provide their ages were included in the 40+ age group.

Table 14: An age-band and gender comparison of the scale values

	Gender-age bands			
Scales	**Females aged less than 40**	**Females aged 40 and more**	**Males aged less than 40**	**Males aged 40 and more**
ACP	4.250	4.314	4.102	4.264
CCP	3.482	3.952	3.513	3.748
CP	3.866	4.133	3.807	4.006
ACO	3.411	3.214	3.541	3.588
CCO	2.494	2.976	2.544	2.877
CO	2.952	3.095	3.042	3.232
ACSS	3.321	3.310	3.186	3.783
ACSA	3.738	4.119	3.874	3.981
CCSA	2.652	2.393	2.528	2.835
CSA	3.195	3.256	3.201	3.408
POC	1.955	2.393	2.028	2.014
CPIY	1.143	1.095	1.126	1.126
ICPIY	1.679	1.287	1.642	1.509
OCPIY	1.857	1.500	1.792	1.604
TCPIY	1.875	1.714	1.953	1.858
PIY	1.638	1.399	1.628	1.524
CPIM	3.060	2.857	3.088	2.742
GCPIM	3.387	3.262	3.462	3.230
PIM	3.223	3.060	3.275	2.986
PTrn	1.738	2.000	1.836	1.774
OTrn	2.369	2.333	2.415	2.396
SSTn	1.631	1.762	1.698	1.484
SATn	2.262	2.286	2.031	2.151

A two-sample t-test was performed on each scale to determine whether there was a difference in the responses between respondents with the following characteristics:

Females aged below 40 (F<40) with a sample size of 28;

Females aged 40 and above (F>=40) with a sample size of seven;

Males aged below 40 (M<40) with a sample size of 53; and

Males aged 40 and above (M>=40) with a sample size of 53.

The p-values of the tests are shown below.

Table 15: The p-values of the age-band and gender comparison of the scale values

Scales	F<40 & F>=40	F<40 & M<40	F<40 & M>=40	F>=40 & M>=40	F>=40 & M<40	M<40 & M>=40
ACP	0.815	0.270	0.923	0.842	0.340	0.149
CCP	0.161	0.885	0.198	0.562	0.228	0.190
CP	0.145	0.622	0.285	0.598	0.135	0.081
ACO	0.565	0.513	0.317	0.232	0.367	0.768
CCO	0.191	0.780	0.027	0.719	0.148	**0.014**
CO	0.567	0.496	0.027	0.504	0.812	0.066
ACSS	0.967	0.452	0.029	0.223	0.704	**0.001**
ACSA	0.286	0.443	0.161	0.601	0.377	0.415
CCSA	0.449	0.512	0.313	0.178	0.691	0.052
CSA	0.811	0.958	0.093	0.451	0.767	**0.025**
POC	0.207	0.641	0.722	0.252	0.243	0.918
CPIY	0.583	0.751	0.744	0.734	0.744	1.000
ICPIY	0.060	0.743	0.148	0.273	0.073	0.172
OCPIY	**0.013**	0.343	**0.003**	0.530	0.030	**0.007**
TCPIY	0.234	0.088	0.806	0.274	**0.007**	0.043
PIY	**0.003**	0.787	**0.013**	0.154	**0.003**	**0.006**
CPIM	0.587	0.884	0.086	0.683	0.464	**0.019**
GCPIM	0.716	0.696	0.419	0.928	0.571	0.167
PIM	0.550	0.742	0.117	0.778	0.440	0.028
PTrn	0.471	0.580	0.839	0.503	0.634	0.676
OTrn	0.940	0.851	0.908	0.870	0.843	0.921
SSTn	0.672	0.712	0.242	0.279	0.863	0.128
SATn	0.960	0.281	0.638	0.750	0.495	0.504

When splitting the responses by both gender and age, the cells in dark green with bold and underlined p-values above show a 5% significant difference in gender for groupings with the same gender but different age groupings and vice versa, and those with different genders and age groupings. The scales are interpreted similar to the analysis after table 11 above using the bolded and underlined p-values in dark green cells from table 14 and scale values from table 13. Here, there is a significant difference at 5% significance level in the commitment levels to South Africa of younger male Fellows compared to older male Fellows, with younger fellows showing less commitment. Older female Fellows are much more likely to have contributed towards a paper at the Actuarial Convention and/or in the South African Actuarial Journal, thus showing championing level of PIY, than younger male Fellows and this result holds at 5% significance level. Cells in the table above that are highlighted in light green and

have a p-value that is underlined but not bolded show a relationship that is significant at 10% significance level. Older male Fellows are more committed to their employing organisation than younger female Fellows and this relationship is significant at 10% significance level.

A presentation of the scale values, split by race, is shown below.

Table 16: A comparison of the scale values by race

	Race				
Scales	**African black**	**Coloured**	**Indian**	**White**	**Prefer not to answer**
ACP	4.44	2.8	4.22	4.221	3.978
CCP	3.567	4.667	3.483	3.635	3.444
CP	4.003	3.733	3.852	3.928	3.711
ACO	3.933	2.167	3.75	3.532	2.981
CCO	2.567	3.667	2.3	2.703	2.778
CO	3.25	2.917	3.025	3.117	2.88
ACSS	4.033	1.667	3.55	3.437	3.278
ACSA	3.467	2.833	4.067	3.964	3.241
CCSA	2.95	3	2.2	2.647	3.167
CSA	3.208	2.917	3.133	3.305	3.204
POC	2.2	3.75	2.175	1.978	2.194
CPIY	1	1.333	1.233	1.126	1.074
ICPIY	1.6	2	1.4	1.595	1.556
OCPIY	1.5	2	1.8	1.72	1.722
TCPIY	1.8	2	1.85	1.905	1.778
PIY	1.475	1.833	1.571	1.587	1.532
CPIM	2.533	5	2.567	2.991	2.704
GCPIM	1.867	4.833	3.083	3.44	3.148
PIM	2.2	4.917	2.825	3.216	2.926
PTrn	1.867	3.333	2.133	1.710	2.407
OTrn	2.933	5.000	2.667	2.300	2.778
SSTn	1.733	1.667	1.767	1.529	2.370
SATn	2.667	3.333	2.233	1.989	3.481

On average, the turnover intentions indicate that the group of Black and White Fellows were leaning towards remaining in the profession, employing organisation, Actuarial Society of South Africa and South Africa although the intention to remain was much stronger throughout among White Fellows than Black Fellows.

The number of African Black, Coloured, Indian, White people and those who preferred not to provide their race were 5, 1, 10, 116 and 9 respectively. In the

table below, all black races are combined and the scale values of the black and white groups are compared using a two-sided t-test.

Table 17: The p-values of the comparison of the scale values by race

Scales	Black	White	p-value (t-test)
ACP	4.200	4.221	0.896
CCP	3.583	3.635	0.828
CP	3.892	3.928	0.804
ACO	3.708	3.532	0.397
CCO	2.469	2.703	0.245
CO	3.089	3.117	0.847
ACSS	3.583	3.437	0.526
ACSA	3.802	3.964	0.384
CCSA	2.484	2.647	0.448
CSA	3.143	3.305	0.234
POC	2.281	1.978	0.105
CPIY	1.167	1.126	0.511
ICPIY	1.500	1.595	0.475
OCPIY	1.719	1.720	0.991
TCPIY	1.844	1.905	0.349
PIY	1.557	1.587	0.567
CPIM	2.708	2.991	0.186
GCPIM	2.813	3.440	**0.004**
PIM	2.760	3.216	**0.010**
PTrn	2.125	1.710	0.032
OTrn	2.896	2.300	**0.022**
SSTn	1.750	1.529	0.196
SATn	2.438	1.989	0.060

At 5% significance, there is a difference in the general citizenship level of PIM between Black and White Fellows. Black Fellows are much more likely to mentor someone within the actuarial profession, encourage people to join the profession and/or actively contribute towards the transformation of the actuarial profession than white Fellows. There is a significant difference in the organisational turnover intentions and professional turnover intentions of Black and White Fellows. At 5% significance level, White Fellows are much more likely to intend to remain at their employing organisation than Black Fellows. At 10% significance level, White Fellows are much more likely to intend to remain within the actuarial profession than Black Fellows.

5.3 Testing the hypotheses

Pearson's correlation coefficients were used to test most of the hypotheses that were presented in section 3. The correlation matrix of all the scales used in this study is presented below. The Pearson's correlation coefficient can be represented by the following formula:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\sqrt{(n\sum x^2 - (\sum x)^2)(n\sum y^2 - (\sum y)^2)}}, -1 \leq r \leq 1$$

Table 18: The correlation matrix of the scales

	ACP	CCP	CP	ACO	CCO	CO	ACSS	ACSA	CCSA	CSA	POC	CPIYa	ICPIYa	OCPIYa	TCPIYa	PIYa	CPIMa	GCPIMa	PIMa	PTrn	OTrn	SSTn	SATn
ACP	1.00																						
CCP	0.06	1.00																					
CP	0.61	0.83	1.00																				
ACO	0.34	-0.04	0.15	1.00																			
CCO	-0.13	0.32	0.19	0.04	1.00																		
CO	0.16	0.19	0.24	0.75	0.69	1.00																	
ACSS	0.67	0.16	0.49	0.32	-0.06	0.20	1.00																
ACSA	0.23	-0.13	0.03	0.40	-0.17	0.19	0.21	1.00															
CCSA	-0.13	0.25	0.13	0.03	0.48	0.34	-0.06	-0.04	1.00														
CSA	0.06	0.10	0.11	0.30	0.25	0.39	0.10	0.65	0.73	1.00													
POC	-0.26	-0.05	-0.18	-0.40	0.16	-0.19	-0.14	-0.19	0.04	-0.10	1.00												
CPIYa	0.17	0.13	0.19	-0.01	-0.05	-0.04	0.19	0.13	0.08	0.16	-0.11	1.00											
ICPIYa	0.09	-0.03	0.03	0.01	-0.04	-0.02	0.12	0.10	0.12	0.16	0.06	-0.04	1.00										
OCPIYa	0.09	-0.03	0.03	0.04	-0.07	-0.01	0.24	0.20	0.08	0.20	0.06	-0.10	0.01	1.00									
TCPIYa	0.05	0.08	0.09	-0.01	0.08	0.05	0.08	0.08	0.19	0.20	0.09	-0.07	-0.18	-0.24	1.00								
PIYa	0.16	0.04	0.12	0.01	-0.07	-0.03	0.27	0.19	0.17	0.26	0.05	-0.39	-0.70	-0.56	-0.58	1.00							
CPIMa	0.34	-0.01	0.18	0.05	-0.02	0.03	0.27	-0.03	-0.05	-0.06	-0.11	-0.08	-0.39	-0.03	-0.01	-0.29	1.00						
GCPIMa	0.26	-0.09	0.07	0.13	-0.19	-0.03	0.27	0.17	0.05	0.15	-0.05	-0.40	-0.19	-0.41	-0.34	-0.53	-0.30	1.00					
PIMa	0.38	-0.09	0.14	0.09	-0.17	-0.05	0.32	0.07	0.01	0.06	-0.10	-0.31	-0.35	-0.28	-0.22	-0.49	-0.79	-0.82	1.00				
PTrn	-0.56	-0.22	-0.48	-0.36	0.06	-0.23	-0.44	-0.14	-0.01	-0.11	0.37	0.04	-0.02	-0.04	-0.11	-0.05	0.13	0.00	0.07	1.00			
OTrn	-0.18	0.12	0.00	-0.49	0.08	-0.31	-0.07	-0.23	-0.03	-0.18	0.33	-0.07	0.13	-0.03	0.03	0.06	0.06	0.00	0.04	0.40	1.00		
SSTn	-0.35	-0.19	-0.35	-0.44	0.00	-0.33	-0.45	-0.28	-0.08	-0.26	0.39	0.05	0.07	0.06	0.02	0.09	-0.02	-0.02	-0.03	0.54	0.35	1.00	
SATn	-0.15	0.05	-0.04	-0.36	0.13	-0.19	-0.08	-0.64	0.00	-0.44	0.27	0.12	0.04	0.08	-0.09	0.06	-0.12	0.01	-0.07	0.32	0.47	0.42	1.00

In the above table, the professional involvement over the past year and professional involvement during the past three months' scales were adjusted in order for the correlations to be more intuitive by using the following adjustment factors:

CPIYa (CPIY adjusted) = 3 – CPIY;

ICPIYa (ICPIY adjusted) = 3 – ICPIY;

OCPIYa (OCPIY adjusted) = 3 – OCPIY;

TCPIYa (TCPIY adjusted) = 3 – TCPIY;

PIYa (PIY adjusted) = 3 – PIY;

CPIMa (CPIM adjusted) = absolute value of (CPIM – 6);

GCPIMa (GCPIM adjusted) = absolute value of (GCPIM –6); and

PIMa (PIM adjusted) = absolute value of (PIM –6).

R-values in the range of (0.5; 1) are highlighted with a green colour and r-values in the range (-1; -0.5) are highlighted in a red colour. R-values in the range (0.5; 1) and (-1; -0.5) represent a high correlation. R-values in the range of (0.3; 0.5) are highlighted with a light green colour and r-values in the range and (-0.5; -0.3) are highlighted in a pink colour. R-values in the range (0.3; 0.5) and (-0.5; -0.3) represent a medium correlation. All items in the diagonals are perfectly correlated.

Affective professional commitment has a high positive correlation with affective commitment to ASSA, with an r-value of 0.67, and a high negative correlation with professional turnover intentions, with an r-value of -0.56. Professional turnover intention has a high positive correlation with ASSA turnover intention, with an r-value of 0.54. The intention to leave South Africa has a high negative correlation with affective commitment to South Africa, with an r-value of -0.64. Professional commitment is highly correlated with affective and continuance professional commitment with r-values of 0.61 and 0.83 respectively. The relationship between professional commitment and continuance professional commitment is the relationship with the highest correlation in the above correlation matrix. It is interesting to note that the intention to leave South Africa has no correlation with continuance commitment to South Africa, with an r-value of 0.00. From Bagraim (2003), the correlation between affective professional commitment and continuance professional commitment for South African actuarial professionals had an r-value of 0.18. For the current study, this relationship is weaker with an r-value of 0.06.

The above table shows Pearson's correlation coefficients for the items in the table. For each hypothesis, r is used to test the population correlation ρ. The null hypothesis, $H_0: \rho = 0$, is tested against the alternative hypothesis, $H_A: \rho \neq 0$ at 5% significance level. It is important to note that the multiple testing problem is relevant here and the adjusted significance level is 0.00625.

Table 19: The t-test statistics that will be used to test the correlation between the items in the table

	ACP	CCP	CP	ACO	CCO	CO	ACSS	ACSA	CCSA	CSA	POC	CPIYa	ICPIYa	OCPIYa	TCPIYa	PIYa	CPIMa	GCPIMa	PIMa	PTrn	OTrn	SSTn	SATn
ACP																							
CCP																							
CP																							
ACO	4.56	-0.50	1.91																				
CCO	-1.65	4.26	2.44	0.50																			
CO	2.04	2.44	3.12	14.30	12.02																		
ACSS	10.94	1.97	6.82	4.10	-0.73	2.47																	
ACSA	2.88	-1.60	0.37	5.33	-2.11	2.36	2.62																
CCSA	-1.60	3.15	1.60	0.37	6.68	4.41	-0.73	-0.49															
CSA	0.73	1.23	1.35	3.84	3.15	5.17	1.23	10.44	13.04														
POC	-3.24	-0.60	-2.20	-5.26	1.95	-2.33	-1.70	-2.33	0.48	-1.21													
CPIYa	2.24	1.70	2.51	-0.13	-0.63	-0.50	2.35	1.60	0.98	1.98	-1.33												
ICPIYa	1.17	-0.39	0.39	0.13	-0.50	-0.25	1.47	1.23	1.48	1.98	0.72	-0.54											
OCPIYa	1.17	-0.39	0.39	0.50	-0.88	-0.13	3.00	2.49	0.98	2.49	0.72	-1.37	0.14										
TCPIYa	0.65	1.04	1.17	-0.13	1.01	0.63	0.97	0.98	2.36	2.49	1.09	-0.95	-2.49	-3.36									
PIYa	2.10	0.52	1.57	0.13	-0.88	-0.38	3.40	2.36	2.11	3.29	0.60	-5.76	-13.33	-9.19	-9.68								
CPIMa	4.69	-0.13	2.37	0.63	-0.25	0.38	3.40	-0.37	-0.61	-0.73	-1.33	-1.09	-5.76	-0.41	-0.14	-4.12							
GCPIMa	3.49	-1.17	0.91	1.65	-2.44	-0.38	3.40	2.11	0.61	1.85	-0.60	-5.94	-2.63	-6.11	-4.92	-8.50	-4.12						
PIMa	5.32	-1.17	1.83	1.14	-2.18	-0.63	4.10	0.86	0.12	0.73	-1.21	-4.43	-5.08	-3.97	-3.07	-7.65	-16.90	-18.79					
PTrn	-8.11	-2.71	-6.57	-4.63	0.72	-2.84	-5.88	-1.70	-0.12	-1.33	4.78	0.48	-0.24	-0.48	-1.33	-0.60	1.57	0.00	0.84				
OTrn	-2.20	1.45	0.00	-6.75	0.96	-3.91	-0.84	-2.84	-0.36	-2.20	4.19	-0.84	1.57	-0.36	0.36	0.72	0.72	0.00	0.48	5.24			
SSTn	-4.47	-2.31	-4.47	-5.86	0.00	-4.18	-6.03	-3.49	-0.96	-3.22	5.06	0.60	0.84	0.72	0.24	1.08	-0.24	-0.24	-0.36	7.67	4.47		
SATn	-1.82	0.60	-0.48	-4.63	1.57	-2.32	-0.96	-10.00	0.00	-5.88	3.36	1.45	0.48	0.96	-1.08	0.72	-1.45	0.12	-0.84	4.05	6.39	5.55	

The results of the two-sided hypothesis tests are shown below. The t-value is extracted from a cell, in table 18, which corresponds with the t-value of the pair of scales whose relationship is being tested. The p-value is determined with reference to a t-distribution with *n*-2 degrees of freedom. Since all samples have more than 122 responses, a standard normal distribution can also be used to determine the p-value.

Table 20: The results of the hypotheses tests

Hypothesis	**Sample size (n)**	**t-value**	**p-value**	**Decision**
1a (PIYa, CP)	170	1.57	0.058	Fail to reject H_0
1a (PIYa, ACP)	170	2.1	0.018	Fail to reject H_0
1a (PIYa, CCP)	170	0.52	0.302	Fail to reject H_0
1a (CPIYa, CP)	170	2.51	0.006	**Reject H_0**
1a (CPIYa, ACP)	170	2.24	0.013	Fail to reject H_0
1a (CPIYa, CCP)	170	1.7	0.045	Fail to reject H_0
1a (ICPIYa, CP)	170	0.39	0.348	Fail to reject H_0
1a (ICPIYa, ACP)	170	1.17	0.121	Fail to reject H_0
1a (ICPIYa, CCP)	170	-0.39	0.348	Fail to reject H_0
1a (OCPIYa, CP)	170	0.39	0.348	Fail to reject H_0
1a (OCPIYa, ACP)	170	1.17	0.121	Fail to reject H_0
1a (OCPIYa, CCP)	170	-0.39	0.348	Fail to reject H_0
1a (TCPIYa, CP)	170	1.17	0.121	Fail to reject H_0
1a (TCPIYa, ACP)	170	0.65	0.258	Fail to reject H_0
1a (TCPIYa, CCP)	170	1.04	0.149	Fail to reject H_0
1a (PIMa, CP)	170	1.83	0.034	Fail to reject H_0
1a (PIMa, ACP)	170	5.32	0	**Reject H_0**
1a (PIMa, CCP)	170	-1.17	0.121	Fail to reject H_0
1a (CPIMa, CP)	170	2.37	0.009	Fail to reject H_0

1a (CPIMa, ACP)	170	4.69	0	**Reject H_0**
1a (CPIMa, CCP)	170	-0.13	0.448	Fail to reject H_0
1a (GCPIMa, CP)	170	0.91	0.181	Fail to reject H_0
1a (GCPIMa, ACP)	170	3.49	0	**Reject H_0**
1a (GCPIMa, CCP)	170	-1.17	0.121	Fail to reject H_0
1b (ACSS, PIYa)	149	3.4	0	**Reject H_0**
1b (ACSS, CPIYa)	149	2.35	0.009	Fail to reject H_0
1b (ACSS, ICPIYa)	149	1.47	0.071	Fail to reject H_0
1b (ACSS, OCPIYa)	149	3	0.001	**Reject H_0**
1b (ACSS, TCPIYa)	149	0.97	0.166	Fail to reject H_0
1b (ACSS, PIMa)	149	4.1	0	**Reject H_0**
1b (ACSS, CPIMa)	149	3.4	0	**Reject H_0**
1b (ACSS, GCPIMa)	149	3.4	0	**Reject H_0**
2a (CP, PTrn)	146	-6.57	0	**Reject H_0**
2a (ACP, PTrn)	146	-8.11	0	**Reject H_0**
2a (CCP, PTrn)	146	-2.71	0.003	**Reject H_0**
2a (CP, SSTn)	145	-4.47	0	**Reject H_0**
2a (ACP, SSTn)	145	-4.47	0	**Reject H_0**
2a (CCP, SSTn)	145	-2.31	0.01	Fail to reject H_0
2b (ACSS, PTrn)	146	-5.88	0	**Reject H_0**
2b (ACSS, SSTn)	145	-6.03	0	**Reject H_0**
3 (PIYa, PTrn)	146	-0.60	0.274	Fail to reject H_0
3 (CPIYa, PTrn)	146	0.48	0.316	Fail to reject H_0
3 (ICPIYa, PTrn)	146	-0.24	0.405	Fail to reject H_0
3 (OCPIYa, PTrn)	146	-0.48	0.316	Fail to reject H_0
3 (TCPIYa, PTrn)	146	-1.33	0.092	Fail to reject H_0
3 (PIYa, SSTn)	145	1.08	0.140	Fail to reject H_0

3 (CPIYa, SSTn)	145	0.6	0.274	Fail to reject H_0
3 (ICPIYa, SSTn)	145	0.84	0.200	Fail to reject H_0
3 (OCPIYa, SSTn)	145	0.72	0.236	Fail to reject H_0
3 (TCPIYa, SSTn)	145	0.24	0.405	Fail to reject H_0
3 (PIMa, PTrn)	146	0.84	0.200	Fail to reject H_0
3 (CPIMa, PTrn)	146	1.57	0.058	Fail to reject H_0
3 (GCPIMa, PTrn)	146	0	0.5	Fail to reject H_0
3 (PIMa, SSTn)	145	-0.36	0.359	Fail to reject H_0
3 (CPIMa, SSTn)	145	-0.24	0.405	Fail to reject H_0
3 (GCPIMa, SSTn)	145	-0.24	0.405	Fail to reject H_0
4a (POC, PIYa)	147	0.6	0.274	Fail to reject H_0
4a (POC, CPIYa)	147	-1.33	0.092	Fail to reject H_0
4a (POC, ICPIYa)	147	0.72	0.236	Fail to reject H_0
4a (POC, OCPIYa)	147	0.72	0.236	Fail to reject H_0
4a (POC, TCPIYa)	147	1.09	0.138	Fail to reject H_0
4a (POC, PIMa)	147	-1.21	0.113	Fail to reject H_0
4a (POC, CPIMa)	147	-1.33	0.092	Fail to reject H_0
4a (POC, GCPIMa)	147	-0.6	0.274	Fail to reject H_0
4b (POC, PTrn)	146	4.78	0	**Reject H_0**
4b (POC, SSTn)	145	5.06	0	**Reject H_0**

The results of the above hypotheses are discussed in section 6 below. Note that many more hypotheses would have been rejected had the significance level not been adjusted.

5.4 Regression model results

The following regression models were found to be the best fit at 5% significance level. There is no need to adjust the significance level for the regression models. The sample size used is 141.

Table 21: The final regression models of the scales

Model	**Adjusted R^2**	**p-value**
ACP = 4.2364		$< 2e^{-16}$
CCP = 3.707 – 0.8351*Gender – 1.2579*Race1 + 1.4351*ASABAM	0.3845	0.0081
ACO = 3.5333 – 0.6861*IFAM	0.1909	0.0241
CCO = 2.8214 – 0.5992*Gender – 1.0714*Race1	0.2654	0.0206
ACSA = 4.0439 – 1.4327*ASABAM	0.3506	0.0022
CCSA = 2.8929 – 0.6845*Gender – 1.0179*Race1	0.2696	0.0195
ACSS = 2.36189 + 0.02982*Age	0.1758	0.0297
POC = 1.5 + 0.6875*ErTypa	0.1383	0.0495
PIYa = -0.02113 + 0.18467*ACP + 0.15203*PTrn + 0.01178*Age – 0.18673*PrAreB	0.4413	0.0067
PIMa = 1.5965 + 0.84229*ACP – 0.23868*CCP – 0.49058*CCO – 0.27792*ACSS + 0.24078*OTrn – 1.41281*Gender + 1.31971*CoreFA	**0.7619**	0.0001
PTrn = 4.93912 – 0.97263*ACP – 0.26276*CCP + 2.20996*PIYa – 0.03789*Age + 0.67044*PrArea	**0.6628**	0.0003
OTrn = 9.14471 – 1.00635*ACP – 0.67602*ACO - 0.5207*CCO + 0.54453*POC – 0.61309*PTrn + 0.02592*WrkHrs + 1.06555*PrAreB	**0.7023**	0.0005
SSTn = 0.97566 + 0.24897*SATn	0.2577	0.0093
SATn = 4.0965 - 0.7299*ACSA + 0.314*OTrn	**0.6355**	0.0178

Table 20 shows that the best way to predict the affective commitment of actuaries to the profession, at 5% significance level, is through a constant of 4.2364. This suggests that Fellows, generally, have a very high affective commitment to the profession. They would tend to like being actuaries, be

enthusiastic about being actuaries, be proud of the actuarial profession, be glad to have entered the actuarial profession and identify with the actuarial profession.

The adjusted R^2 values are higher than 0.5 for the following models, and have been bolded in table 20 above:

- professional involvement during the past three months;
- professional turnover intention, organisational turnover intention; and
- intention to leave South Africa.

Regression results that are significant at 5% significance level and have adjusted R^2 values that are greater than 0.5 are important to note. The development of the regression model where the intention to leave South Africa is the dependent variable was used to illustrate how the multiple linear regression results were obtained. The resulting model shows that the intention to leave South Africa reduces as a Fellow's affective commitment to South Africa increases while the intention to leave South Africa increases at a Fellow's intention to leave their employing organisation increases. A unit increase in the affective commitment to South Africa results in a 0.7299 decrease in the intention to leave South Africa scale while a unit increase in the intention to leave their employing organisation scale results in a 0.314 increase in the intention to leave South Africa scale.

The regression model of professional-organisational conflict in the above table relates professional-organisational conflict with employer type.

6 Discussion

This study examines the nature and outcome of actuaries' commitment to their profession. A two-sided t-test is used to test the correlation between professional commitment and its outcomes, as proposed by literature. A regression model is used to test whether there is a difference in the professional-organisational conflict experienced by actuaries working for traditional and non-traditional employers. The sample size of the data used for this discussion will affect the amount of credibility that can be placed on the insights found from each data collection method. High credibility is placed on data from the questionnaire while it would be difficult to place a high amount of credibility on data from the interviews and focus groups. This is a weakness in the interpretability of the results from the interviews and focus groups. However, the interviews were useful to provide better direction on what the questionnaire should focus on and the focus groups were important in checking the reasonability of the questionnaire results and the researcher's interpretation of these.

6.1 The nature of actuaries' commitment to the profession

In this study, the nature of professional commitment among actuaries is explained using two components, i.e. affective and continuance commitments. The scale values of both affective and continuance professional commitments are high, with the former being higher than the latter. A comparison of the affective and continuance professional commitment scales from this study to that of the Bagraim & Fitzmaurice (unpublished) study shows that these two commitment scales have remained steady among actuaries for over 10 years, even when the profession has undergone much change during this period. This suggests that the changes have not been significant enough to impact the nature of actuaries' professional commitment during this period. This is supported by Meyer, Allen & Topolnytsky (1998) who found that changes that affected the nature of

professionals' commitment levels were those linked to significant professional changes such as mergers and acquisitions, which were not experienced in the South African environment. One could argue that there was significant change in the professional association that most actuaries in South Africa belonged to. This change occurred when they opted to cease their membership of international actuarial bodies and only belong to ASSA. As such, it is expected that the level of commitment to the professional association is significantly different from the level that would have been observed over 10 years earlier had they been recorded.

Although a literature review was performed to inform the choice of using the Meyer, Allen & Smith (1993) commitment model, it is worth noting that the use of another model for commitment levels among Fellows could lead to different results from the ones obtained in the current study.

6.1.1 Age effects on commitment, conflict, professional involvement and turnover intentions

There is no significant evidence to suggest that the professional commitment levels of actuaries differ by age at 5% significance level. In fact, the same is true when looking at gender and race. This result is important because it indicates that the nature and level of professional commitment does not rely on the demographics of the professional. This is supported by the regression line of a constant for affective professional commitment. The regression line for continuance professional commitment has gender and race as explanatory variables but its adjusted R^2 value is low. This further supports the assertion that professional commitment does not rely on demographics.

While there is no significant difference in professional commitment based on demographics, commitment to the professional association (ASSA) differs by age. This study provides evidence that actuaries aged 40 and older have more of an emotional attachment (affective commitment) to their professional association and

they are more involved in the profession compared to those aged below 40. The age difference is prevalent among male actuaries, with older actuaries being more committed to the Society than their younger counterparts. This result was expected because older actuaries would typically have been members of ASSA for a longer time compared to the younger actuaries. Over this longer period, they would have had more opportunities to get an affectionate attachment to the Society. Older actuaries' level of professional involvement is significantly more on aspects around organisational championing, overall professional involvement over the past year, compliance and overall professional involvement during the past three months. This is supported by interview discussions where younger participants felt they had to have a lot of experience, which comes with age, before they were worthy to participate and get involved in the profession. When asked about his involvement in professional committees, one interviewee with 5 years' actuarial work experience said, "*It feels like I'm a bit too young, really, to have a voice. I mean, if some of the people on committees have 20-30 years' experience. So, for me it is about what can I really bring… if I'm really needed*." A group of siblings involved in the focus group indicated that they would expect similar results based on the way professional involvement was quantified in this study. The older group of actuaries from the focus groups commented that actuaries start having more time to get involved in the profession closer to retirement age and beyond. Another group suggested that older actuaries could delegate their own work at their employers so that they could create time to get involved in the profession. They also have the ability to influence their employers more, compared to younger actuaries, to ensure their own involvement. These are valid observations from the focus groups. The interview and focus groups were used to provide qualitative input on the quantitative study about the professional commitment of actuaries and its outcomes. As such, anecdotal results are treated as qualitative inputs to the current study and support the results of the qualitative analysis of the questionnaire data.

Although not always the case, the older an actuary gets the more likely that they will occupy a senior role, e.g. manager, executive or partner, at their employer and be in a better position to manage any professional-organisational conflict. There was no age difference in the perceived professional-organisational conflict levels among the questionnaire participants. This result was unexpected and conflicts with the findings by Aranya & Ferris (1984), Wallace (1993), Brierley & Cowton (2000) and Kalbers & Cenker (2007) who found professional-organisational conflict to reduce as seniority increased. The general level of professional-organisational conflict was very low among actuaries and this might explain why there was no correlation with age.

Younger actuaries were just as likely as older actuaries to intend to change employers. This result challenges the notion that younger people prefer to job hop and suggests that there may be other reasons why younger actuaries change employers. Young actuaries are generally better paid compared to other professionals at the same age. This could explain why there was no age effect on the professional and professional association turnover intentions of actuaries in this study, invalidating the results from Dhawan & Mulla (2011) when using age as a proxy for years of work experience.

6.1.2 Gender effects on commitment, conflict, professional involvement and turnover intentions

There is no significant gender difference on all scales included in this study at 5% significance level, as seen in Ngo & Tsang (1998). Bellis (1996) puts forward that women are just as determined to make a success of their careers as men are in the actuarial profession but they are often not given the opportunities they seek. Based on studies by Meyer & Allen (1991), Clugston, Howell & Dorfman (2000) and Gendron, Suddaby & Qu (2009), these results suggest that the cultural socialisation of female actuaries in to the profession, professional association and employers is similar to that of male actuaries. One focus group participant

highlighted that the actuarial profession was largely based on meritocracy and individuals' demographics played a lesser role. Two focus group participants were surprised that there was no gender difference, which they expected to be observed on the affective professional commitment scale. A linear regression of continuance professional commitment showed significant difference due to the combined effect of one's gender, race and membership with ASABA. However, its adjusted R^2 value was low suggesting that not much reliance could be placed on this model. Based on the credibility of the samples used, the results of the effect of gender from analysis done on the questionnaire data are used.

The theory on stereotype threat suggests that women and black actuaries are at risk of not identifying with the profession as much as other actuaries and this may result in their commitment levels being lower than those of other actuaries. The results of the study could not support that.

6.1.3 Racial effects on commitment

Existing literature in this field does not focus on race. As a consequence, there is no direct study to compare the results to using race. When looking at the effect of race in the South African actuarial profession, it is worth noting that most black actuaries are male and aged less than 40. As such, some gender and age effects will also be observed. One such observation is that there is no significant difference in commitment levels based on race.

Black actuaries were significantly more involved in the profession over the shorter-term (past three months) than white actuaries. This suggests that black actuaries are more likely to mentor other actuarial professionals, encourage people to join the profession and actively contribute towards the transformation of the actuarial profession compared to white actuaries. These activities are usually associated with transformation initiatives and it is expected that more black actuaries would get involved in them compared to white actuaries.

The average level of professional turnover intentions and organisational turnover intentions, for either race group, is lower than 3 for each domain – the level at which the respondent is indifferent on whether he/she intends to leave the domain or not. There is a significant difference in employer turnover intentions. White actuaries show a stronger intention to remain at their current employer compared to black actuaries. According to Krishnan & Mary (2012), people who perceive a high organisational support from their employer are likely to reciprocate this with a desire to remain at the employer. Based on this, the organisational turnover intentions result suggests that on average white actuaries are more satisfied than black actuaries with the following components of perceived organisational support: pay level, professional development opportunities, work-family support, leader-member exchange, organisational rewards and job conditions, organisational size and procedural justice. The notion of black actuaries tending to job hop is supported by the results of this study and is possibly explained by the lack of perceived organisational support that black actuaries experience at their employer. It is important to note that an intention to leave a domain does not necessarily mean that the individual will certainly leave the domain.

6.2 Hypothesis tests

There are eight hypotheses being tested in this study and their results are discussed below. It is important to note that in order to fully appreciate the interpretation of the results in this study, a good sense of the limits in the data collection and analysis methods contained in section 4 above will assist in this regard.

6.2.1 H1(a) – Professional commitment is not correlated with professional involvement

Several studies about professional commitment, including Meyer, Allen & Smith (1993), Lee, Carswell & Allen (2000) and Meyer & Herscovitch (2001), argue and/or assume that affective professional commitment leads to professional involvement. This study uses the two-component model of commitment by Meyer, Allen & Smith (1993) and did not attempt to ascertain whether affective professional commitment led to professional involvement or vice versa i.e. the direction of this relationship. The focus of this hypothesis is to test whether a relationship exists between professional commitment and professional involvement. Among actuaries, affective professional commitment has a significant positive correlation with overall professional involvement over the short-term (past three months) and its components, i.e. compliance level of professional involvement during the past three months and general citizenship level of professional involvement during the past three months. The null hypothesis is **rejected** for these relationships. This result was expected based on literature.

For the professional involvement over the past year, only the relationship between the compliance level of professional involvement and overall commitment to the profession was significant. What was not expected in the results was that actuaries' professional involvement over the past year and its components, other than the compliance level of professional involvement, were not correlated with professional commitment or any of its components. As such, there is a failure to reject the null hypothesis. This contradicts the results of a study of accountants conducted by Gendron, Suddaby & Qu (2009) and a study by Meyer & Herscovitch (2001) that found a significant positive relationship existed between overall professional commitment and professional involvement. The responses on professional involvement over the past year were binary while a five-point Likert-type scale was used to record responses on professional involvement over the short-term. This may have affected the results of the study.

The regression model for professional involvement during the past three months supports a significant positive correlation with affective professional commitment. The adjusted R^2 value of the regression model for professional involvement during the past three months of 0.7619 is very high, further supporting the validity of this relationship.

6.2.2 H1(b) – Commitment to professional associations is not correlated with professional involvement

Most professional associations depend on volunteers in order to operate optimally. This creates opportunities for professionals to get involved in their profession through the professional associations. When referring to the profession, nine out of ten interview participants used the words profession and professional association interchangeably. This created the expectation that in some instances the profession and professional associations were seen as one. This hypothesis was a good opportunity to test whether this was such an instance. If so, then the results of H1(a) and H1(b) would be similar. The results were similar for the relationship of affective commitment to professional associations with professional involvement over the short-term and its components. However, the hypothesis was **rejected** for the correlation of affective commitment to the professional association with overall professional involvement over the past year, making it different to the results of H1(a) between affective commitment to the profession with overall professional involvement over the past three months. The hypothesis was also rejected for the correlation of affective commitment to the professional association with organisational championing level of professional involvement over the past year. The positive correlation between organisational championing level of professional involvement over the past year and affective commitment to professional associations is good news for the Society because its committees are almost exclusively run by volunteers who possess expert skills in their fields. It would be difficult for the Society to replace the volunteers with paid

staff members. So, these results assist the Society on how to manage its current and future supply of volunteers to meet its organisational championing needs. Using the profession and professional association interchangeably, these results support those from Gendron, Suddaby & Qu (2009) who found that professional committee volunteers had a higher professional commitment compared to non-volunteers.

6.2.3 H2 – Professional or professional association commitment is not correlated with professional or professional association turnover intention

The combined discussion of H2(a) and H2(b) is included here. The highest levels of human performance referred to in Ericsson & Lehmann (1996) suggest that professional associations and employers need to retain their members and staff so that they can benefit from the expertise that the actuaries would acquire over time in their associations and/or employing organisations. This study shows that affective commitment to the profession **is negatively correlated** with professional and professional association turnover intentions. The same result is true for affective commitment to the professional association. These results are expected because actuaries who feel an emotional attachment to their profession or professional association tend to want to remain in the profession and professional association. When looking at continuance professional commitment, no correlation could be proved between it and professional association turnover intentions. However, continuance professional commitment is negatively correlated with professional turnover intentions. The relationship between continuance commitment to the profession and professional turnover intentions was expected since there is generally a high cost to leaving the actuarial profession for actuaries so most of them would experience some continuance commitment to the profession regardless of whether or not they intend to leave

their profession. This result supports those by Dhawan & Mulla (2011) who found that employers had a role to play in increasing the professional commitment of their employees and would benefit from an increased affective commitment to the employer by the employee and a reduction in the employee's intention to leave the employer and profession. This study expands the results by Dhawan & Mulla (2011) to include that employers' role in increasing professional commitment of their employees would also benefit the professional association by reducing the employee's intention to leave their professional association.

6.2.4 H3 – Professional involvement is not correlated with professional or professional association turnover intention

The two outcomes of professional commitment that are examined in this study were tested for whether they were distinct constructs or correlated with each other. The results of the two-sided t-test confirmed that professional involvement and professional (association) turnover intention are distinct outcomes, and hence the null hypothesis is not rejected. However, the multiple linear regression model for professional turnover intention indicates that professional turnover intention has professional involvement over the past year as one of its explanatory variables. This result is unexpected and suggests that the more involved an actuary is with their profession the higher their intention to leave the profession becomes. It is possible that their professional involvement over the past year is a proxy for another variable that was not included in the regression analysis and could explain an actuary's professional turnover intention much better than the professional involvement over the past year variable does. Although the professional turnover intention is generally low in the actuarial profession, this result is a concern and warrants further investigation due to its implications if true.

The regression model of professional involvement over the short-term has organisational turnover intention as one of its explanatory variables. This suggests

that actuaries may opt to get involved in the profession over the short-term while they intend to leave their employer. This supports the findings by Meyer, Allen & Topolnytsky (1998) that during stressful times professionals tend to redirect their energies towards their profession. Making a decision to leave an employer and taking steps to do so can be a stressful time. Actuaries may find it helpful to get involved in the profession during this time in order to manage this stressful event and shift in commitment. This is good insight for the Society.

6.2.5 H4(a) – Professional-organisational conflict is not correlated with professional involvement

There is **insufficient evidence to reject** the null hypothesis. This suggests that the decision for actuaries to get involved in their profession is not significantly affected by whether they perceive professional-organisational conflict in their professional lives or not. According to Lui, Ngo & Tsang (2001) and Johnson, Morgeson, Ilgen, Meyer & Lloyd (2006), professionals are likely to identify more strongly with their profession when they experience professional-organisational conflict. As such, one would have expected the null hypothesis to be rejected and professional-organisational conflict to be positively correlated with professional involvement. This suggests that among actuaries who experience professional-organisational conflict, their tendency to get involved in the profession depends more on their affective commitment to the profession or professional association than whether they experience conflict or not.

6.2.6 H4(b) – Professional-organisational conflict is not correlated with professional or professional association turnover intention

This hypothesis is **rejected** in its entirety. Professional-organisational conflict has a significant positive correlation with a professional's intention to leave their

profession, professional association and employing organisation. These findings are consistent with those from the study by Lui, Ngo & Tsang (2001). It is good that the profession, professional association and employer are all at risk of losing an actuary when he/she experiences professional-organisational conflict as this may assist in aligning the interests of these entities in managing the conflict. However, the existence of conflict often means that it may be beneficial in the short-term to one of the entities if the actuary left the entity and hence the conflict is removed. However, when professional-organisational conflict, often ethical, is not dealt with adequately it tends to recur and retaining the actuaries that perceive the conflict is likely to yield better outcomes more often if they are involved in creating a solution to reduce or eliminate the conflict. The study by Meixner & Bline (1989) highlights that if the professional has a higher commitment to their employer than to their profession then they may not maintain their professional ethics and norms when they experience professional-organisational conflict. This is likely to put the actuary at risk of being removed from their professional association.

It is important for the profession, professional association and employing organisations to ensure that the perceived and actual professional-organisational conflict is kept to an absolute minimum in order to ensure retention of professionals within the profession, professional associations and employing organisation. It is difficult to deduce whether professionals who intend to leave ever do because this study was anonymous in order to encourage more honest responses.

6.2.7 H5 – Professional-organisational conflict is similar at traditional and non-traditional actuarial organisations

Participants in the focus groups experienced higher professional-organisational conflict when working at a non-insurer due to the profession not being as highly

appreciated and entrenched in non-traditional actuarial employing organisations compared to at an insurance company. However, this study failed to reject the null hypothesis. As stated before, the lack of in the sample size of the focus groups does not allow for inference to be made based on the discussions from the groups. A significant positive correlation was found between professional-organisational conflict and employer type, with actuaries working in non-traditional actuarial organisations indicating a higher perceived professional-organisational conflict. However, the adjusted R^2 value of the professional-organisational conflict regression model with type of employer as an explanatory variable was too low to reject the null hypothesis. Exploring responses from those who agreed or strongly agreed with statements that indicated perceived professional-organisational conflict reveals that 16 out of 147 actuaries indicated that the expectations of their work behaviour and attitudes from their employers were incompatible with those from their profession and 7 out of 147 actuaries indicated that the way they did their work seemed to be more accepted by their employer than by their profession. This is a concern because the majority of these respondents were employed by an insurance company and, as a traditional employer of actuaries, the work ethics and norms at an insurer should be more aligned with those of the profession. Overall, the average professional-organisational conflict level for actuaries who responded to the survey in this study was low.

6.3 The profession versus the professional association

As stated before, the majority of the interview participants considered the profession and professional association to be the same thing. This proved to be the reality even during focus group discussions. The focus groups expressed surprise that the average affective commitment to ASSA was closer to a “3” than a “4” because they expected to see actuaries committing to ASSA and the profession in a similar way. The discussion in 6.2.2 explored the view of the profession and professional association being considered as the same thing among actuaries.

Such a relationship could not be established using data collected from the questionnaire used in this study.

Clarity was needed, by the focus groups, on what the definition of leaving the profession was. This definition was not given in the questionnaire and this would need to be considered when a similar study is done in the future. A suggestion was given of "doing work that is totally unrelated to the profession, for example, an actuary working in a family factory but remaining a member of ASSA." Another definition given was "to cease membership of an actuarial association". The focus group participants felt that the reported intentions to leave ASSA and the profession were too high (both were just below "2", – disagreeing with statements of their intention to leave) as they expected most actuaries to disagree strongly with statements of their intention to leave. One actuary suggested that he would have expected one in 20 actuaries to intend to leave and not one in five, as suggested by the average intention to leave score which is just below 2. By counting the number of actuaries who "agreed" or "strongly agreed" with statements regarding their intention to leave either their profession or their professional association, however, it becomes apparent that one in 13 and one in 16 intend to leave their profession and professional association respectively. This is still higher than the expectation of the actuary in the focus group. The actuaries who intend to leave are mostly considering careers in other professions or membership of other professional associations. This is a concern because people who intend to leave are mostly planning to move to alternative professions and not to retire. The focus group participants stressed the importance of maintaining their membership of ASSA even if they no longer did work that related to their actuarial qualification. They saw it as a way to "leave the door open" for when they wanted to come back. This echoes the sentiments in the preliminary research interview discussions. This also explains why, although there is a higher affective

professional commitment compare to the affective commitment to ASSA, the intention to leave ASSA is lower than the intention to leave the profession.

7 Conclusion

In order to understand the professional commitment of an individual, it is important to understand their commitment to other domains that are competing for their attention.

7.1 The nature of actuaries' commitment to the profession

A two-component model of commitment explains the nature of the professional commitment of actuaries as affective and continuance commitments. The professional commitment levels of actuaries do not differ by age, gender or race. However, the employer turnover intention of black actuaries is higher than that of white actuaries and challenges the level of organisational support given to black actuaries. Professional involvement and professional turnover intention are outcomes of professional commitment and form the basis of the hypotheses tested in this study.

7.2 Hypotheses tests

Below is a table that concludes on the results of each hypothesis tested in this study:

Table 22: Conclusion on the hypotheses tested

Hypothesis	Conclusion
H1(a)	**Reject H1(a) in the short-term for affective commitment to the profession**. The professional involvement during the past three months and its components are positively correlated with affective professional commitment.
H1(b)	Professional involvement is generally positively correlated with affective commitment to ASSA, **invalidating** H1(b).
H2	The null hypothesis is **rejected for affective and overall professional and professional association commitment**. The affective commitment to the profession is negatively correlated with professional and professional association turnover intentions. Similarly, the affective commitment to the profession association is negatively correlated with professional and professional association turnover intentions.
H3	There is insufficient evidence to reject this hypothesis. Professional involvement is not correlated with professional or professional association turnover intention.
H4(a)	There is no statistically significant correlation between professional-organisational conflict and professional involvement. Therefore, the hypothesis holds – professional-organisational conflict is not correlated with professional involvement.
H4(b)	This hypothesis is **rejected**. There exists a significant positive correlation between professional-organisational conflict and an actuary's intentions to leave the profession or professional association.
H5	There is insufficient evidence to reject this hypothesis. Actuaries who work in traditional actuarial organisations experience similar professional-organisational conflict as those who work in non-traditional actuarial organisations.

The above hypotheses conclude on the outcomes of professional commitment. Professional involvement and professional turnover intention are related to professional commitment.

8 Recommendations

This study emphasizes the importance of using different entities to which an actuary can be committed in order to understand his/her professional commitment. An extension of this study could incorporate actuaries' commitment to their families, friends and other entities in order to shed more light in understanding the commitment of actuaries to their profession, and this is recommended.

The professional commitment models assume that affective professional commitment leads to professional involvement. It is recommended that the directionality of this relationship be studied. An unexpected regression model result implied that the more involved an actuary is with their profession the higher their intention to leave the profession. This relationship needs to be studied further and its implication understood because it contradicts the results of H3.

A further study on similar research subjects should be conducted to verify these results with a larger sample where possible. Using a Likert-type scale to evaluate the level of professional involvement over the past year instead of using binary responses would help to make the comparison between professional involvement over the past year with involvement during the past three months easier and more consistent with other scales used in the study, which had Likert-type scale responses. This refinement should be done as part of a future study. A similar study should be conducted on actuaries in other geographical territories to test for any regional differences and for any changes in the commitment levels after a major change in the profession as discussed in 6.1 above.

The validity of assuming that the nature of the commitment to professional associations does not include continuance commitment to professional associations (ASSA and/or ASABA) needs to be tested in future research.

In this study, multiple linear regression was used to establish relationships between dependant and independent variables. The use of multiple linear regression introduced assumptions with were outlined in 4.4.2 above. It is

recommended that the impact of how deviation from the assumptions underlying the multiple linear regression model will affect the results of this study be performed as future research.

Younger male actuaries seem to be less involved in their profession compared to other groups of actuaries. Further research is required to understand the extent of this and what this could mean for the profession, professional associations, employing organisations and the country. It is recommended that the actuarial professional association (ASSA) consider ways to get younger actuaries to actively participate in creating a new body of knowledge within the profession that will ensure that the profession is relevant within the diverse South African society it serves. It is also recommended that professional associations make more meaningful short-term volunteer roles available in order to effectively utilise actuaries who might be more committed to their professional association in the short-term while intending to leave their employers in the near future.

An investigation by the professional association to understand what would cause the ethics and norms of a traditional employer of actuaries to divert from those of the profession is recommended.

It is also recommended that the professional association and employing organisation consider ways to manage potential conflict before the conflict affects the actuary so much that he/she decides to leave their employer, profession or professional association. It is also recommended that employers and the professional association consider how they could actively work together to increase the professional commitment levels of their actuaries. An increase in the professional commitment level is linked with:

- increased professional involvement;
- reduced professional association turnover intention; and
- reduced employer turnover intention.

This is an alternative way which employers could use to retain their professional staff.

Finally, it is recommended that employing organisations evaluate the level of organisational support they give to actuaries of different demographics, with the aim of managing staff turnover.

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10 Appendices

10.1 Consent form: Interview

Understanding the Commitment of South African Actuaries to their Profession

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School of Management Studies, Actuarial Science Section

University of Cape Town

I am a masters student in the School of Management Studies, Actuarial Science Section. As part of my thesis, I am conducting research under the supervision of Ms Shivani Ramjee. I am inviting you to participate in my study. The purpose of the study is to examine the commitment levels of South African actuaries to their profession and whether life roles affect one's level of commitment to the actuarial profession.

All information obtained in this study will be kept strictly confidential and anonymous unless permission is given by the interviewee to the interviewer for a specific context.

The results of this study will be presented collectively and no individual participants will be identified without their permissions.

Participant's consent

Acknowledgement of Study, Consent, and Agreement to be Recorded:

I have been informed of and understand the purpose of this interview.

I understand that I am free to withdraw my consent and discontinue my participation in this interview or study at any time. I understand that I can choose to answer only the questions that I wish to answer.

I understand that the interview will be audio taped.

I agree / wish not (circle one) to be audio taped.

Permission to Quote:

The researcher may wish to quote your words directly in reports and publications resulting from this. With regards to being quoted, please check yes or no for each of the following statements:

☐ Yes ☐ No	I wish to review the notes / recordings collected during my interview.
I agree that researchers may publish documents that contain quotations by me under the following conditions (checking YES to any of the below means that you grant copyright permission to the researcher for the purpose of publication):	
☐ Yes ☐ No	I agree to be quoted directly (my name is used).
☐ Yes ☐ No	I agree to be quoted directly if my name is not published (I remain anonymous).
☐ Yes ☐ No	I agree to be quoted directly if a made-up name (pseudonym) is used.

By signing this consent form, you are indicating that you fully understand the above information and agree to participate in this study.

Participant's signature _____

Date: _____

Researcher's signature: _____

Date: _____

If you have any questions about this study, please contact:

Kgodiso Mokonyane
kgodisom@yahoo.co.uk

Shivani Ramjee
0216502478
shivani.ramjee@uct.ac.za

10.2 Understanding the commitment of South African actuaries to their profession: interview guide

Dear Participant

Thank you for agreeing to be interviewed about your commitment to the actuarial profession. This interview will be recorded. Please note that you can opt out of this interview at any moment. The interview is designed to be open-ended so that you may give as much information as you deem is necessary. Do I have your consent to commence with the interview? (If "yes" then the questions below will be asked. If "no" then the interview ends.)

1. Why did you choose to join the actuarial profession?
2. Would you say that you are committed to the profession? Why?
3. Everyone has many roles that they play in their lives. Such roles include occupational, marital, parental and homecare roles, among others. What are your most important life roles and how do they affect your commitment to the actuarial profession?
4. Do you think that your gender and race affect your commitment?
5. What do you think the commitment level of people in the actuarial profession is like?
6. The profession is trying to diversify its membership by attracting people from under-represented groups. Is the profession likely to retain its members, especially those from such under-represented groups?

Thank you once again for allowing me to interview you.

10.3 Understanding the Commitment of South African Actuaries to their Profession: Questionnaire

I am an Actuarial Science masters student at the University of Cape Town investigating the multiple commitments of South African actuaries.

I am inviting you, as a Fellow member of the Actuarial Society of South Africa, to participate in this study by completing a questionnaire. The aggregate results of this investigation will be presented to the Actuarial Society of South Africa.

You can access the questionnaire here
https://ucpcommerce.eu.qualtrics.com/SE/?SID=SV_0v2Qr4j5JOTuQm1.

If you have any questions, please contact me or my supervisor on:

Kgodiso Mokonyane
kgodisom@yahoo.co.uk
021 650 2475
Masters student

Shivani Ramjee
shivani.ramjee@uct.ac.za
Research supervisor

This research has been approved by the Commerce Faculty Ethics in Research Committee at the University of Cape Town.

As part of the study, you will be required to provide some form of identifiable information about yourself. However, all information obtained in this study will be kept strictly confidential and used for the purposes of this research only.

Please note that your participation in this research is completely voluntary. You may choose to withdraw from the research at any time, if you wish to do so. By completing the questionnaire you acknowledge that you are a Fellow Member of the Actuarial Society of South Africa and consent to participate in this study.

The questionnaire closes on 14 January 2014.

1. **Are you a Fellow member of the Actuarial Society of South Africa?**

Yes..... No.....

2. **Indicate your current membership in the following actuarial associations**
   - Actuarial Society of South Africa.....
   - Association of South African Black Actuarial Professionals.....
   - Institute and Faculty of Actuaries.....
   - Other international actuarial body.....

3. **Indicate your response to each statement with a "yes" or "no"**

	Over the past year	**Yes**	**No**
3.1	I complied with the minimum requirements for CPD.		
3.2	I attended activities organised by the actuarial association(s) beyond those required for CPD.		
3.3	I was a member of an actuarial professional committee.		
3.4	I was a leader in an actuarial professional committee.		
3.5	I attended the annual general meeting of my actuarial professional body.		
3.6	I attended the Actuarial Convention.		
3.7	I contributed towards a paper that was presented at the Actuarial Convention.		
3.8	I read the South African Actuarial Journal		
3.9	I contributed towards a paper for the South African Actuarial Journal.		

4. Indicate how frequently you performed the following activities

	Over the past three months	Very Frequently	Frequently	Occasionally	Rarely	Never
4.1	I attended actuarial sessional meetings.					
4.2	I read actuarial journals.					
4.3	I read professional newsletters					
4.4	I read professional magazines.					
4.5	I provided mentorship to other actuarial professionals.					
4.6	I transferred my knowledge and skills to other actuarial professionals beyond that required by my job.					
4.7	I actively created awareness about the actuarial profession.					
4.8	I encouraged people to join the actuarial profession.					
4.9	I volunteered my time within an actuarial association.					
4.10	I volunteered my time, as part of my professional involvement, outside an actuarial association.					
4.11	I actively contributed towards the transformation of the actuarial					

	profession.					
4.12	I worried about the legacy of the actuarial profession.					

5. In the next year, I plan for my professional involvement to

Increase..... Remain the same..... Reduce.....

6. Indicate your level of agreement or disagreement with each of the following statements

	Commitment	**Strongly disagree**	**Disagree**	**Neither disagree nor agree**	**Agree**	**Strongly agree**
6.1	**To the actuarial profession**					
a	Being an actuary is important to my self-image.					
b	There are pressures to keep me from changing professions.					
c	Changing professions now would be difficult for me to do.					
d	I like being an actuary.					
e	Too much of my life would be disrupted if I were to change my profession.					

f	I am enthusiastic about being an actuary.					
g	I have put too much into the actuarial profession to consider changing now.					
h	I am proud to be in the actuarial profession.					
i	I am glad that I entered the actuarial profession.					
j	It would be costly for me to change my profession now.					
k	I identify with the actuarial profession.					
l	Changing professions now would require considerable personal sacrifice.					
6.2	**To employer's organisation**					
a	I would be very happy to spend the rest of my career with this organisation.					
b	If I had not already put so much of myself into this organisation, I might consider working elsewhere.					
c	It would be very hard for me to leave my organisation right now, even if I wanted to.					
d	I feel "emotionally attached" to this organisation.					
e	Too much of my life would be disrupted if I decided I wanted to leave my					

	organisation now.					
f	This organisation has a great deal of personal meaning to me.					
g	Right now, staying with my organisation is a matter of necessity as much as desire.					
h	I feel a strong sense of "belonging" to my organisation.					
i	I really feel as if this organisation's problems are my own.					
j	I feel that I have too few options to consider leaving this organisation.					
k	I feel like "part of the family" at my organisation.					
l	One of the few negative consequences of leaving this organisation would be the scarcity of available alternatives.					
6.3	**To South Africa**					
a	I would be very happy to spend the rest of my career in South Africa.					
b	If I had not already put so much of myself into this country, I might consider working elsewhere.					
c	It would be very hard for me to leave South Africa right now, even if I wanted					

	to.					
d	I feel “emotionally attached” to this country.					
e	Too much of my life would be disrupted if I decided I wanted to leave South Africa now.					
f	This country has a great deal of personal meaning to me.					
g	Right now, staying in South Africa is a matter of necessity as much as desire.					
h	I feel a strong sense of “belonging” to South Africa.					
i	I really feel as if South Africa’s problems are my own.					
j	I feel that I have too few options to consider leaving this country.					
k	I feel like “part of the family” of South Africa.					
l	One of the few negative consequences of leaving this country would be the scarcity of available alternatives.					
6.4	**To the Actuarial Society (ASSA)**					
a	I would be very happy to spend the rest of my career as a member of the Actuarial Society.					

b	I feel “emotionally attached” to the Actuarial Society.					
c	The Actuarial Society has a great deal of personal meaning to me.					
d	I feel a strong sense of “belonging” to the Actuarial Society.					
e	I really feel as if the Actuarial Society’s problems are my own.					
f	I feel like “part of the family” of the Actuarial Society.					
6.5	**To ASABA**					
a	I would be very happy to spend the rest of my career as a member of ASABA.					
b	I feel “emotionally attached” to ASABA.					
c	ASABA has a great deal of personal meaning to me.					
d	I feel a strong sense of “belonging” to ASABA.					
e	I really feel as if ASABA’s problems are my own.					
f	I feel like “part of the family” of the ASABA.					
6.6	**Conflict between your profession and employer**					

a	The expectations of my work behaviour and attitudes from my employer are incompatible with those from my profession.					
b	It is easy to be “a good employee” of my employer and “an ideal actuary” at the same time.					
c	The work procedures and practices of my employer sometimes deviate from the standard practices of the profession.					
d	The way I do my work seems to be more accepted by my employer than by my profession.					

7. Indicate your level of agreement or disagreement with each of the following statements

	Intention to leave	**Strongly disagree**	**Disagree**	**Neither disagree nor agree**	**Agree**	**Strongly agree**
7.1	**The actuarial profession**					
a	I often think about leaving the actuarial profession.					
b	I am likely to explore other career opportunities outside the actuarial profession.					
c	I am likely to leave the actuarial profession within the next year.					

7.2	**My employer**					
a	I often think about leaving my employing organisation.					
b	I am likely to explore other career opportunities outside my employing organisation.					
c	I am likely to leave my employing organisation within the next year.					
7.3	**South Africa**					
a	I often think about leaving South Africa.					
b	I am likely to explore work opportunities outside South Africa.					
c	I am likely to leave South Africa within the next year.					
7.4	**ASSA**					
a	I often think about leaving ASSA.					
b	I am likely to explore other actuarial professional membership opportunities outside ASSA.					

c	I am likely to end my ASSA membership within the next year.					
7.5	**ASABA**					
a	I often think about leaving ASABA.					
b	I am likely to explore other actuarial professional membership opportunities outside ASABA.					
c	I am likely to leave ASABA within the next year.					

8. Indicate your level of agreement or disagreement with each of the following statements

		Strongly disagree	**Disagree**	**Neither disagree nor agree**	**Agree**	**Strongly agree**
8.1	**If I won R50 million I would:**					
a	Continue to practice as an actuary.					
b	Leave the actuarial profession.					
c	Stop working.					

d	Do work with greater social impact.					
e	Move away from South Africa.					
8.2	**It is important to me that my actuarial Fellowship qualification is internationally recognised.**					

9. Indicate your response to each question in the space provided

9.1 Age in years: .....

9.2 Sex: Male..... Female.....

9.3 Race: Black..... Coloured..... Indian.....
Oriental..... White..... Other..... Prefer not to answer.....

9.4 Are you married to- or in a long-term relationship with an actuary?
Yes..... No.....

9.5 What is the average number of hours you spent at work in a typical week over the past 3 months? .....

9.6 What proportion of your working time was spent on technical work in a typical week over the past 3 months? .....

9.7 Number of years of work experience: .....

9.8 Number of years with current employer: .....

9.9 Type of employer: Insurer..... Reinsurer..... Consultancy.....
Bank..... Government..... Other....., please specify.....

9.10 Practice area: Health care..... Life insurance..... General insurance.....
Pensions..... Finance and investments..... Enterprise risk management..... Other....., please specify.....

9.11 Please select the category (from A to E) in which the core function of your work lies (similar to ASSA's CPD categories):

Category A = work that is required by statute of a country.....

Category B = work, other than that included above, that requires a formal report or professional opinion to a specific third party (other than your employer) and where the actuarial qualification is of material relevance to the subject matter.....

Category C = work related to the actuarial specialist syllabi, other than that included above.....

Category D = general employment. This category is required to cover those actuaries who are involved in wider fields or non-traditional actuarial roles and those who perform non-actuarial specific roles such as management.....

Category E = not working.....

9.12 Any comments?

.....
.....
.....
.....

End of questionnaire.

Thank you for your participation.

10.4 Understanding the Commitment of South African Actuaries to Their Profession: Results to Discuss With Focus Group

1. The regression model for **affective commitment to the profession** is:

ACP = 4.2364

2. The regression model for **continuance commitment to the profession** is:

CCP = 3.707 – 0.8351*Gender – 1.2579*Race1 + 1.4351*ASABAM

Adjusted R^2 = 0.3845

Predictor	Response	Relationship as expected?
CCP	Gender	
CCP	Race1	Yes
CCP	ASABAM	Yes, similar relationship as Race1 i.e. ASABA members more committed. However, Race1 and ASABAM are not correlated

*No age difference.

3. The regression model for **professional-organisational conflict** is:

POC = 1.5 + 0.6875*ErTypa

Adjusted R^2 = 0.1383

Predictor	Response	Relationship as expected?
POC	ErTypa	

4. The regression model for **professional involvement over the past year** is:

PIYa = -0.02113 + 0.18467*ACP + 0.15203*PTrn + 0.01178*Age – 0.18673*PrAreB

Adjusted R^2 = 0.7619

Predictor	Response	Relationship as expected?
PIY	ACP	Yes
PIY	PTrn	No
PIY	Age	Yes
PIY	PrAreB	

*No gender difference.

5. The regression model for **organisational turnover**:

OTrn = 9.14471 – 1.00635*ACP – 0.67602*ACO -0.5207*CCO + 0.54453*POC – 0.61309*PTrn + 0.02592*WrkHrs + 1.06555*PrAreB

Adjusted R^2 = 0.7023

Predictor	Response	Relationship as expected?
OTrn	ACP	Yes
OTrn	ACO	
OTrn	CCO	
OTrn	POC	
OTrn	PTrn	
OTrn	WrkHrs	
OTrn	PrAreB	

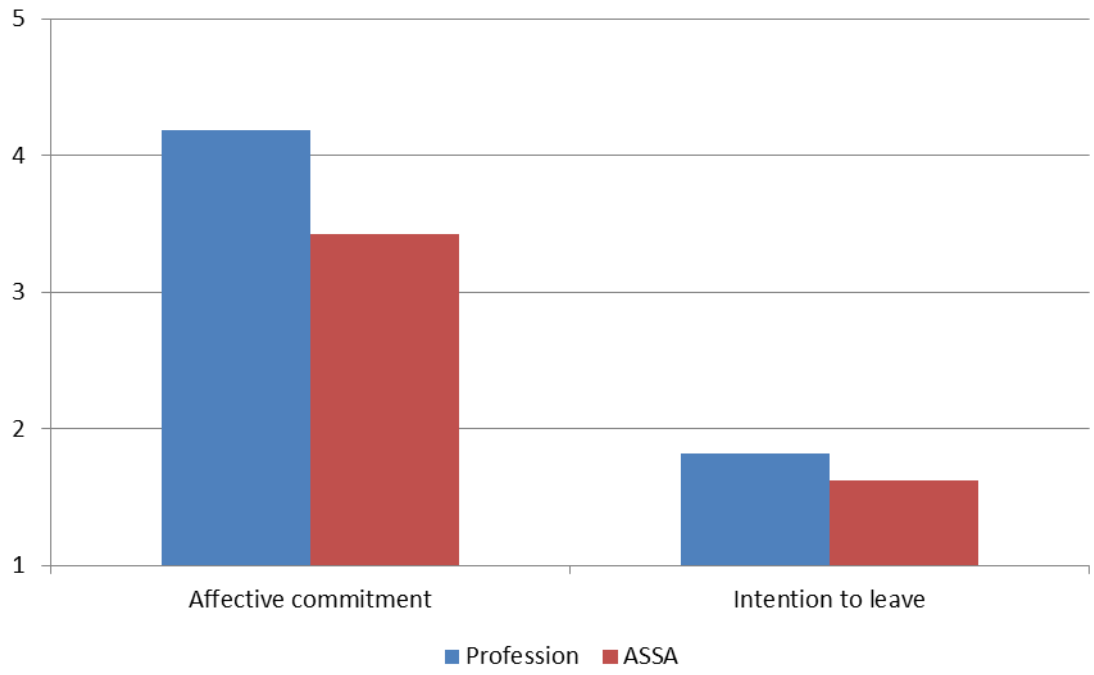
6. The regression model for **ASSA turnover** is:

SSTn = 0.97566 + 0.24897*SATn

Adjusted R^2 = 0.2577

Predictor	Response	Relationship as expected?
SSTn	SATn	

7. The **profession versus ASSA**



10.5 Consent form: Focus Group

Understanding the Commitment of South African Actuaries to their Profession

Research by Priscilla Mokonyane (Kgodiso)

School of Management Studies, Actuarial Science Section

University of Cape Town

I am an Actuarial Science masters student at the University of Cape Town investigating the multiple commitments of South African actuaries and how these affect their professional commitment. Of interest is the effect of commitment on actuaries' professional turnover intentions and professional involvement.

I am inviting you, as a Fellow member of the Actuarial Society of South Africa, to participate in this study by being part of a focus group discussion of the results of the research. The discussion will take approximately 60 minutes. The aggregate results of this investigation will be presented to the Actuarial Society of South Africa.

This research has been approved by the Commerce Faculty Ethics in Research Committee.

You will not be requested to supply any identifiable information, ensuring anonymity of your responses. All information obtained from the discussion will be kept strictly confidential and anonymous. The other participants in the group will be asked to keep what we talk about private, but this cannot be assured.

Participant's consent

Acknowledgement of Study, Consent, and Agreement to be Recorded:

I have been informed of and understand the purpose of this focus group.

I understand that my participation in the focus group discussion is voluntary and I am free to withdraw my consent and discontinue my participation in this focus group or study at any time. I understand that I can choose to answer only the questions that I wish to answer.

I understand that the focus group discussion will be audio taped.

I agree / wish not (circle one) to be audio taped.

Permission to Quote:

The researcher may wish to quote your words directly in reports and publications resulting from this. With regards to being quoted, please check yes or no for each of the following statements:

☐ Yes ☐ No	I wish to review the notes / recordings collected during the focus group discussion.
I agree that researchers may publish documents that contain quotations by me under the following conditions (checking YES to any of the below means that you grant copyright permission to the researcher for the purpose of publication):	
☐ Yes ☐ No	I agree to be quoted directly if my name is not published (I remain anonymous).
☐ Yes ☐ No	I agree to be quoted directly if a made-up name (pseudonym) is used.

Participant's Demographics:

The researcher may wish to analyze the discussion based on the participants' demographics. Please indicate your age, sex and race below:

Age in years: …

Sex:	Female…	Male…	Prefer not to answer…
Race:	Asian…	Black…	Coloured… Indian…
	White…	Other…	Prefer not to answer…

By signing this consent form, you are indicating that you fully understand the above information and agree to participate in this study.

Participant's signature _____

Date: _____

Researcher's signature: _____

Date: _____

If you have any questions about this study, please contact:

Kgodiso Mokonyane
kgodisom@yahoo.co.uk

Shivani Ranchod
0216502478
shivani.ramjee@uct.ac.za